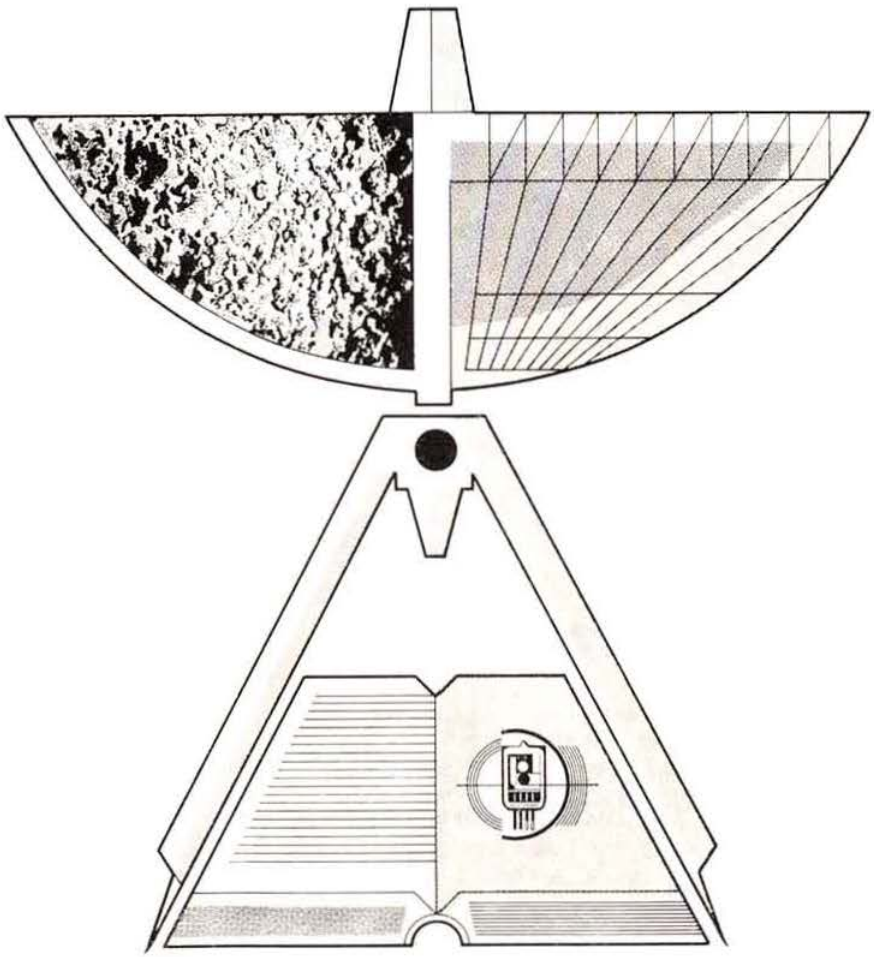
radio communication

May 1970

Journal of the Radio Society of Great Britain



world telecommunication day

17 may 1970

international telecommunication union

May 1970

radio communication

Volume 46 No 5 Price 4s

FRONT COVER

The WORLD TELECOMMUNICATION DAY is 17 May 1970 and this year the theme is "Telecommunications and Education."

The foundation of the present organization took place on 17 May 1865 when the representatives of 20 nations signed a convention founding the International Telegraph Union, which in 1932 became the International Telecommunication Union. The ITU, which has had headquarters at Geneva since 1948, is now a specialized agency of the United Nations. The basic purposes of the ITU are the regulation, co-ordination and planning of international telecommunications. These are achieved through conferences, the administrative council and the four permanent organs of the Union which are (*a*) the General Secretariat, (*b*) the International Frequency Registration Board, (*c*) the International Radio Consultative Committee (CCIR) and (*d*) the International Telegraph and Telephone Consultative Committee (CCITT).

The secretary-general of the ITU is Monsieur M. Mili (from Tunisia), and Mr R. E. Butler (from Australia) is the deputy secretary-general. There are now 137 member nations.

CONTENTS

Radio Communication **(incorporating** *The RSGB Bulletin***) is published by The Radio Society of Great Britain as its official journal and is posted to all members of the Society on the first Tuesday of each month**

Contributions and all correspondence concerning *Radio Communication* should be addressed to: The Editor, *Radio Communication*, 35 Doughty Street, London WC1N 2AE. Tel 01-837 8688.
Closing date for contributions, unless otherwise notified: 7th of month preceding month of publication.

Advertising, other than Members' Ads, should be addressed to: Mrs P. D. Harvey, Sawell & Sons Ltd, 4 Ludgate Circus, London EC4. Tel 01-353 4353

AMATEUR ELECTRONICS G3FIK

TRIO COMMUNICATIONS EQUIPMENT. By the time this appears in print we hope to have our new communications room in operation in which the whole range of TRIO products will be displayed in fully operative order. Our intention is to provide the customer with the opportunity to see each individual piece of equipment in action, so to speak, in comfortable surroundings where he may make an unhurried assessment of its capabilities. It never fails to amaze us how so many people are prepared to buy on the strength of high pressure advertising without actual knowledge of the product and even in the field of communications we encounter customers who are quite happy to walk out with a piece of equipment straight off the shelf without having seen a dial lamp illuminated. This to us is simply asking for trouble and with this in mind we have provided the staff and facilities to give the customer every protection in this respect.

The same service, of course, applies to used equipment also which may be examined at leisure and for the Audiophile we shall have second-to-none demonstration facilities. In our experience half the problem with shop demonstrations lies in the congestion which often ensues but in providing separate departments away from our serving area we hope we have overcome this.

By next month we hope to start listing our stocks of used equipment again but in the meanwhile would remind readers of the availability of the following.

TTC SWR BRIDGES C3005. A high quality unit employing separate meters indicating simultaneous forward and reverse reading **£6.10.0**

TTC SWR BRIDGES C3042. Single meter version of the above **£4.12.6**

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TRIO 9R-59DE RECEIVERS. We have just taken into stock a few of these in used but first class condition both electrically and physically Carriage paid from **£32.10.0**

TRIO JR-500SE RECEIVERS. Again a small quantity is offered in similar excellent order Carriage paid from **£57.10.0**

AR88D RECEIVERS. We have once again started stocking reconditioned sets in first class order in all respects Prices from **£47.10.0**

Full details upon application.

BC 221 FREQUENCY METERS. Several grades available all with correct calibration charts and fully tested From **£22.10.0**

Finally we should like to draw the attention of our visitors to the fact that we are located on the East side of Birmingham some three miles from the centre and it is by no means necessary to travel through the City centre in all cases. For instance, if coming from the Coventry direction or the M1 in general be sure to look out for the Stonebridge roundabout midway between Coventry and Birmingham. At this point turn off to the right and we are located some eight miles from the island on an alternative route which leads directly into the city via Castle Bromwich.

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PR1 2 metre MOS/FET Preamplifier. Gains in excess of 15dB at low noise figure. Good cross modulation characteristic. In aluminium box. Power required 12·6v. (approx) at 5mA. Socket and plug provided. Price **£4.15.0.** P. & P. 4/6

CN1 2 metre converter. Nuvistor cascode design. Bandwidth better than 4dB. over band. Measured NF less than 3dB. Complete with 38·666MHz crystal for 28-30 MHz. Price **£8.10.0.** P. & P. 4/9

CN2 CN1 with power supply in attractive case. Mains lead, pilot lamp, on/off switch, etc. Price **£13.17.0.** P. & P. 6/6

CN3 4 metre converter similar to CN1. Complete with 42MHz crystal for 28-30MHz. output. Price **£8.10.0.** P. & P. 4/6

CN4 4 metre version of CN2. Price **£13.17.0.** P. & P. 6/6

PS1 Mains Power supply suitable for CN1 and CN3. 150v at 15mA and 6·3v at 1A. Price **£3.** P. & P. 4/6

TU2 Antenna tuning unit for the Rx. 1·5-30MHz with pi-network, system switch, etc. Completely encased. Price **£4.10.0.** P. & P. 4/6

GV1 All band vertical 1·8-28MHz. Price **£4.12.0.** P. & P. 7/6

GD1 Multi band dipole, 5RV type. 102ft horizontal (18g Polyanite). 110ft. feeder. Fibre glass encapsulations. Price **£4.** P. & P. 4/6

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HC18/U 38·666MHz (o/t). Large stocks held. Return post delivery guaranteed. **25/-**

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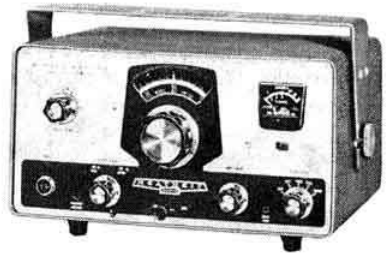

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Model 9R-59DE

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* Communications Speaker which has been designed for use with the 9R-59DE. * Dimensions: 3-9/16" (W), 7-1/8" (H), 5-3/16" (D).

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MEMBER SOCIETY INTERNATIONAL AMATEUR RADIO UNION

PATRON: HRH THE PRINCE PHILIP, DUKE OF EDINBURGH, KG

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Current Comment

£ £ £ £

From time to time all organizations need to review their administrative and financial affairs in the light of current trends. The Council of the Society is currently conducting such a review in what it believes to be the best interests of all who participate in amateur radio.

The major issue facing Council at the present time is that the Society is unable to maintain or improve its services to members at the current subscription rate. In common with many other organizations, we are faced with continually rising costs, so that expenditure is rising faster than income. From analysis of the published accounts for the last seven years we note with alarm that in *every one of those years our expenditure exceeds the income from subscriptions and investments*. The profit on the sale of the Society's publications has helped to avert an earlier crisis, but even this profit has not offset the deficit in recent years.

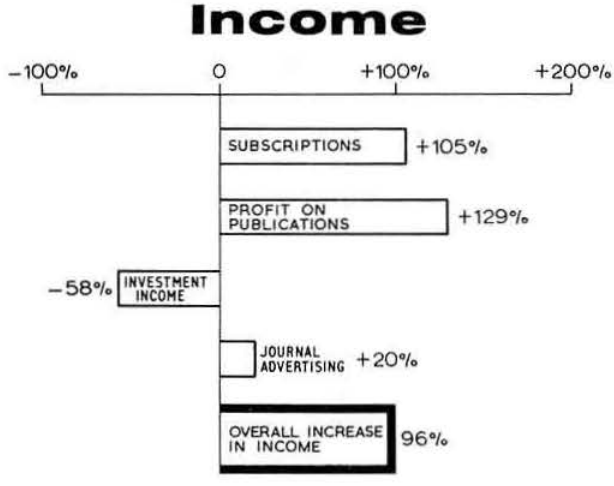
To avoid an increase in subscriptions the shortage has so far been made good by withdrawal from reserves, but these are dwindling. With a large increase in membership it might be possible to avoid—or at least to postpone—a higher subscription, but although there has been an encouraging increase in membership the gap has not been bridged. To seek economies a close scrutiny of expenditure is maintained, but only marginal savings have been possible without pruning drastically the services offered to members and the representation effected on their behalf.

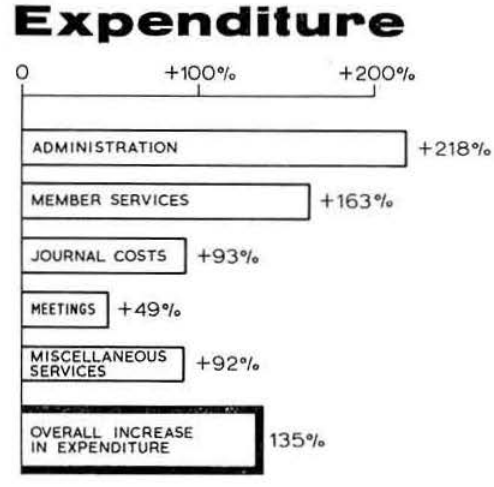
Since its formation the Society has enjoyed, and indeed has depended upon, voluntary assistance from members for services which would otherwise have to be paid for. Inevitably, with the growth of the Society, it becomes more difficult for some services to be continued in this manner, and the appointment of additional permanent staff has been necessary in recent years. In spite of this a deterioration in service became apparent, notably a delay in the maintenance of up-to-date records, and this caused inconvenience and annoyance to some members. This was only brought under control by considerable voluntary effort on the part of members able to spend evenings—even days—in headquarters. Reorganization of the office administration is proceeding, but increased costs appear unavoidable.

The chart below shows the percentage variation in figures taken from the published accounts for 1969 compared with those for 1963.

It must be borne in mind that investment income has fallen, as investments were realized to help to purchase the new headquarters building. There has been a general and continuing increase in items such as rates, heating, lighting, postage and paper, all of which are outside the Society's control.

It is the wish of Council that members should be fully aware of this grave situation. A strong Society is essential for the continuance of amateur radio, and added resources are vital to enable Council to plan for the future. Very soon it will make formal proposals for an increase in subscription rates which will be considered by a Special General Meeting, of which due notice will be given.





QTC

AMATEUR RADIO NEWS

The President of RSGB, Dr J. A. Saxton, who is International Chairman of Study Group V, recently attended the CCIR Plenary Conference held in New Delhi. During the period of the conference the Amateur Radio Society of India held a reception for the delegates. The photograph, above left, shows Dr Saxton with Lieutenant General K. Umrao Singh, VU2US (centre), and A. N. Bannjee, VU2CZ. On the right Dr Saxton is seen with (seated) Jack Herbstreit, the Director of the CCIR, and Mrs Herbstreit. On the extreme right is M. G. Karnik, VU2CK, vice-President of the ARSI.

RSGB Lecture

Radio research into propagation and radio meteorology

will be the subject of a lecture by

Dr J. A. Saxton, DSc, CEng, FIEE, FInstP,
President of the Radio Society of Great Britain

on 20 May 1970

at the Institution of Electrical Engineers, Savoy Place, London WC2.

Buffet tea 6pm Lecture 6.30pm

Members who will be attending this lecture are requested to advise Society HQ so that necessary catering arrangements can be made.

RSGB Show, 1970

The date of this year's International Radio Engineering and Communications Exhibition, better known to members as the RSGB Show, has, of necessity, had to be brought forward to August from the usual date in early October.

It will take place from **19 to 22 August** at the same venue as last year: The Royal Horticultural Society's New Hall, Greycoat Street, Westminster, London SW1.

More details will be given in future issues of *Radio Communication*.

Agreed . . .

During question time in the House of Commons recently it was suggested that in view of the use of radio by police and ambulance services, taxi companies and amateur radio transmitters, the Minister of P & T should take action to lay down standards for adequate screening of all tv receivers sold or rented in the UK.

This proposal was rejected by the Minister who said that the number of occasions when interference was received from the systems referred to was extremely small in relation to the millions of tv sets in use. The problem, when it arose, was much better dealt with according to the circumstances of each case *and the remedy was often aerial, rather than set, modification.*

IRTS QSL Bureau

The new address is PO Box 462, 12 Stella Avenue, Dublin 9, Republic of Ireland. The former bureau address at Wicklow Street will be kept open for at least three years to take care of late comers.

IARC Convention

The annual convention of the International Amateur Radio Club will take place at Geneva over the weekend 16 to 18 October 1970. No details of the programme are yet available. The address of the IARC is PO Box 6, 1211 Geneva 20, Switzerland.

Vhf operating aids

In addition to the wall mounting **QRA Locator map of W. Europe** (9s post paid) and the **Locator desk map** printed on card (1s 7d post paid), there are now available the revised **band plan maps** for the 2m and 70cm bands, printed on card, the cost of which is 1s 7d post paid.

Talking books for the blind

If any readers of *Radio Communication*, or their friends, feel that they can spare a little time and effort to help maintain talking books for the blind and disabled they would find their efforts rewarding in this useful work.

There is a shortage of such help in most districts of the British Isles and anyone who feels able to spare the time for an occasional call on his (or her) services will find such help very much appreciated by those concerned.

Contact: The Manager, The British Talking Book Library for the Blind, Mount Pleasant, Wembley, Middlesex.

New Mullard pamphlets

The Mullard Educational Service has recently produced two new pamphlets: *Introducing Thyristors* and *Educational Projects in Electronics.*

The first contains a brief description of the construction and operation of the thyristor. An explanation of the thyristor characteristic is followed by a section on the basic power control circuit and feedback control. The pamphlet ends with a short description of the diac and the triac.

The second describes how to build a simple inexpensive fet voltmeter. The meter has eight ranges, the smallest being 0 to 250mV and the largest 0 to 500V. Because it has a high input impedance of at least 10MΩ on each range, the instrument is suitable for measuring dc levels in transistor and valve circuits.

The meter described is not a sophisticated piece of equipment and no claim is made to its accuracy; it contains no close-tolerance resistors and a fairly low cost fet transistor (type BFW61) has been used. Nevertheless, the educational prototype has been in constant use since it was built twelve months ago, and design information is given for those who wish to make a more accurate instrument.

Teachers, lecturers and others professionally concerned with science education can obtain sample copies of these pamphlets from the Mullard Educational Service, Mullard Limited, Mullard House, Torrington Place, London WC1.

Technical manuals from SGS (UK)

There are now several attractively produced manuals in A4 format available from SGS (UK) Ltd, Planar House, Walton Street, Aylesbury, Bucks. These include: *The application of linear microcircuits*, volume 1 (30s) and volume 2 (12s 6d); *Consumer Devices* (containing a planar selector and characteristics) price 21s; *Industrial Discrete Devices* (containing a planar selector and characteristics for industrial devices) price 21s, and *Integrated Circuits* (21s).

Aerial equipment

Members who are remote from sources of the many items required for aerial and earth installations will be interested in the mail order service offered by J. M. Gale, G3JMG, 14 Wessex Rd, Horndean, Portsmouth. A stamped foolscap envelope will bring a full list and wire/rope samples.

International Electrotechnical Commission

In connection with the 35th AGM of the International Electrotechnical Commission at the Washington Hilton Hotel, Washington, DC, USA, from 15 to 31 May, a special events station, WF3IEC, will be in operation at the hotel. It will be in the charge of W4ZM assisted by members of the Foundation for Amateur Radio. Ssb and cw will be used on all bands except 160. A special QSL card will be sent to all who contact WF3IEC, and cards may be sent to W3ZA.

The International Electrotechnical Commission is the oldest international standards organization in the world and develops world standards on electrical and electronic components and equipment. Approximately 1,000 overseas delegates from 41 countries are expected to attend this year's meeting.

Falkirk and district

In response to requests from several members in the Falkirk area, a meeting is being arranged for 12 June to try and reform the defunct club, or start a new one for the area. A confirmed date and venue will appear in a later issue. It would be appreciated if this advance notice could be brought to the attention of all who may be interested. Any queries to N. G. Cox, GM3MUY, RR 14, 191 Maxwell Avenue, Westerton, Bearsden, Dunbartonshire. Tel 041-BEA 6437.

Calling all AAJs

Ron Broadbent, G3AAJ, has set himself a personal dx contest. He is trying to obtain QSOs and QSL cards from at least 50 amateurs whose callsign suffix letters are the same as his own—AAJ.

To date he has five QSOs and five confirmed, and any 'AAJ wishing to enter into the spirit of the game can contact him on any band 80 to 10 or 2m ssb or cw, or by post to 94 Herongate Road, Wanstead Park, London E12 to arrange a sked.

Radio press please copy.

RNARS high-speed Morse runs

The RNARS QRQ high-speed Morse runs have started up again and take place on the first Tuesday of each month at 1900gmt on 3,520kHz. The practice run on top band has been stopped for the time being due to technical trouble.

The speeds will be from 20 to 40 w/m and copies should be sent to: The QRQ Manager, RNARS, HMS *Mercury*, Petersfield, Hants.

A direct conversion receiver for 14MHz

by C. F. DOREY, BRS16468*

THE origins of the homodyne or direct-conversion receiver date back many years, at least to the early 'twenties when alternatives to the relatively unselective "straight" and the rather complex "superhet" circuits were being actively sought. Early progress for amateur and/or broadcast reception, however, was limited by the difficulty of receiving a.m. signals except with the additional complexity of coherent or synchronous detection, though a fairly simple method of doing this, proposed by Tucker (the "synchrodyne"), resulted in some experimental circuits in the late 'forties.

Undoubtedly the present revival of interest in this form of receiver—which has been likened to a superhet with an i.f. of 0kHz or to a straight receiver with a balanced linear heterodyne detector—can be traced to a 1961 *QST* article by James White, W2WBI, [1]. He pointed out clearly the considerable attractions (as well as the disadvantage of the audio image) of this relatively simple form of receiver for the reception of ssb and cw signals, where there is no need to achieve phase coherence between the heterodyne local oscillator and the incoming signal. He also described a simple valve receiver for 7MHz capable of providing excellent ssb and cw reception.

Little more was heard of this form of reception until the description in early 1967 of a fully-transistorized 3·5MHz receiver by K. Spaargaren, PA0KSB, [2] appeared in *Electron* and subsequently reached a wider readership by being reprinted, with additional comments by P. Hawker, G3VA, in *Technical Topics* [3]. Many other comments and references have followed. Since 1968 a number of articles on semiconductor receivers of this type have appeared in *QST* [4][5][6], and the name "direct conversion" has been widely adopted to describe such receivers. However, most of the direct conversion receivers, both European and American, have used the direct conversion techniques at 3·5MHz.

The author decided to use the balanced ring diode modulator, described in [4], but to employ this technique twice in order to achieve direct conversion to audio of incoming 14MHz signals. The first of these ring modulators, using Hewlett Packard Associates type 2800 hot-carrier (Schottky) diodes, provides the balanced heterodyne detector; the second ring modulator, using ordinary silicon diodes, premixes the output of a 4·0 to 4·4MHz vfo with the output of a 10MHz crystal oscillator to synthesize a 14·0 to 14·4MHz local heterodyne oscillator.

* 41 Primrose Lane, Yeovil, Somerset.

The receiver circuitry is divided into five sub-units or blocks.

(1) A dual oscillator circuit board (vfo and 10MHz crystal oscillator).

(2) An oscillator-mixer and output amplifier.

(3) A signal-mixer and input circuitry.

(4) A low-pass filter and high-gain af amplifier

(5) An output power amplifier for loudspeaker operation.

Each of these five sub-units is built on a small printed circuit board and housed in a separate screened compartment. Blocks (1) and (2) are contained in the two halves of an *Electroniques* 4·6 by 3·6 by 1·0in diecast box, divided by a screen, and form the *oscillator module*. Blocks (3) and (4) similarly form the *signal module*. Block (5) consists of an RCA CA3020 linear integrated circuit mounted in an Eddystone $4\frac{3}{8}$ by $2\frac{3}{8}$ by $1\frac{1}{4}$in diecast box, and forms the *output module*.

Circuitry

The circuit techniques are largely drawn from circuits previously reported in *Technical Topics* [3][7][8], and full details of each of the three modules are shown in Figs 1, 2 and 3. Since the circuit operation of each of these sections can be found in the *QST* and *Radio Communication* references, only a few points of special importance will be mentioned here.

An emitter follower stage has been added after the crystal oscillator in order to match its output to the input impedance of the balanced mixer. A tuned fet/bipolar cascode amplifier filters the "sum" output of the oscillator-mixer and amplifies it; this amplifier can be fixed-tuned to the mid-band frequency of 14,200kHz.

The signal mixer carrier input is fed via an emitter-follower stage, and the signal input to this ring modulator via a fixed-tuned circuit, also 14,200kHz. Although different types of toroidal core are shown in Fig 1 for this tuned circuit and for those in the oscillator-mixer output amplifier, this was merely a matter of availability, and either type should be found suitable for either or both functions.

The inductance in the low-pass af filter preceding the high-gain af amplifier tends to be series-resonated by the coupling capacitor to the base of the first transistor. It was found that to avoid peaking up the af response at a low frequency it was necessary to use a value for this capacitor (C22) rather lower than those shown in references [4] and [7].

The capacitance values used in conjunction with the CA3020 integrated circuit are chosen to shape the overall audio response to about 300–3,000Hz.

Total consumption of the receiver from a 9V battery is 35mA.

Main layout and construction

The complete receiver is housed in a 5 by 8 by 5in Datum Dinkicase, as shown in Fig 4. Many readers will have seen the receiver on the Home-Constructors' Stand at the 1969 RSGB Show—where it gained an award of merit. The front panel assembly carries the Jackson 6/36 dial and drive, tuning capacitor (housed in a small screened box), output module, loudspeaker and on/off switch.

The rear panel assembly carries the oscillator module, signal module, battery and inter-module wiring. Connections between the front panel assembly, rear panel assembly and modules are made by B7G plugs and sockets, and by miniature coax cable for rf and af signals.

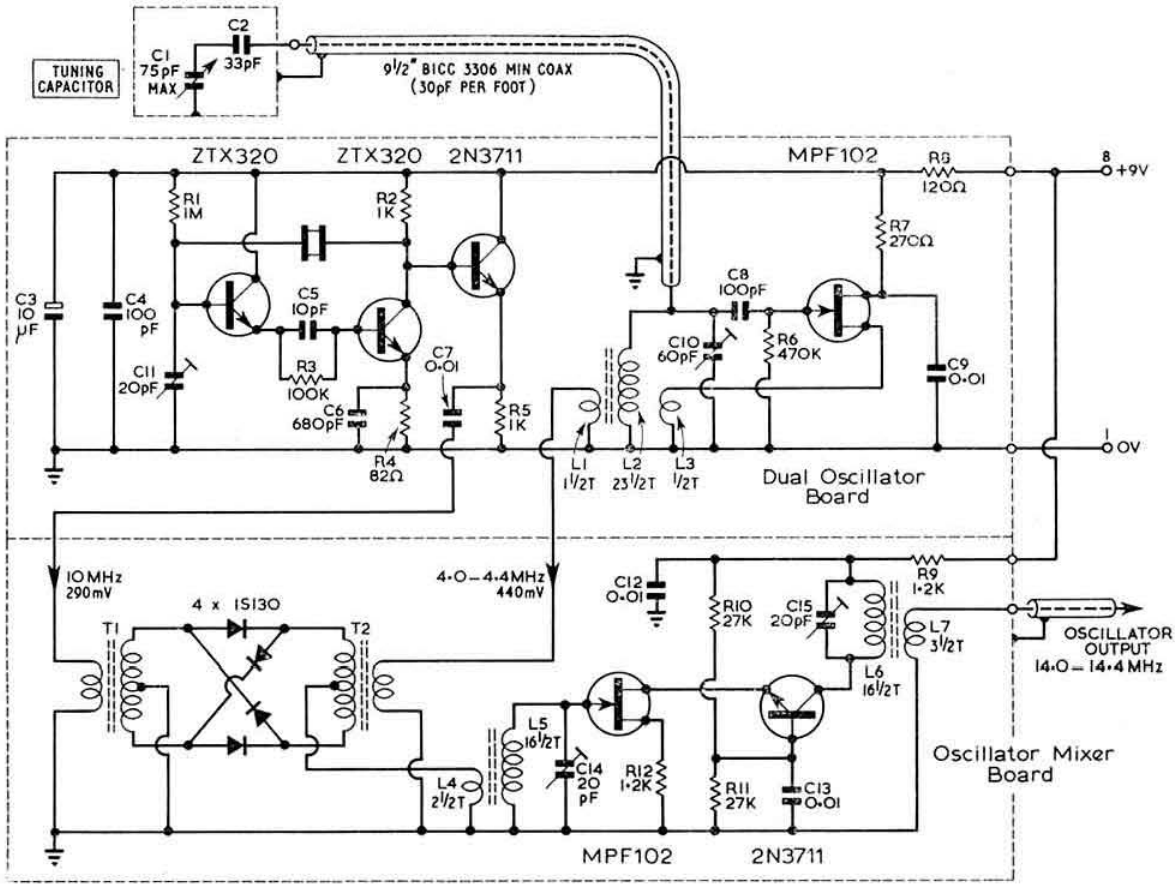


Fig 1. Oscillator module circuit. T1 and T2 are made by trifilar windings of 3 × 15 turns of 30swg. The toroid cores of T1 and T2 and the vfo coils, L1, L2 and L3 are GEC Feralex MM628/K7. L4, L5, L6, and L7 are wound on Mullard FX3014 cores

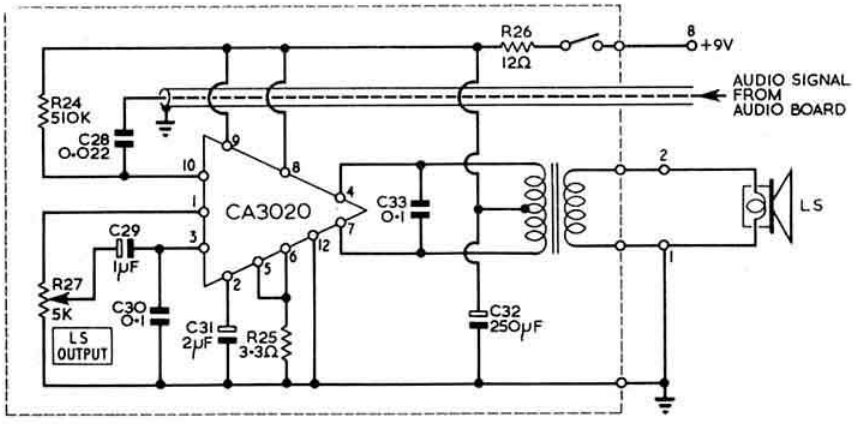


Fig 3. Output module circuit

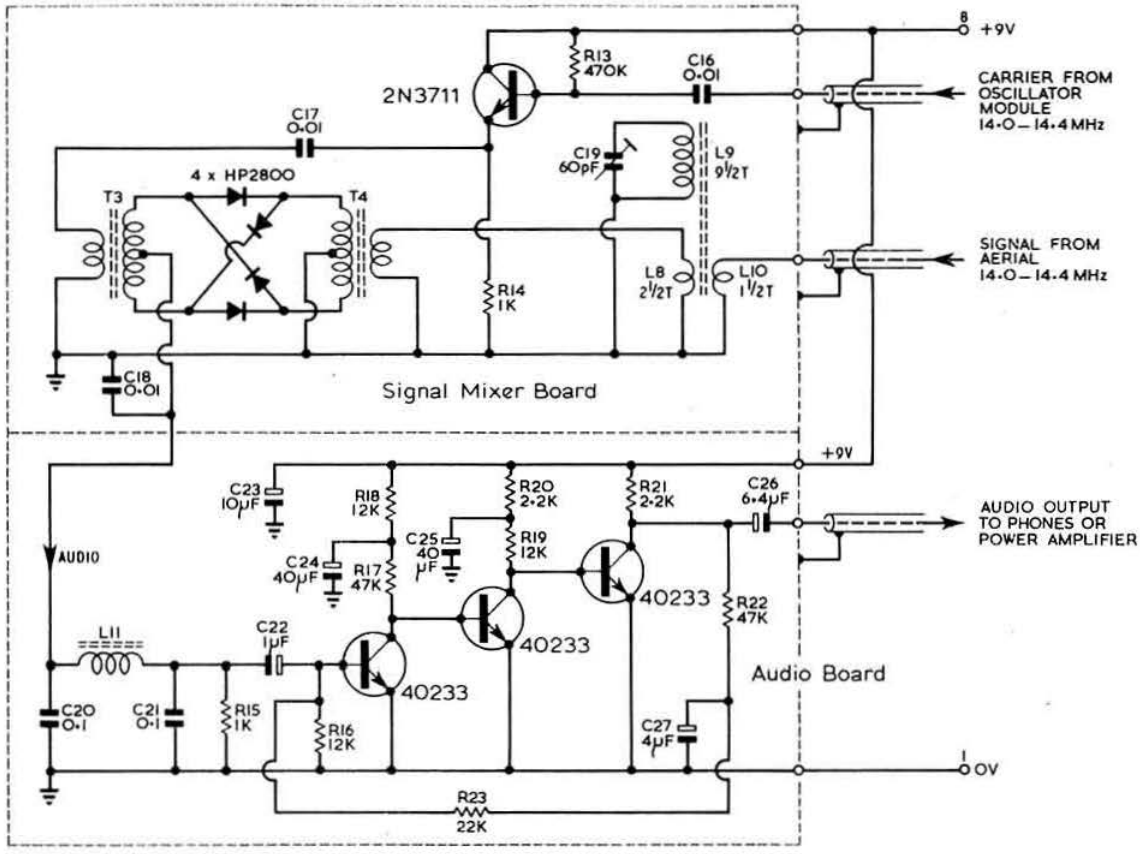


Fig 2. Signal module circuit, T3 and T4 are made by trifilar windings of 3 × 15 turns of 30swg. The toroid cores of T3 and T4 are Mullard FX3014. L8, L9 and L10 are wound on GEC Feralex MM628/K7. The audio choke, L11, consists of 200 turns of 41 swg on FX 2236 with an inductance of 88mH

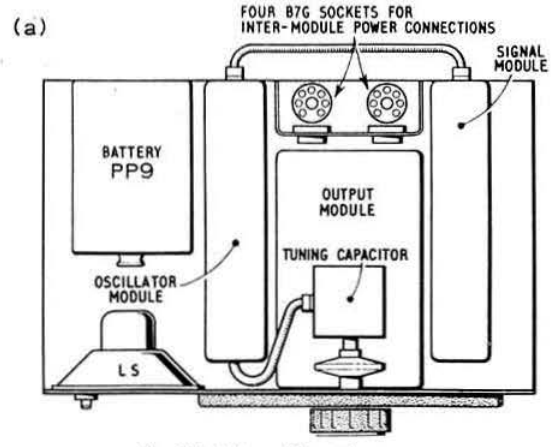


Fig 4(a). Internal layout

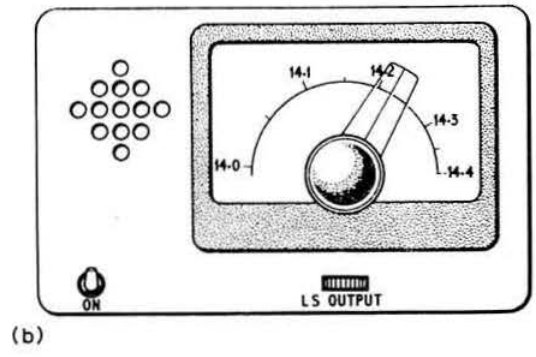


Fig 4(b). Front panel layout

Performance

The receiver will detect signals down to the lowest setting of the attenuator on the author's Advance E2 signal generator. As a result of the use of a synthesized local oscillator, a few spurious beats can be detected within the tuning range, but in practice do not appear as more than very weak signals. Stability is adequate for resolution of ssb signals. In the first hour or two of operation, using an indoor aerial, ssb signals were received from Africa and the Far East, as well as many from North America and European stations, justifying the belief that the direct-conversion technique is capable of high-performance at relatively low cost.

References

[1] J. White, "Balanced detector in a trf receiver", *QST* May 1961.

[2] K. Spaargaren, PA0KSB, *Electron* January 1967.

[3] P. Hawker, G3VA, Technical Topics, *RSGB Bulletin* March 1967. See also July 1967, November 1967. *Radio Communication* December 1968, February 1969, April 1969, November 1969.

[4] Hayward and Bingham, "Direct Conversion—a neglected technique", *QST* November 1968.

[5] D. DeMaw, W1CER, "Some notes on solid-state product detectors", *QST* April 1969.

[6] D. DeMaw, W1CER, "The D-C 80-10 Receiver", *QST* May 1969.

[7] Technical Topics, *Radio Communication* February 1969, p113.

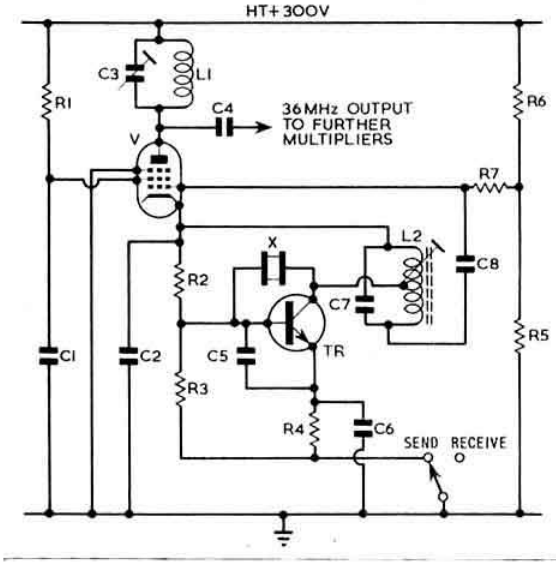
[8] Technical Topics, *Radio Communication* June 1968, p371 (crystal oscillator).

Put a transistor in your cathode!

A hybrid overtone crystal oscillator/multiplier

by R. C. Marshall, MA, CEng. MIEE, G3SBA*

This article, the first of a series of three dealing with combinations of valves and transistors, describes one circuit required to adapt a low-band mobile radio transmitter to 2m work. An existing 11MHz crystal oscillator/doubler using a single EF91 had to be adapted to give a 36MHz output from a 6MHz crystal. This was achieved by designing a single-transistor third-overtone oscillator whose 18MHz output drives the original valve doubler. This transistor draws its power from the valve cathode circuit.



An overtone oscillator differs from an ordinary crystal oscillator in that a tuned circuit is used to prevent oscillation at the fundamental and encourage the desired harmonic mode. The circuit shown in the figure is recognizable as an old favourite† with this modification. Third and fifth overtone operation is possible, at least with post-war crystals. The 18MHz tuned circuit L2 C7 is tapped to obtain the correct impedance match and increase the signal passed to the valve grid via C8. C5 is chosen to be the largest possible value consistent with oscillation, and the remaining components control the dc operating conditions. R6 and R5 bias the control grid so that the valve acts as a cathode follower voltage regulator supplying +15V to the transistor circuit. L1 C3 tune to 36MHz and C4 carries this doubled output to further multiplier stages which double twice more to reach the 144MHz band.

Component details

C1	10,000pF ceramic.
C2, 6, 8	1,000pF ceramic.
C3	50pF trimmer.
C4	500pF silvered mica
C5	47pF silvered mica.
C7	100pF silvered mica.
L1	7 turns 22swg closewound on ½in dia former.
L2	12 turns 22swg tapped at 3 turns from cathode end, closewound on ⅜in dia former with ferrite core.
R1	68kΩ }
R2, 3	10kΩ }
R4	1kΩ } All ¼W, 10 per cent.
R5	18kΩ }
R6	1MΩ }
R7	330kΩ }
TR	2N706A
V	EF91
X	6MHz crystal used on 18MHz 3rd overtone.

* 30 Ox Lane, Harpenden, Herts.

† Technical Topics for the Radio Amateur p49 Fig 36 (1965).

Transistorizing DC to DC converters

by

R. B. KERR, GM8CFL

and

A. J. MITCHELL, GM3UDL*

Introduction

With the increasing availability of surplus commercial radiotelephone equipment suitable for use on 2 or 4 metres, many amateurs are faced with the problem of obtaining spare or replacement vibrator units. There is a large number of types of vibrator unit in use commercially, most of which are expensive—one well-known radiotelephone uses a synchronous vibrator costing some £9! Bearing this in mind, when equipping their stations for RAEN activity, the authors decided to undertake a design study on the methods of converting vibrator dc convertors to use transistors as the active element.

The design method outlined in this article has been used, up to the present time, for dc output powers from 1W to 60W. The smallest unit constructed used a pair of OC78s whereas the 60W unit employed a pair of 2N277s (maximum dc current rating 15A each). The units all self start even under 20 per cent overload and have an efficiency of the order of 70 per cent.

Vibrators

The electro-mechanical vibrator is a self-driven switch which chops the dc supply to square wave ac (see Fig 1). This ac is then transformed up to obtain the desired output voltage which is then, in the simple "non-synchronous" circuit, rectified, and smoothed in the normal way (Fig 2). There are other arrangements in use in commercial designs and simplified diagrams of some of these are given in Fig 2 as a guide to anyone undertaking power supply modifications.

In the so-called "synchronous" vibrator, an extra set of changeover contacts are provided, ganged to the primary contacts. At any instant during one half cycle of the transformer secondary voltage, one end of the secondary winding is positive and the other negative. On the next half cycle, the situation is reversed with the first end of the secondary winding being negative and the other positive. The secondary contacts on the vibrator are arranged to select the positive end of the secondary winding during any half cycle; therefore a positive dc output results.

The vibrator, although reasonably efficient as a power conversion device, generates troublesome rf interference due to switching transients, and hence requires extensive rf and af filtering and heavy screening. It is also important to note that the vibrator is often mechanically unreliable, thereby being to some extent unsuitable for RAEN use.

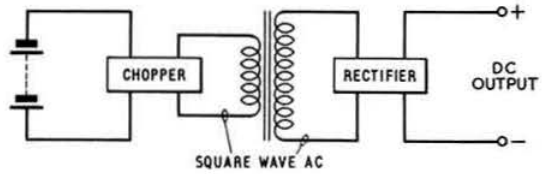


Fig 1. The principle of the vibrator

The transistorized circuit

In order to chop the dc supply, the primary contacts of the vibrator must be replaced by a suitably rated pair of transistors, made to switch on and off alternately and driving the original vibrator transformer.

The first attempt at this modification used a circuit from an *RSGB Bulletin* of some years ago (Fig 3). Although this works, efficiency is low since the transistors are forward biased and conditions approximating to Class A are obtained if the drive resistors are low enough. The greatest efficiency achieved with this circuit at GM8CFL was 50 per cent.

$$\left(\text{Efficiency} = \frac{\text{dc power out}}{\text{dc power in}} \times 100\right)$$

This lack of efficiency made it obvious to the authors that a zero bias system had to be devised and a pair of power transistors driven by a direct coupled multivibrator as in Fig 4 was the next attempt. Note that this arrangement is not in fact truly zero bias since at each multivibrator emitter there is a dc component as well as the ac component. An efficiency of about 60 per cent resulted and this arrangement was seen to have an important secondary advantage in that it may be run at any desired frequency. Therefore, if the driving frequency is increased until just before hysteresis losses become appreciable, the transformer magnetizing current may be kept down to a low value. The circuit is also useful in that the transformer runs non-saturated and the system has a finite maximum load current beyond which the output voltage falls drastically, making the circuit virtually self protecting against short term overload. It might also be possible to "tune" the transformer and hence produce a sine wave ac output, but this would depend to a great extent upon the individual transformer inductance and "Q". Unfortunately none of the specimens tried so far by the authors have obliged in this respect.

As explained, zero bias working was not possible using the circuit of Fig 4, and therefore the removal of the dc component by ac coupling was tried. However, in this condition the

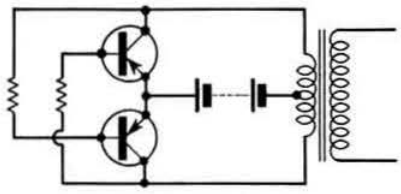


Fig 3. Original circuit (low efficiency)

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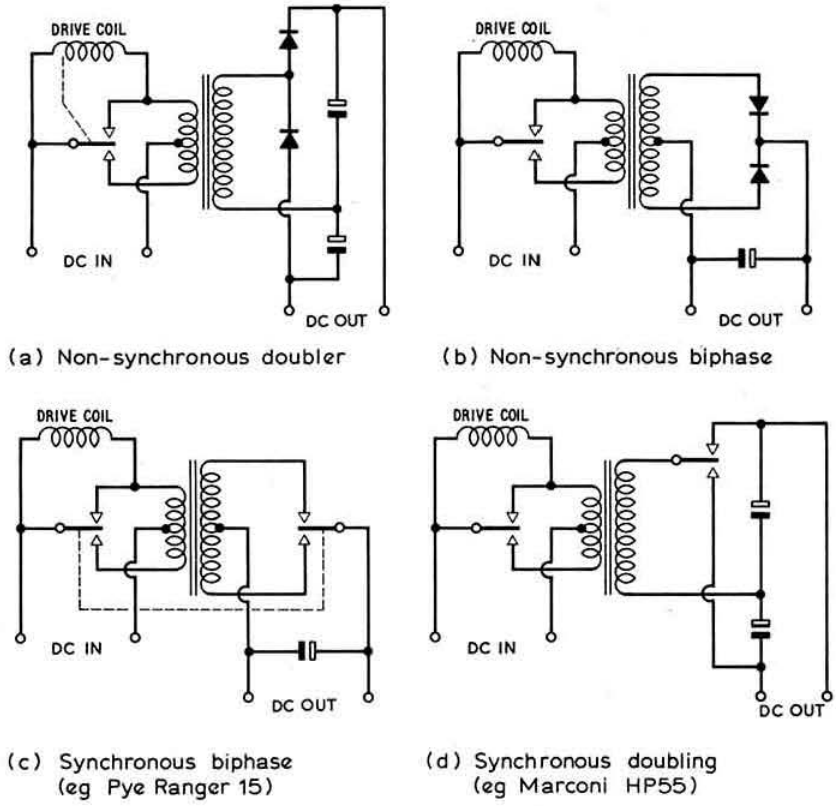


Fig 2. Various common types of vibrator circuit

transistor base-emitter junctions rectified due to their diode characteristic, cutting the transistors off and reducing the available output power almost to nil.

This state of affairs caused a good deal of worry until it was realized that the rectification could be stopped by connecting a diode across each base-emitter junction but in the opposite sense with respect to the diode formed by the junction. The power transistor circuit would then be as in Fig 5 and it can be seen that the added diodes would effectively short out any reverse bias.

Experiment proved that the circuit of Fig 5 does indeed work, very little current being drawn until a load is applied to the transformer secondary, the efficiency being around 75 per cent. However, the ac coupled multivibrator driven circuit is obviously not efficient in the use of components. For this reason it was decided that the power transistor section should be made to self oscillate. If the transformer core is allowed to saturate momentarily on each half cycle, the transformer hysteresis and inductance would determine the self oscillation frequency.

A good deal of experimentation finally produced a good, cheap and reliable design with an efficiency of between 70 and 75 per cent. The circuit is shown in Fig 6.

The design

Fig 7 shows the equivalent circuit of one half of the circuit of Fig 6.

(*a*) With the vibrator unit working unmodified, or by applying a low ac voltage to the primary winding, find the turns ratio (N):

$$N = \frac{Vsec}{Vpri} \qquad \ldots (1)$$

(*b*) Decide the output current (Isec) to be provided by the modified supply unit. If the rating for the original is known, use this for Isec. Hence calculate the primary current (Ipri):

$$Ipri = N.\ Isec \qquad \ldots (2)$$

However, this figure is only theoretical and 40 per cent must be added to account for transformer losses etc. We shall designate this practical value of current Ic′.

$$\therefore\ Ic' = 1{\cdot}4 \times Ipri \qquad \ldots (3)$$

NB For the purpose of these calculations we ignore forward junction potentials and saturation state:

$Ic' = \frac{Vsupply}{R_L}$ (see Fig 7) with the transistor fully on.

(*c*) Next, with reference to the calculated value of Ic′, the type of power transistor to be used must be decided. The

type chosen must have a maximum collector-emitter voltage rating of at least twice the supply voltage. For the type chosen, a value of h_{fe} should be found from data sheets. h_{fe} (or α' or β) = forward current gain in common emitter. Usually this parameter is quoted with a spread, for example for an OC28, h_{fe} = 20–40. Always use the lower figure for this design in case the specimens used are a bit low, ie for OC28s use h_{fe} = 20, or even 15 if you are doubtful about their gain.

Use this value of h_{fe} to calculate the value of the drive resistors (R_d):

$$R_d = \frac{Vsupply}{Ic'} \times h_{fe} \quad \ldots (4)$$

Calculate the base current (Ib):

$$Ib = \frac{Ic'}{h_{fe}} \quad \ldots (5)$$

∴ The power rating of R_d (P_{Rd}) should be:

$$P_{Rd} = Ib^2 \times R_d \quad \ldots (6)$$

(*d*) The value of the coupling capacitors (C) should be calculated on the assumption that they should possess a low reactance with respect to R_d at the operating frequency (f_o):

$$X_c = \frac{R_d}{3} = \frac{1}{2\pi f_o . C} \quad \ldots (7)$$

If in doubt about the operating frequency, assume it to be 50Hz. The working voltage of C should be at least twice the supply voltage.

(*e*) A diode of sufficient forward current rating to pass Ib as found in equation (5) should be connected across the base-emitter junction of each transistor. It is recommended that a resistor of between 47 and 150Ω is connected across each base-emitter junction. This resistor does not materially affect the drive current but reduces temperature dependent leakages

(*f*) Finally, if the original circuit used a synchronous vibrator, a rectifying circuit will have to be built in. Basically this is a matter of deciding which type of rectification, eg biphase or doubling, was performed by the vibrator secondary contacts and then replacing the contacts by silicon diodes. The PIV rating of these diodes must be twice the secondary voltage, since the peak, average and rms values of a square wave are the same.

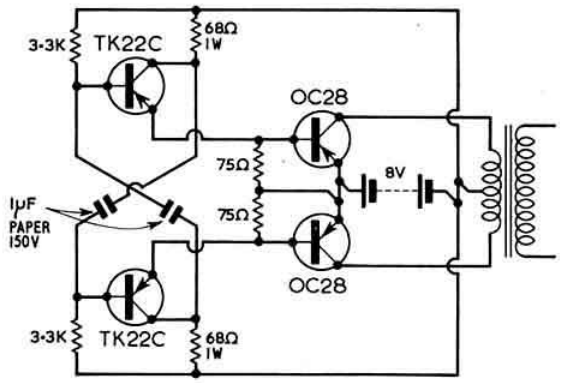


Fig 4. Multivibrator-driven circuit (60 per cent efficiency)

Problems

The usual complaint about transistor convertors is that they do not start readily. The authors have found it impossible to produce this fault with the circuit described unless the rated output current is exceeded by about 200 per cent, since each transistor, diode, drive resistor and capacitor would have to be identical in every respect to produce this fault under normal load conditions. However, if this unlikely situation ever cropped up, a certain cure would be to make the capacitors of different values since it is the charging surge at "switch on" which starts oscillation.

Allied to the problem of non-starting is that of spurious modes of oscillation, which the authors have demonstrated by overloading a converter to 200 per cent of rated output current and feeding the converter from a flat battery through high resistance leads. The symptoms of this fault are easily recognized in that a high-pitched whistle is emitted from the transformer core, the input current rises and the output voltage drops sharply. If this should happen, switch off immediately and investigate—the only time this happened to the authors "in the field", the explanation proved to be a shorted ht diode.

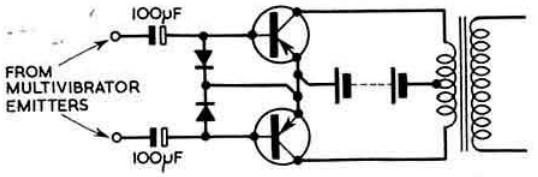


Fig 5. AC coupling for Fig 4 with diodes to remove reverse bias

Interference

There are many possible causes of interference generated by transistor converters, but the most likely in the circuit described is the use of unsuitable transistors or transformers. The authors recommend the use of af transistors and vibrator transformers since the use of rf transistors or transformers not designed for vibrator use may give rise to sharp transients which could be troublesome. However, if only rf or high-speed switching transistors are available, the following two possible cures suggested by G2HIF may be helpful.

1. Capacitors of between 0·001μF and 0·01μF connected across the base-emitter junction of each transistor will slow down the transistor switching speed and reduce spikes.

2. Two zener diodes, each with a minimum voltage rating slightly greater than twice the maximum supply voltage, connected in shunt with the transistors, or alternatively, two similar zener diodes connected in series, back to back, across the primary winding will effectively limit any spikes. It is difficult to calculate the power rating for these diodes but 1·0W types are usually satisfactory.

It is also possible that common impedance If coupling and rf radiation may prove troublesome. The problem of common impedance coupling is easily cured by returning the earth side of the converter supply directly via a heavy lead (not via the chassis) and by connecting a high value capacitor (several thousand microfarads) across the supply as near to the converter as possible.

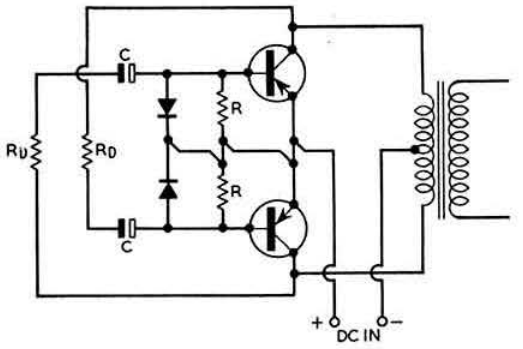


Fig 6. Final self-oscillating circuit

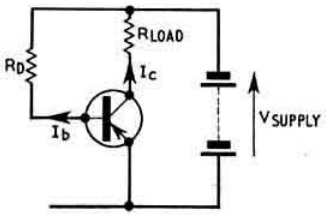


Fig 7. Equivalent circuit for one transistor

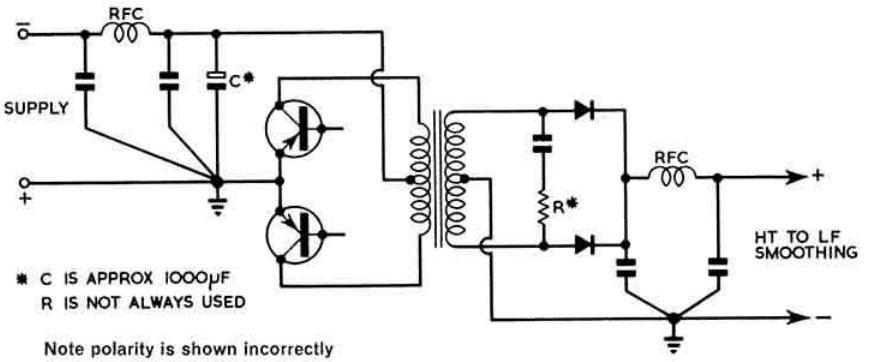


Fig 8. Common suppression methods

Rf radiation can be a cause of more severe interference than the above, and Fig 8 shows all the common methods of suppressing a converter unit. Note that the capacitor across the entire secondary winding is sometimes required to slow down the edges of any residual spikes across the secondary due to winding leakage inductance. In a number of vibrator units, a 4·7kΩ resistor is connected in series with a 0·01μF capacitor (1kV working) across the transformer secondary.

Conclusion

It is hoped that this article will assist the amateur in converting vibrator units, and success is probable if the following salient points are borne in mind.

1. Af type transistors of suitable power and voltage rating should be used.
2. Original vibrator transformers should be used.
3. All the original suppression components should be retained.
4. Attention should be paid to the battery side wiring with particular regard to the possibility of chassis return currents.

It may be found possible to use other types of transformer providing the low impedance winding is of adequate current rating and *accurately* centre tapped, but this is not recommended. Above all, if experimenting with transformers, avoid types with air gaps.

The authors would like to thank G2HIF for his help during the preparation of this article and hope that the article may go some way towards solving the problem of non-starting converters which can prove embarrassing, especially during RAEN operation.

Possible references

Use of vibrators—Audel's *Radioman's Guide* (Theo. Audel & Co, New York, 1942). Various surplus equipment manuals, eg BCC-69, Marconi HP-55, Pye Ranger 15 etc.

Transistor as a switch—*Mullard Reference Manual of Transistor Circuits* (1963), Chapter 23.

Transistor converters—*Mullard Reference Manual of Transistor Circuits* (1963), Chapter 26.

The FM system

Reprinted from
Amateur Radio December 1969
by courtesy of WIA

by R. F. DANNECKER, VK4ZFD*

SINCE the introduction of the 146MHz fm net frequencies to this country (Australia), many amateurs have come to realize the advantages that frequency modulation provides. However, many amateurs have only a rather sketchy knowledge of the processes involved in the frequency modulation system. It is the purpose of this article to discuss some fundamental aspects of the fm system.

Deviation

Everyone is aware of the process involved when an a.m. signal is produced. If the modulating signal is, say, 1kHz, two sidebands, one at carrier frequency minus 1kHz (lower sideband, lsb) and the other at carrier frequency plus 1kHz (upper sideband, usb) are produced. The total power in the sidebands is half the carrier power for 100 per cent modulation (see Fig 1a).

When a frequency modulated signal is produced with 1kHz modulating frequency, sidebands are produced at 1kHz intervals **to infinity** (see Fig 1b).

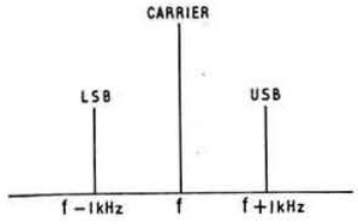


Fig 1a. AM signal with 1kHz modulation

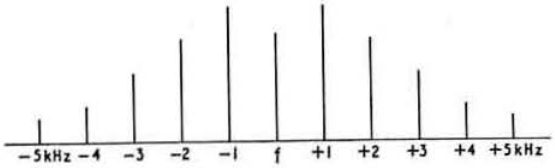


Fig 1b. FM signal with 1kHz modulation

However, beyond a certain point the amount of power contained in higher order sidebands is insignificant. The number of significant sidebands and the amount of power transmitted in them can be determined using Bessel functions. Two Bessel function charts are shown in Figs 2a and 2b.

There are several points to note with reference to Fig 1b:

(*a*) The carrier power diminishes during modulation.
(*b*) The energy taken from the carrier goes into the sidebands—greater amplitude of modulating signal produces more energy in the sidebands.
(*c*) One or more sidebands can contain **more** power than the carrier.

A small amplitude audio modulating signal of frequency 1kHz may produce sidebands as shown in Fig 3a. If the amplitude is increased, the frequency spectrum of the signal may change to that shown in Fig 3b. The signal in Fig 3b has greater deviation than that in Fig 3a.

A signal modulated with a 1kHz tone with 10 significant sidebands requires a total bandwidth of 20kHz, while a 100Hz tone giving rise to 10 significant sidebands requires a total bandwidth of 2kHz.

The bandwidth required for a signal therefore depends on:

(i) The intensity of the modulating signal.
(ii) The frequency of this signal.

The modulation index of a frequency modulated signal is defined as:

$$\text{Modulation index} = \frac{\text{Deviation of fm carrier}}{\text{Audio freq producing this deviation}}$$

For a maximum carrier shift of (±) 15kHz and a highest modulating frequency of 3kHz, the modulation index = $15 \div 3 = 5$.

From Fig 2a we see that there are eight significant sidebands in this signal, ie although the carrier has shifted only (±) 15kHz, significant sidebands have been produced to $8 \times 3 = (\pm)$ 24kHz.

The relative **amplitudes** of the sideband sets are obtained

Modulation index	Number of significant sidebands: Above carrier	Below carrier	Bandwidth required
0·01	1	1	2f
0·05	1	1	2f
0·20	1	1	2f
0·40	1	1	2f
0·50	2	2	4f
1·00	3	3	6f
4·00	7	7	14f
5·00	8	8	16f
7·00	10	10	20f
10·00	14	14	28f

Note: f equals frequency of audio signal.

Fig 2a. Bessel function chart (1)

* 52 Pohlman Street, Southport, Qld, 4215.

Modulation index	Carrier value	1st set of sidebands	2nd set	3rd set	4th set	5th set	6th set	7th set	8th set	9th set	10th set	11th set	12th set	13th set	14th set
0·00	1·000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
0·01	1·000	0·005	—	—	—	—	—	—	—	—	—	—	—	—	—
0·05	0·9994	0·025	—	—	—	—	—	—	—	—	—	—	—	—	—
0·20	0·9900	0·0995	—	—	—	—	—	—	—	—	—	—	—	—	—
1·00	0·7652	0·4401	0·1149	0·0020	—	—	—	—	—	—	—	—	—	—	—
2·00	0·2239	0·5767	0·3528	0·1289	0·0341	—	—	—	—	—	—	—	—	—	—
4·00	−0·3971	−0·0661	0·3641	0·4302	0·2811	0·1321	0·0491	0·0152	—	—	—	—	—	—	—
5·00	−0·1776	−0·3276	0·0466	0·3648	0·3912	0·2611	0·1310	0·0534	0·0184	—	—	—	—	—	—
7·00	0·3001	−0·0047	−0·3014	−0·1676	0·1578	0·3479	0·3392	0·2336	0·1280	0·0589	0·2035	—	—	—	—
10·00	−0·2459	0·0435	0·2546	0·0584	−0·2196	−0·2341	−0·0145	0·2167	0·3179	0·2919	0·2075	0·1231	0·0634	0·0290	0·0120

Note: Where blank spaces are indicated the values of the sidebands are insignificant.

Fig 2b. Bessel function (2). The -ve sign indicates that the component is 180 degrees out of phase with respect to the others

from Fig 2b and are shown in Fig 4 applied to a carrier aerial current of 9·0A.

Note that although the carrier is never shifted beyond (±) 15kHz, significant sidebands are produced beyond this limit. Hence the seemingly wide spacing between fm channels.

Note also that for a modulation index less than 0·4, only two significant sidebands are produced. A modulation index of 0·4 with an upper audio limit of 3kHz corresponds to a carrier deviation of (±) 1·2kHz (see Fig 5).

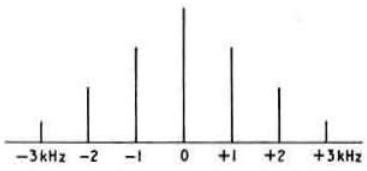


Fig 3a. Small deviation

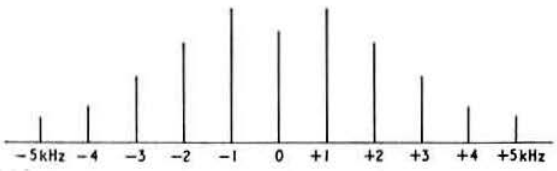


Fig 3b. Large deviation

Sideband set	Amplitude (amps)	Power (arbitrary)
Carrier	1·598	2·50
1st set	2·948	8·70
2nd	0·419	0·175
3rd	3·283	10·80
4th	3·521	12·40
5th	2·350	5·52
6th	1·179	1·39
7th	0·481	0·231
8th	0·166	0·0276

Fig 4. Power in sidebands

Phase modulation

Consider an audio signal modulating a carrier such that the phase of the carrier is changed corresponding to change in the amplitude of the modulating signal. This is shown in Fig 6a relative to a reference carrier whose phase is constant. An alternative representation in terms of rotating phasors is shown in Fig 6b where OB is the reference carrier and OA is the phase modulated signal.

Actually, in Fig 6b OA is rotating at angular frequency ω, while the phase varies, relatively, very slowly. Consider now the change in vector OA in going from (i) to (ii) and (iv) to (v) in Fig 6b. In the first case OA must speed up to go from position (1) to position (2), while in the second case OA must slow down to go from position (1) to position (3). This speeding up corresponds to an increase in frequency of the carrier represented by OA and the slowing down corresponds to a decrease in carrier frequency.

Each time the carrier phasor wobbles back and forth to reach the new phase positions dictated by the audio modulation, we find the frequency also changes in order to have the phasors reach the new positions. Note, however, that over the whole audio cycle the average frequency of the carrier represented by OA is constant.

In producing phase modulation of the carrier we have in fact produced indirect fm. What we are doing is adding sufficient change, either positive or negative, to a fixed frequency to permit the carrier to reach the desired phase position. In "pure" fm the carrier frequency itself is **directly** affected and shifted in response to the modulating voltage.

Factors affecting indirect fm

The amount of indirect fm produced depends on the extent of phase shift and the frequency of the modulating audio signal. The extent of indirect fm produced varies directly with both the frequency and maximum phase shift of the carrier.

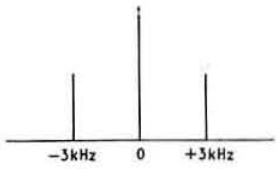


Fig 5. Small modulation index

C

In direct fm the value of the carrier itself swings between its maximum limits. The carrier is shifted directly by the modulation. In indirect fm (from pm) the carrier is not actually shifted by the modulation. Rather, the effect of the phase shifts is to either add to or subtract frequency variations from a fixed carrier.

Interference

Consider two carrier waves slightly different in amplitude and frequency. The resultant of these two waves is shown in Fig 7. There are two types of variation in this signal as compared to carrier 1. They are: (1) amplitude, (2) phase.

In a.m. systems type (1) produces beat frequencies (eg 10kHz whistle).

In fm systems type (1) is eliminated by limiters in the receiver, but type (2) is still present at the detector. Note that this phase modulation produces indirect fm. With a 2:1 ratio of desired to unwanted signals, a maximum phase shift of about 30° is produced.

The indirect fm cannot be eliminated, but in wideband fm systems it can be minimized.

As noted before, the indirect fm is directly proportional to the modulation frequency (in Hz) and the maximum phase angle (in radians) of carrier shift.

Now suppose that the interfering signal differs by 1,000Hz from the desired signal and is only half as strong as the desired signal. As noted before, a maximum phase shift of 30° (approx. 0·5 radians) in the desired signal will be produced. The frequency shift (indirect fm produced) in the desired signal is in fact 1000 × 0·5 or 500Hz. The shift is periodically above and below the average frequency of the stronger signal. The frequency variations shift at a rate of 1,000 times a second (1,000Hz mod signal).

If the desired fm signal is deviated to (±) 15kHz then the (±) 500Hz produced by the interfering signal produces an audio signal considerably smaller than the desired audio signal.

For a desired to undesired signal ratio of 10:1 this effect is even more marked. Thus the wideband fm completely swamps the small indirect fm developed from the interference. Herein lies the interference reduction power of fm.

Note that if the two signals are of the same frequency no interfering indirect fm is produced, and the greater the frequency separation of the two signals the greater the amount of interference produced. However, the amplitude will be reduced by the bandpass characteristics of the receiver.

Domination by the stronger signal

When two signals are comparable in amplitude, the moment one signal becomes even a trifle stronger the response changes and the stronger signal assumes noticeable control. The process is complete when the ratio reaches the 2:1 point. (For a comparable amount of interference in an a.m. system, a ratio of 100:1 is required.)

Consider two signals of nearly equal amplitude and only slightly different frequency (see Fig 8).

Let 1 be the stronger signal, 2 be the interfering signal and R be the resultant carrier due to these two signals. As 2

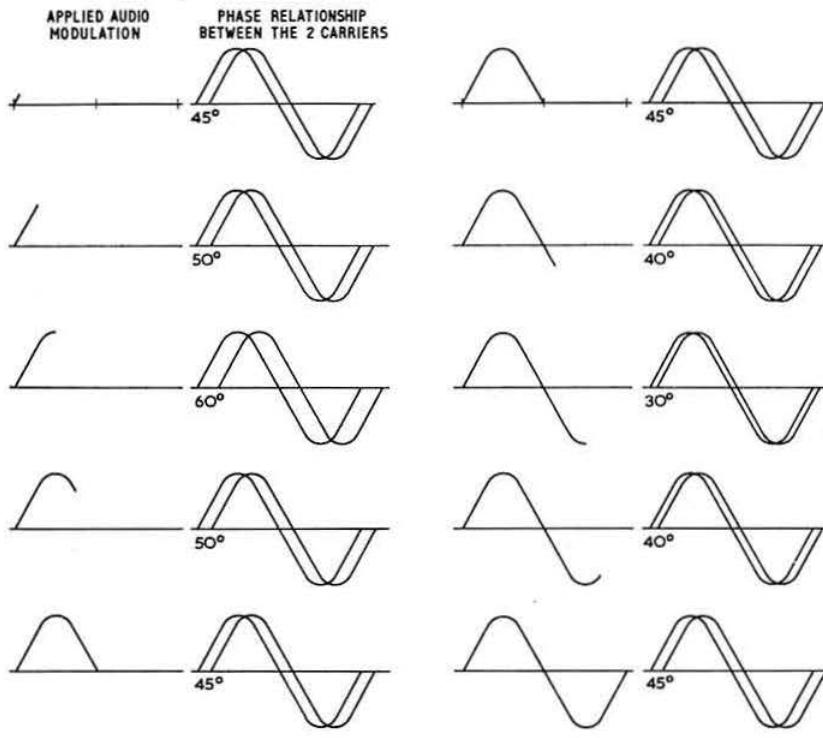


Fig 6a. A simplified illustration of phase modulation

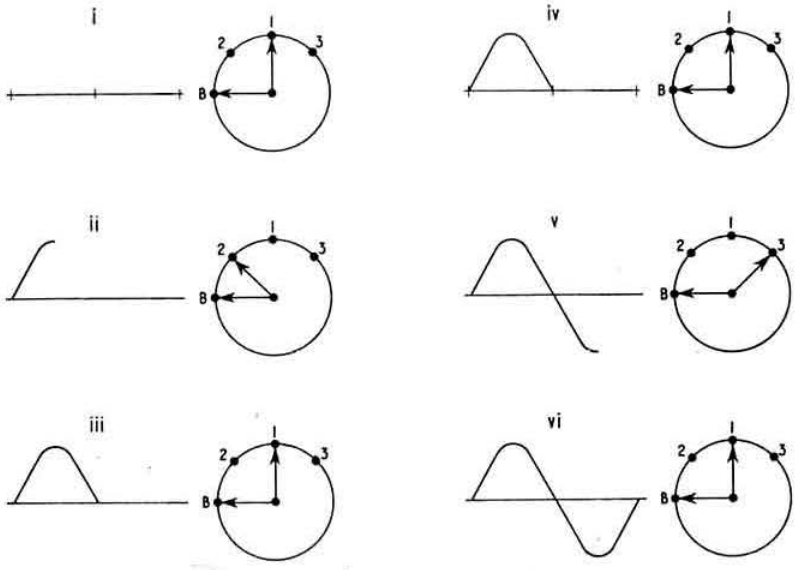


Fig 6b. An alternative representation of Fig 6a

rotates around relative to 1 (different in frequency), R changes greatly in phase but its average frequency is still that of 1, the stronger signal. Hence by bringing the two signals close in amplitude we have produced more phase modulation in the resultant phasor R, but R still follows signal 1, so we hear signal 1 but with some distortion produced by the indirect fm caused by signal 2 interacting with 1. If 2 was stronger than 1, then the phasor R would follow signal 2, hence the sharp transition from one signal to the other and this is why the predominant signal assumes control in fm systems.

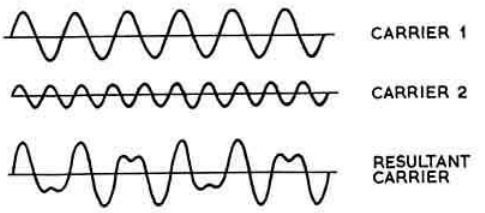


Fig 7. The combination of two carriers to form a resultant which is amplitude and phase modulated

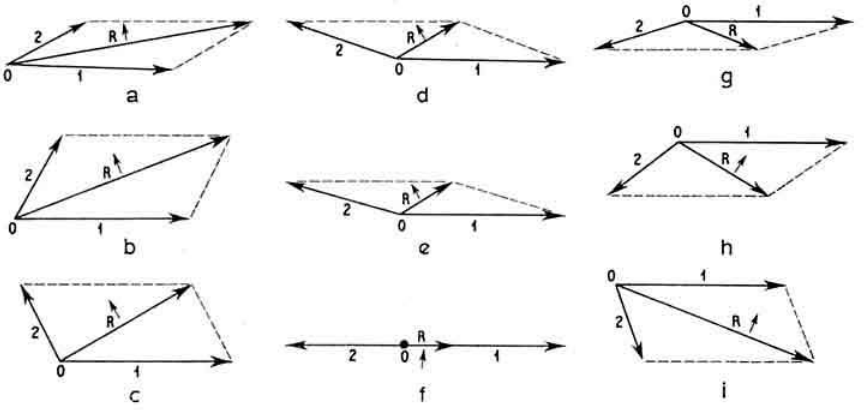


Fig 8. The amplitude and phase variation of a resultant (R) carrier due to the interaction of two signals. The small arrows on R indicate whether its phase (with respect to the desired signal, 1) is going in a positive or negative direction

Noise

Consider random noise in the receiver. Interactions between random noise voltages and the carrier, and interactions between the random noise voltages produce:

(1) Amplitude modulation of the carrier;

(2) Phase modulation (and thus indirect fm) of the carrier.

The amplitude variations are eliminated in the limiters but the phase variations (indirect fm) still result in noise.

The amount of indirect fm (ie noise) is proportional to the frequency difference between the carrier and each random noise voltage, ie zero at carrier frequency and increasing directly with increase in bandwidth (see Fig 9a). Above 5kHz we have inaudible noise (considering the response of receiver audio systems). The comparable "noise spectrum" for an a.m. system is shown in Fig 9b. Note the greater improvement in the amount of noise in the fm receiver compared to an a.m. receiver. This can be shown mathematically to be 18·75dB or an s/n voltage ratio of 8·65:1.

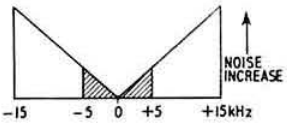


Fig 9a. Noise in fm system

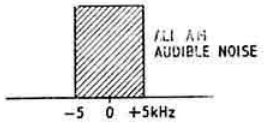


Fig 9b. Noise in a.m. system

Let us now consider the effect of reducing the modulation index of the fm system. Figs 10a to 10b to 10c show successive reductions in modulation index until in 10c, with a modulation index of 1, ie a roughly comparable bandwidth to the a.m. system, the s/n ratio improvement of fm over a.m. is 4·1875dB. Hence the importance of obtaining the highest modulation index possible.

Pre-emphasis and de-emphasis

It is well known that most of the energy of a voice-modulated transmission is contained at the lower audio frequencies, ie up to 3kHz. In addition, it has further been brought to light that the greatest irritating noise generated is located from 3kHz up. To reduce the effect of this noise, a pre-emphasis network is inserted in the audio section of the transmitter. Its purpose is to boost the frequencies above 1kHz.

At the receiver there is a de-emphasis network to reduce frequencies above 1kHz to their original values. The overall effect is a return of the signal to its proper relative proportions, but with a considerable reduction in noise.

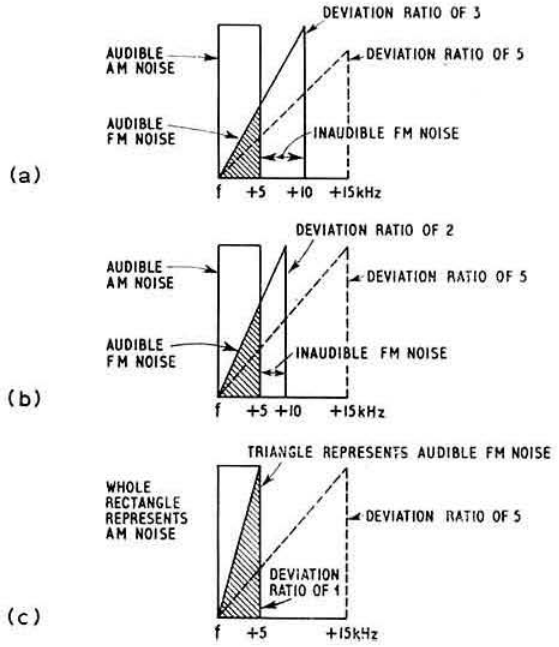


Fig 10. Further comparisons between the noise in a.m. and fm systems with various fm deviation ratios

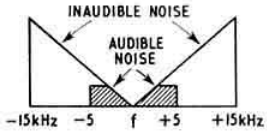


Fig 11. Improvement in noise reduction due to pre-emphasis circuit in transmitter

Another beneficial effect of de-emphasis is concerned with the noise produced by another signal or the ever-present random noise.

As previously noted, the greater the difference between the carrier frequency and the interference, the greater the indirect fm produced. By the use of the de-emphasis network the triangular response of Fig 10 is modified to the trapezium of Fig 11. The de-emphasis action, by reducing the level of all frequencies above 1kHz, slices off a considerable portion of the noise.

I trust that this article has been able to shed some light on the rather neglected subject of the theory behind the fm system and it will enable amateurs to speak with a little more authority about the effects observed in their equipment.

TVI TIPS

by B. Priestley, G3JGO

Interstage couplings

In a transmitter with a complicated synthesis of the output frequency, such as an ssb transmitter with two or more mixers, or a vhf transmitter with a large multiplication factor, there are many possibilities for spurious outputs close to the desired frequency. A good design will attenuate these at the earliest possible stage so that the aerial filter has only to deal with harmonics, This allows a fairly simple filter with low losses which is of vital importance at the 400W level. Also it is generally easier to filter at the earlier stages, eg in a 144MHz transmitter starting at 8MHz a quite moderate Q will select 24MHz and reject 16 and 32, but a much higher Q is needed to separate 144MHz from 136 and 152MHz.

When a tuned circuit is damped by an external load, such as the output impedance of a triode mixer, then the Q is directly proportional to the C/L ratio; think of it as an rfc which is very broad. Consequently a tuned circuit which resonates with stray capacitance only will be unselective and encourage spurious radiation. (Ref 1.). It is better to add as much capacitance as possible to narrow the bandwidth.

Often this results in a compromise between flat response across the desired range and selectivity outside the range. In this case the solution is a pair of tuned circuits suitably coupled, which can be set up to have a flatter response across the band, but, more important, twice the rate of fall off outside the band, see Fig 1. Objections have been raised to doing this in a vhf transmitter as "it is difficult to get a flat response across the 144MHz band", although the ARRL claims to do it, see Ref 2. However, if it is difficult to do this with double tuned circuits it will be impossible with single tuned, and the chances of output at, say, 192MHz (48 × 4) joining forces with channel 9 would be increased greatly.

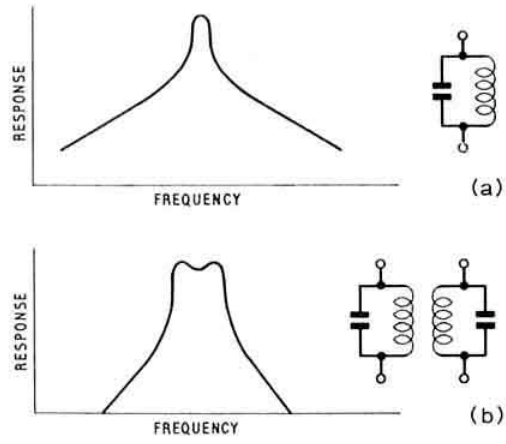


Fig. 1. In a single tuned circuit the response falls at only 6dB/octave away from the resonant peak (a). When two coupled circuits are used the rate is 12dB/octave.

The type of coupling does not have much effect on the response in band, but it will have some effect on the far off response. Mutual inductance and link coupling give a symmetrical response, but top capacitance coupling does not fall off indefinitely on the high frequency side, while common capacitance has the opposite behaviour. However, in practice there is little to choose between the systems, so the most convenient can be used.

Ref 1. "Break-in operation with the Geloso Signal Shifter", G.A.S. Lander, *RSGB Bulletin* March 1960 pp405 and 412.

This also describes a modification to reduce the harmonic output of the multiplier stage. Without such a modification the author has heard a Geloso radiate strong signals simultaneously on 3·5, 7, 10·5, 14, 17·5, 21 and 24·5 . . . the upper limit was not found during the CQ call.

Ref 2. *Radio Amateurs' VHF Manual*, ARRL p111.

BOOK REVIEW

Simplified Modern Filter Design by Phillip R. Geffe. Published by Iliffe at 21s, paperback and 50s hardback.

Filter design grew out of the experimental fact that a telephone line with coil loading had low pass properties. and was developed from transmission line theory. Because of this the theory depends on matching between sections, ie no swr, when the total attenuation in dB is simply the sum of that of the individual sections. Unfortunately this simple state of affairs is only true when the terminating impedance has its theoretical value, which is varying resistance in the pass band and a reactance in the stop band. When a filter is terminated in a practical resistor the resultant reflection loss or gain modifies its performance. For this reason filter design has remained something of an art, or involves laboriously calculating corrections.

Recently the transmission line "simplification" which only postpones the awkward calculation, has been dropped. In *Simplified Modern Filter Design* the source and load resistors are decided on and the response of a filter calculated simply as a circuit with the assurance that a practical device would perform as calculated. This innovation had to wait for the invention of the digital computer to do the hard work of calculation, but it is now possible to design a filter to meet a specific requirement, and be sure of meeting it provided the components have the design values, all on one piece of paper!

In order to keep the tables of component values to a reasonable size they are prepared only for low-pass filters with a cut-off frequency of 1/2πHz and an impedance of 1Ω. Any other low-pass filter can be produced by scaling the impedance and cut-off frequency, while high-pass bandpass and band-stop filters are devised by a little more mathematical manipulation.

This is best illustrated by an example. Suppose a receiver is being overloaded by broadcast band signals, particularly 692 and 1,214kHz beating together in the mixer to give 1,906kHz, and one would like to fit a hpf to prevent this. If we settle on 1,500kHz as the cut-off frequency we need, say 30dB at 1,214kHz and below, now $\frac{1,500}{1,214} = 1{\cdot}235$ and so we look for a prototype lpf with at least 30dB at 1·235 times the cut-off frequency. Having found a suitable prototype (actually it gives 35dB or more at 1·186 times cut-off with 0·5dB ripple in the passband, ie an swr of up to 2 : 1). This is converted to a hpf by replacing all the inductors or capacitors by the opposite element with reciprocal value, eg 2F becomes 1/2H, 3H become 1/3F. Now the values are scaled up to 75Ω and 1·5MHz by multiplying the inductances by $75/2\pi \times 1,500,000$ and the capacitors by

$$\frac{1}{75 \times 2\pi \times 1,500,000}$$

For the reader now bursting to design a hpf to keep the second harmonic of the i.f. of an fm set off the 21MHz band the question is where do I get some filter tables? The most convenient source is in the book *Simplified Modern Filter Design*, a copy of which should find a place in the equipment of any tvi group or indeed any progressive radio club.

B.P.

TECHNICAL TOPICS

A monthly feature by PAT HAWKER, G3VA

THE useful and comprehensive survey last month by Peter Martin, G3PDM, revealed the large number of linear integrated circuit devices now available for communciations applications—and also underlined how much the prices of some of these useful circuit blocks have fallen recently. But not all readers may have appreciated the important new opportunities these devices give to the home constructor in reducing the time required to develop and put together relatively complex equipment.

This point has been well made by Frank Wiseman, GW3GRY, who has been looking into applications of the Plessey SL600 series of linear ICs, described recently in *TT* (March 1970). However, he also puts forward views which are fundamental to the recent pleas for more individual design and construction activities, and his letter well deserves quoting in some detail.

GW3GRY regards himself as belonging to what could be described as the middle generation of amateurs—those licensed not too long after the war in the days when the majority of equipment was still home constructed. Many such amateurs regret the passing of that era, although fully appreciating the varied and valid reasons for this: the increasing calls on time as other responsibilities intensify and the enormous difficulty of keeping abreast of all the technical developments. So, as the years go by, major constructional projects become fewer and fewer and the temptation to go "all commercial" becomes stronger and stronger.

In this environment, GW3GRY feels that it is surprising that, as yet, the amateur journals are not stressing the new opportunities for home design and construction that integrated circuits are bestowing upon us all; his own first experiments in this field are sufficiently encouraging for him to wish to pass on the message to others. After some years of operation with equipment based primarily on G2DAF's excellent and highly respected designs, he cherished a desire to build a single conversion (with low rf gain) transceiver built around a modern hf filter. Like many others he shrank from the effort and time which would be involved in such a major project using discrete components.

But a few months ago his imagination was fired by obtaining some of the Plessey SL600 series of ICs of the types mentioned in the March *TT*. The resulting project has been built in simple modular form utilising Veroboard construction in unit die-cast boxes around one of the well-known KVG hf filters. Although the transceiver is still incomplete, the receiver section is already outperforming his main station receiver, especially in terms of quietness and selectivity, and the ssb generator is producing immaculate sideband on 9MHz.

The really important point, however, is that this has been achieved with such a reduction of time and constructional effort compared with his constructional work a decade ago, that it has left GW3GRY "astonished at the paucity of information and designs based upon such devices, which are now becoming readily available."

His own unit utilizes, in the receiver chain, one SL610 rf amplifier; one SL641 frequency changer; the KVG filter; one SL612 i.f. amplifier; a conventional twin-transistor product detector; one SL630 audio output stage; and a SL621 to provide audio-derived agc. Originally a second SL612 device had been used in a two-stage i.f. strip, but this was found totally unnecessary, and overloaded the following stages. The crystal oscillator and vfo (based on W3JHR's "synthetic rock" circuit, *ART*) are entirely conventional. Ssb generation is by an SL640 modulator, audio fed from an SL630 device, controlled by an SL620 to give painless control.

Final frequency conversion on transmit (not complete at the time of reporting) will use a further SL640 with final power amplification by means of a conventional two-stage valve amplifier. At present the unit is confined to 1·8 and 3·5MHz using switched vfo, but this will be extended to all bands by means of a heterodyne crystal/vfo mixer unit. The only constructional feature which GW3GRY has found it necessary to pay special attention to is to ensure adequate decoupling and impedance matching. If this is done, "first time" results ensue.

His main purpose in describing his pioneering effort with integrated circuits in a major project is to indicate that the technology has now reached a point where it could and should stimulate the constructive side of our hobby—thus reversing the trends over several decades which have tended to inhibit home construction. He believes that the integrated circuit could lead to a real revival in constructional activities.

Perhaps what is needed to trigger off this spate of new equipment are a few basic constructional articles, equivalent to the series with which G2DAF did so much to encourage a new look at complex receivers and transmitters in the early 'sixties.

Sic audio filters

Active audio filters using integrated circuit amplifiers form one way of making a start on using ICs. A tunable filter with both notch and peak facilities based on the RCA CA3020 is described by W2EEY in *Ham Radio*, March 1970. He also provides a version of the same filter using discrete transistors: see Fig 1. Both these filters, however, require a three-gang linear potentiometer (2x10k plus 5k) which may not be easy to obtain in the UK.

Another arrangement, using the Motorola MC1709G, was passed along some time ago by Bob Whelan, GW3PJT, who found it in *Handbook on RC Active Networks*: Fig 2. The *Q* of the filter, and hence the effective bandwidth, can be adjusted between 1 and about 100 by varying VR1, without changing the centre frequency, However, since the gain

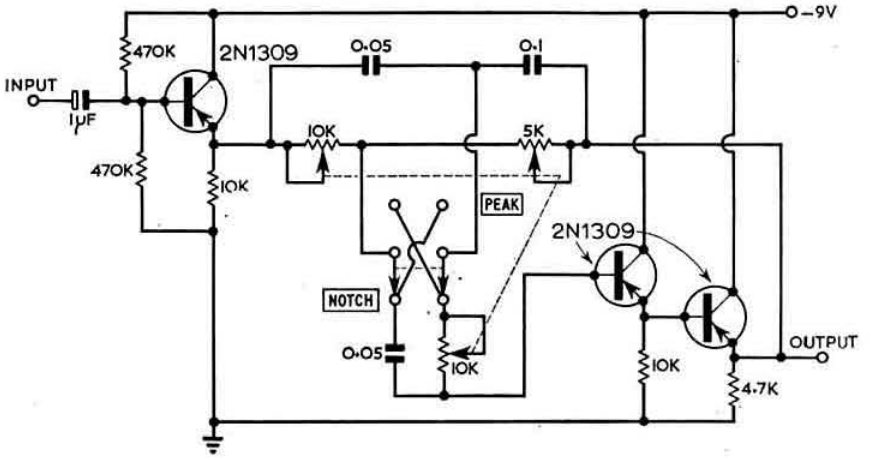


Fig 1. W2EEY's peak/notch tunable audio filter using the twin-T network provides high selectivity from about 500Hz to 1,750Hz. The twin-T network can also be used with fets or a linear sic

of the filter increases with the Q, while the ic provides only about 2V peak-to-peak, it is very desirable to limit the input to the filter by an agc system. Since the centre frequency is determined by R and C only, a variable frequency filter could be built using a two-gang potentiometer.

Centre frequency $fo = 1/(2\pi RC)$ for $fo \simeq 1$kHz R is 6·8k and C is 0·022 μF. With slider at top of 5k pot $Q \simeq 1$, gain about 1; slider at bottom $Q \simeq 100$, gain $\simeq 198$.

Barry Priestley, G3JGO, has also drawn attention to an af filter based on a twin-T network with separately variable gain and selectivity (*Electronic Design*, 15 February 1969). The figures suggest that this arrangement, which is basically similar to the W2EEY filter, could be of interest for narrow-band cw reception.

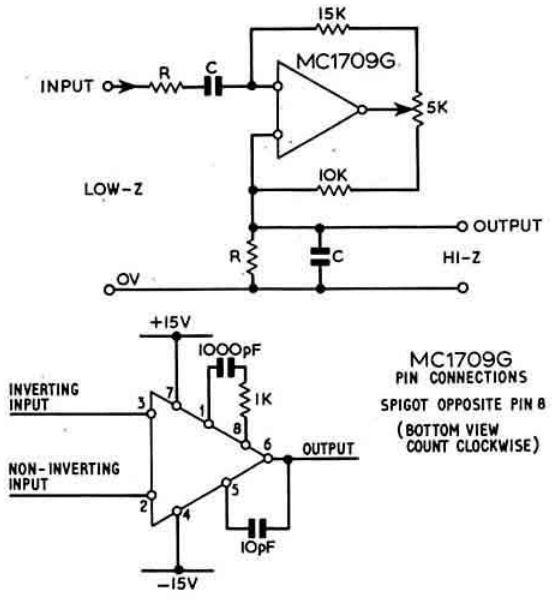


Fig 2. AF filter using MC1709G sic

Sic for agc squelch and vox

Last month G3PDM indicated several uses for the National Semiconductor LM170/270/370 agc/squelch amplifier integrated circuit. This device, which incorporates 34 transistors and diodes and 20 resistors, provides a particularly interesting example of how a sophisticated integrated circuit approach can overcome problems which would be difficult to solve satisfactorily with normal numbers of discrete components. Of these three devices, the LM170 operates over the widest temperature range but is appreciably the most expensive; for most amateur requirements the electrically similar but lower cost LM370 (just over the £2 mark) should prove entirely suitable.

A whole series of applications having relevance to amateur operation are described in the firm's application note AN-11 (well worth obtaining from Athena Semiconductor Marketing Company, 140 High Street, Egham, Surrey). These include techniques for the remote control of an audio amplifier using a dc control line; agc circuits with external or built-in detector; squelch pre-amplifier with hysteresis (audio squelch for noisy environments to suppress background microphone noises when not speaking); twin-tee regulated output audio oscillator; modulated 455kHz signal generator (using 455kHz ceramic filters as the resonant circuits); automatic load control for ssb transmitter (to prevent overdriving of a high-power linear rf amplifier); and vox preamplifier for transmitter or tape recorder (Fig 8b of G3PDM's article). Not a bad list for a single device plus a few external components.

Low angle radiation

On several occasions (*TT* November 1967, *ART* and *TT* June 1969) reference has been made to the truly interesting and spectacular possibilities which might arise from greater knowledge of extreme low angle radiation, chordal hop, layer entrapment, round-the-world echoes, trans-equatorial and similar unconventional modes of propagation. It is still by no means certain what, if any, link exists between these various topics, though some engineers believe that tilts in the ionosphere form a common thread. For a considerable time, I, for one, have been convinced that many of the best dx contacts on most hf bands are made by amateurs without

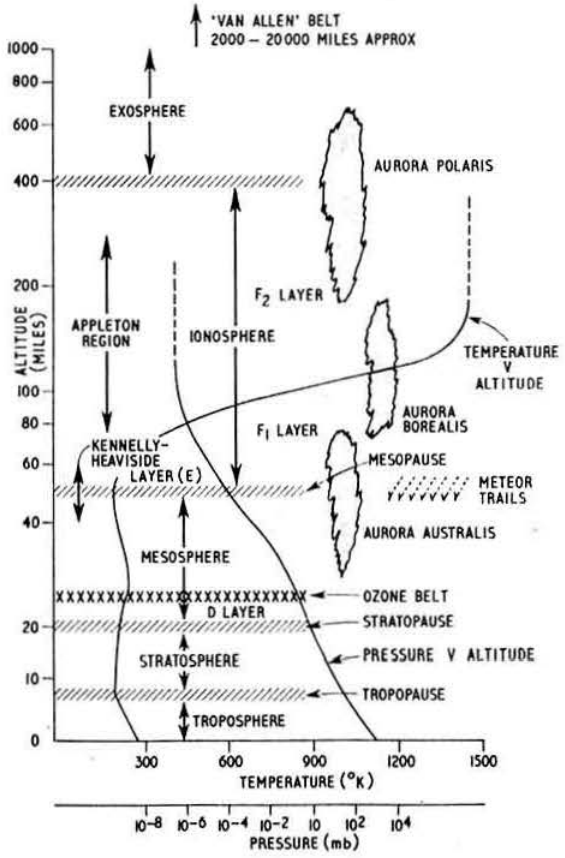


Fig 3. Earth's atmosphere and structure with approximate pressure and temperature versus altitude profiles—a basic diagram for all concerned with radio propagation (from the book *VHF radio wave propagation in the troposphere* by W. G. Burrows)

including in their calculations ground reflection attenuation which just does not always happen. More knowledge of these various effects would have very significant implications for those who chase top-band dx.

To my mind, what has yet to be fully determined is whether these interesting chordal hop paths (see Fig 4) occur only when suitable tilting of the ionosphere is occurring at the control points (about 1,250km from each end of the great circle path), or whether similar conditions can be generated at almost any time by very low-angle radiation. Interestingly enough, a possible explanation (although concerned with high-angle radiation) was put forward by H. W. Wheeler, VK5HW, in a letter in the *T & R Bulletin* in July 1934, who suggested that rays may leave the lower ionospheric layers at slightly different angles to which they entered them.

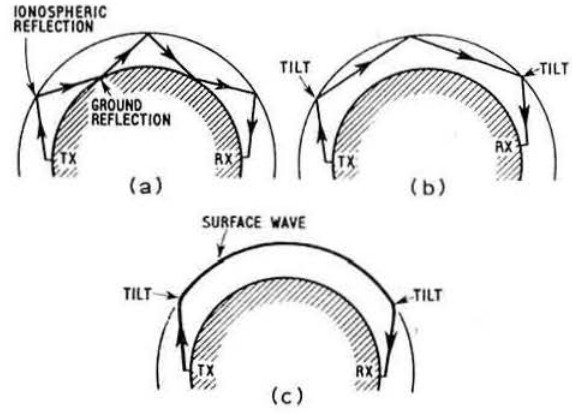


Fig 4. Chordal hop propagation of hf waves. (a) Conventional multi-hop path including the attenuation resulting from two ground reflection points; (b) chordal hop path resulting from ionospheric tilting at the first and final ionospheric reflection points—in practice the wave may be trapped between various layers of the ionosphere; (c) another possible form of chordal hop in which the wave grazes the underside of the ionospheric layer as a form of surface wave—it is not believed there is any experimental evidence of this form of propagation but it seems quite likely that it can occur

intermediate earth reflection points, and that the usual explanations in terms of multiple-hop paths are positively misleading. This does not apply, at least to the same degree, to the commercial point-to-point operators who normally work at the so-called "optimum working frequency" which is appreciably below the muf—it is where amateurs are working at or above the muf that such modes are most likely to occur.

That such phenomena extend both to mf and vhf, as well as hf, is also becoming increasingly evident. For instance, a report of recent observations made by broadcasting organisations (EBU Working Party B, Study programme 17A/VI) shows that several years of observations on the reception of mf broadcast stations over paths exceeding 3,500km indicate that (particularly at distances between about 6,000 to 9,500km) the actual strength of signals is appreciably greater than would be expected from extrapolations of normal propagation curves. It seems possible that this is another example where the experts have previously been misled into

It may be recalled that my notes in *TT* of July 1969 made reference to the important work in this field by Les Moxon, G6XN. For some considerable time he has been interested in determining the effects of sloping ground on radiation angles and how the chordal hop mode affects choice of sites for hf operation. Now, G6XN has published a most useful account of his low-angle radiation work in *Wireless World* (April 1970). Anyone interested in this subject—and there are possibly few aspects of hf propagation investigation having greater practical value to amateurs—should beg, borrow or otherwise "acquire" a copy of this article.

G6XN shows how difficult it is, under normal site conditions, to radiate effectively at angles of less than about 5° (that is without say 1,000ft masts), unless use is made of: (1) ground sloping steeply for a long distance above and below the actual site, extending possibly right down to the sea; (2) sloping ground utilising profiles which break up the Fresnel zones; or (3) the use of the sea as ground plane. Using portable sites selected on these principles, G6XN

has shown that it is possible to work VK readily with powers of about 1W using an inverted -V dipole having a maximum height of only about 20–25ft on sites having a ground slope of about 30–40°. At his fixed site, with ground sloping towards VK at an angle of about 22°, careful comparisons with G3DVM show the value of low angle radiation *as the path opens and fades out.*

He also describes a fixed low-angle beam aerial for 7MHz (Fig 5) making use of vertical polarisation but reducing mast height requirements by using the horizontal supporting wires to provide end-loading of the shortened vertical elements.

G6XN concludes that where there is freedom of choice of location (that is, for portable operation) a low angle of radiation is readily achievable by exploitation of natural ground features. But he also underlines that much more needs to be learned on optimum radiation angles (interesting papers on this subject include one by A. T. Low and B. V. Harris in the IEE "Convention on HF Communication" 1963 book and another by a GCHQ team in *Proc IEE*, February 1969).

As the original QTH of G3VA was on the steep lower slopes of the North Hill at Minehead, this subject of utilising ground slope has always been of interest to me, and I can certainly confirm—as many other amateurs could—the advantage such a site gives in the direction of the slope. Perhaps the most important thing to remember is that (as for earth conductivity) what matters is not only the conditions immediately below the aerial but extending out to many wavelengths around. Read carefully what G6XN has to say on this subject!

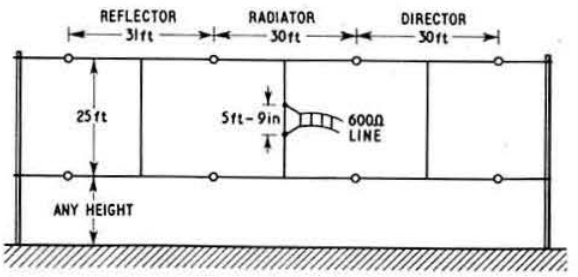


Fig 5. G6XN's low radiation angle aerial for 7MHz. The reflector and director are tunable by adjusting the length of verticals or lower horizontal wires. (*Wireless World*)

Fuse-links

For most of us, fuses or, more correctly, fuse-links tend to be dismissed as simple devices which have a nasty habit of blowing at the most inconvenient times, often for no apparent cause, or alternatively failing to blow fast enough to give the protection required. One of my own first appreciations that even domestic fuses could be much more ingenious than just a thin wire in an awkward-to-get-at porcelain block came in Germany at the end of the war in the form of houses fitted with effective miniature contact breakers (for example, rated at 2 and 6A) which could be reset by just pushing a button (and which would not reset if there really was a short-circuit on the line). There was also the Continental screw-in type domestic fuse which usefully provided immediate visual indication of its condition, and was well within the capabilities of all XYLS to replace.

For the protection of most electronic equipment, the standard current-operated fuse-link is the simple wire-type cartridge unit. The snag with this is that it tends to be blown too readily by switch-on surges. For this reason, various anti-surge and temperature-operated fuses are also used, although one seldom sees much reference to them in amateur journals. It seems worth-while trying to throw a little more light on this seldom considered but useful component, and also to indicate why it is important always to replace a fuse-link with one of similar characteristics.

The conventional wire cartridge fuse is intended to be fairly quick acting, but this means that it may blow when an equipment is switched on due to the surge current arising from smoothing capacitors charging up and/or the heavy current which flows in series-connected heater chains while the heaters are cold. The two main types of anti-surge fuse-links are those using thin magnesium-nickel wire, and the more widely used technique of having a soft-soldered (low-melting point) joint under spring tension: see Fig 6. Heavy current is converted into heat by the resistance of the spring: a continuous or repetitive overload produces enough heat to melt the solder and the spring does the rest. While this type of device will seldom be activated by a switch-on surge, it must be appreciated that it will take some seconds to respond to a moderate overload (typically up to 10 seconds for double the rated current).

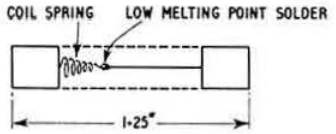


Fig 6. Construction of anti-surge cartridge-type fuse-link

Another type of temperature operated fuse which has been used in some equipments is one built into a mains transformer. In this case, a copper strip inserted between ht and heater windings conveys heat to a low melting point solder joint under tension; this will spring apart and break the mains input to the transformer. The fusible alloy used with this type of device may be a mixture of bismuth, lead and tin in specific proportions to produce an "eutectic" alloy (one which melts rapidly at a specific temperature). This type of fuse can be reset, but it is important not to change the proportions of the fusible alloy, for example by adding solder (the soldering iron should always be cleaned before use to prevent this happening).

A problem with low melting point solder fuses is that the rating may be affected by the ambient temperature. For example, a typical cartridge anti-surge fuse-link rated at 600mA at 35°C would probably represent a fuse-link of about 480mA at 70°C ambient.

It should always be remembered that cartridge fuse-links have resistance (otherwise they would not operate), and this may be appreciable for light duty units. For example, a 50mA fuse-link is likely to have a resistance of some 80Ω or so. Strictly speaking, a fuse needs to be designed into an equipment, noting not only possible effects of introducing the fuse resistance but such factors as input impedance, values of current at switch-on, both when the equipment is cold

and when it is hot, what type of current increase will be caused by the failure of various components, and the maximum mains supply voltages which may occur. For example, a domestic television set may have a current value reaching some 50A when switched on around the peak of a mains input voltage cycle, though this current will only last about 0·5 millisecond.

Dual-purpose neon pilot light

While on the subject of fuses, an ingenious means by which the neon-bulb pilot lamp can double as an indicator warning that a fuse has blown was noted recently in *Electronic Design* (4 January 1970). The neon-bulb acts normally as a continuous light unless the fuse has blown; it then continuously flashes, showing that mains supplies are connected: see Fig 7.

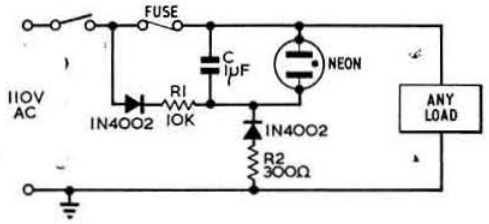


Fig 7. Dual-purpose neon pilot bulb in which the bulb flashes to indicate a blown fuse. The diode in series with R.1 is D1, and D2 is in series with R.2.

With the fuse normal, D2 forms a rectifier and applies current to the neon, with D1 acting as a blocking diode the light thus functions continuously. If the fuse is open-circuit, however, D2 blocks but D1 rectifies and with R1 and C1 forms a relaxation oscillator, pulsing the neon on and off. The various resistance values in the diagram are those suitable for 110V supplies, and the values will need some adjustment for 240V mains and for various types of neon bulb.

PA screening versus ventilation

Recently (*TT* March) it was suggested, with some trepidation, that perhaps we sometimes pay too much attention to transmitter ventilation and too little to really effective screening of the power stages, resulting in cool tvi. Admittedly, the limiting factor in the operation of ssb transmitters using tv line-output (sweep) valves is often envelope heat, and one would have to be very careful in reducing ventilation of equipments using this category of valves.

But for many months we have been using a TT21 Class C virtually enclosed, in a fairly large transmitter cabinet with no ventilation holes, without apparent harmful effects. This suggestion also seems to be borne out by some useful measurements made by W. F. G. Reid, G3CPA.

Using temperature-sensitive paper, he has measured the valve envelope temperature of his cw Class C power amplifier under extreme conditions. He uses two TT21 in parallel in a screening box 9 by 9½ by 7in high. Natural ventilation is provided by 35 $\frac{5}{16}$in diameter holes drilled around each valve base, and similar holes in the lid of the box. During the tests the pa was operated into a 150W lamp load with 50 per cent overload (225W input) running continuously first for 10 minutes and then for 30 minutes, with no keying. Both tests resulted in an envelope temperature of only 150°C, or some 100°C below the maker's recommended maximum temperature of 250°C. In practical operation, keying and receive periods would represent far less severe conditions.

These practical tests do seem to back up the view that maybe we worry too much about ventilation, at least with some valves. As G3CPA puts it: "I only wish the tvi level was as low as the temperature rise." On the general topic of screening, it may be worth reminding readers that double screening (a box within a box) is very much more effective than single screening.

There is less enthusiasm for another suggestion made at the same time—the reminder about absorptive filters. G3JGO suggests there is little evidence that these are likely to prove more effective than the conventional type—though more information from anyone who has actually tried them would be welcome. Even if the absorptive filter (*TT* February 1969) has its limitations, there can be little question that the accompanying suggestion of using double-clad printed circuit boards for filter construction has considerable merit.

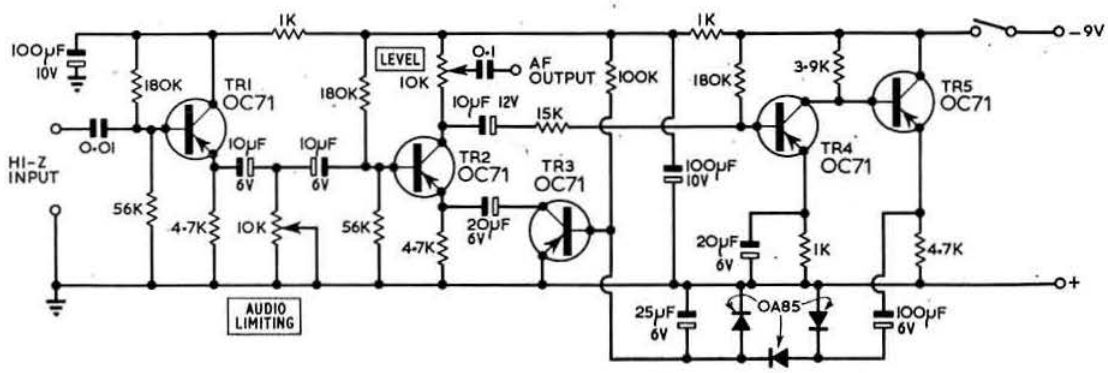


Fig 8. ZL1UI's audio peak limiter for ssb, nbfm or a.m. applications

Audio peak limiter

For those with a handful of transistors rather than integrated circuits in the junkbox, a useful looking audio peak limiter which is claimed to be suitable for ssb, am and nbfm has been described by Ian Cardno, ZL1UI, in *Break-in*, October 1969. This allows of the order of 10dB more average output, has fast attack (approximately one millisecond) and about 100 milliseconds release time. The original article provides details of a compact printed circuit board, and it is reported that a number of New Zealand stations are using the limiter (Fig 8) successfully.

A high-impedance emitter follower (TR1) is followed by the gain-controlled stage (TR2) using common-emitter configuration with the emitter by-passed through TR3 which controls the gain; TR4/TR5 form a dc current amplifier the output of which is rectified by the diodes to provide the control voltage for TR3, limited to about 0·2V by the OA85 connected directly across C1, allowing fast release even on loud noise pulses. The whole unit should be well shielded to prevent rf pick-up and hum, not forgetting the input and output leads.

Setting up procedure as outlined by ZL1UI is as follows:

Adjust transmitter audio gain for correct operation before connecting the limiter. Note setting and do not change it until after R2 has been adjusted.

Transfer microphone from transmitter to limiter, and connect limiter to transmitter audio input. Switch on the limiter and set R1 at maximum. Speak into microphone normally and adjust R2 for correct operation: do not afterwards change setting of R2. Adjust degree of limiting by R1 (up to about 12 to 15dB of limiting). Adjust transmitter audio gain control for correct operation with desired amount of limiting.

Since it is possible to overload the limiter, R1 should be adjusted so this does not happen. With a limiter in circuit it is desirable to avoid breathing and background noises as far as possible. Remember that the use of a limiter will impose additional demands on the transmitter, which will have to operate almost under cw conditions—so watch for overheating. Audio frequency response should be shaped as far as possible to 300 to 3,000Hz.

Class B licences

Several interesting (and far from abusive) letters were received as a result of the recent suggestions on encouraging Class B licensees to learn Morse. For the moment we must deal with two of these rather briefly.

I must admit to being puzzled at what appears to be Minpostel, Post Office and RSGB policy in suggesting that "the Class B licence is not intended for threshold work"—if Geoff Rogers, G8ABB, has understood the position correctly. Surely only by being prepared for operation down to the weakest possible signals can the amateur, whether Class A or Class B, hope to advance the art of radio communication. If, in fact, Class B operators are supposed to confine their activities to good strong signals then it is no wonder that some operators are warning that 144MHz could rapidly become merely a "natterers' band". G8ABB would like to see Class B given an additional cw facility on the lines of the American novice facilities. I suppose there could be arguments against this—but hardly that of writing off Class B as a non-threshold service!

Malcolm Jones, G8BGE, suggests that G8s qualifying in cw could be allocated a G4-three-letter call with the same call letters, provided that the Minpostel reserves the early block of G4-three-letter calls (generally expected to come into use after G3ZZZ is issued) for this purpose.

Book Review

The Radio Amateur's Handbook (47th editon—1970) by the HQ staff of the ARRL. 657 pages, profusely illustrated, including 582 valve-base diagrams and many tables. Price 57s, postage paid, from RSGB Publications, 35 Doughty Street, London WC1N 2AE.

This handbook, known so well internationally, has been published continually since 1926, and more than four million copies have reached the hands of radio amateurs, students, professional engineers and scientists. Considerable revision has been made in both the theory and construction sections, many illustrations have been helpfully redrawn, and much new material added.

There is an attractive fet converter for 14, 21 and 28; this would liven up an old receiver whose top bands lack sensitivity. It employs a JFET common-gate rf amplifier, so neutralization is no problem as the gate is earthed.

A direct-conversion receiver for beginners has Mark I and Mark II versions. It tunes 3·5–4MHz and has converters for 7, 14, 21 and 28MHz. It employs three transistors, three diodes and an integrated circuit in the main amplifier, and two FETs in each converter. The Mark II has, additionally, an rf control, an ic 1W audio amplifier a band switch and a loudspeaker/headphone option.

A more elaborate single-conversion receiver operating 80 to 10, inclusive, is the HB–70: it uses circuit-board modules, and has a 9MHz crystal-lattice i.f. filter, a 100kHz calibrator giving strong markers through the 28MHz band, a vxo circuit giving a bfo variation of 5kHz, and a "hang agc" circuit.

It is noteworthy that of the hf receiver designs shown, all are transistor operated, though circuits for valve noise-limiters, discriminators, etc are still described.

New on the transmitting side is a transistor QRP rig for 3·5 and 7MHz, giving an output of about 2W, for home or field use; and a "Novice Special" valve CO–PA (and PU) for 3·5 and 7MHz, rated at 15W. The 2kW pep amplifier has been slightly modified and there is a new SS-70 2kW amplifier, connected for grounded-grid operation, using a linearity-indicating circuit which samples input and output waveforms, rectifies them, and compares their difference voltage by means of a centre-zero micro-ammeter.

Two new low-noise converters, for 50 and 144MHz, with a gain of about 30dB, a noise figure around 2·5dB and an i.f. of 28–30MHz, ensure good conversion gain in the mixers and good immunity to cross-modulation by using dual-gate MOSFETs. They use commercially-made circuit boards. Also new is a solid-state converter for 1,296MHz, using a simple crystal mixer in a tuned trough-line circuit; the oscillator, doubler, doubler chain feeds a diode multiplier in the first trough-line, to get a multiplication factor of five, and so produce an i.f. of 144MHz.

In vhf transmitters, there is a 500W fm and cw job for 220MHz, and a 2W solid-state 50MHz circuit for QRP or as an exciter.

A 144MHz omnidirectional pylon slot aerial, which will surely have attraction for the amateur in a city, is described with full constructional detail.

The section on mobile and portable emergency equipment has been completely rewritten and improved. Noticeable are home-made mobile loading coils, impedance matching of whips by L networks, continuously-loaded helical whips for higher efficiency, a JFET pre-amplifier for fm mobiles, a portable transmitter for 21MHz and a 144MHz solid-state transmitter.

In the measurements section an in-line rf wattmeter and swr bridge for use from 3 to 30MHz looks very useful.

This edition is fully up to the very high standard of the previous editions of this famous handbook.

T. P. A.

Where TVI is a problem

D. G. Pinnock, G3HVA, clarifies points arising from his "top band to ten ssb transmitter" article

Following discussions with Barry and Kay Priestley, representing the TVI Study Group, I would like to clarify a few points in the second part of my article, particularly references made to the use of filters.

My definition, on page 78, that low-pass filters are "fine" must be read in the right context. I wished to point out that many operators tend to blame their failure to cure tvi on their low-pass filter, when, in fact, a whole host of harmonic leakage points exists on the transmitter cabinet. Barry quite rightly points out that circumstances could exist where a filter is out of alignment due to being ill-treated in the post or because it was never aligned correctly in the first instance. In such cases re-alignment can make a world of difference, in the same way as with the harmonic traps described in the article.

The term "shock excitation" tends to be used rather loosely and is sometimes employed to indicate strong-signal effects, such as blocking, cross-modulation and intermodulation. It was used by the author in this context. It is decidedly better *not* to use this term at all if it conjures up visions of completely extraneous oscillations and such-like being produced by the big-signal effect.

My assertion that standard TCC filters have always effected a cure in cases of fundamental blocking cannot be taken as typical, especially as more transistorized tv front-ends are introduced. Barry feels that in probably 90 per cent of cases they would quickly and conveniently "do the trick". However, in a transistorised tv receiver where the gain is only 1dB down at 29MHz with respect to the tv frequency, more protection may be needed. Since the TCC filter was not specifically designed for amateur applications, it has no notches outside the 33–39MHz region and its attenuation at 29 and 21MHz is not great.

G3JGO points out that other types of filter, such as ferrite transformers, Faraday loops and toroids are mode filters designed to prevent rf flowing down the outside of the coaxial downlead and making the tv chassis live at the fundamental frequency. This point should have been mentioned by the writer, who feels that many operators, having tried standard TCC (or similar) filters, were fitting all sorts of gimmicks in the hope of producing a miracle cure, when, in fact, harmonic leakage at the transmitter was the real problem.

The effects of operating the tv fine-tuning control as a means of ascertaining the offending gear relate to sound-bar patterning and not to the herringbone pattern caused by a steady carrier which behaves in the opposite manner.

On the subject of harmonics, the author would challenge strongly the accuracy of statements made in the *Radio Communication Handbook* regarding the procedure to be adopted when suppressing tvi, particularly in relation to dummy loads. The table devised by G2IG was obviously put forward in good faith as a quick and adequate means of cure. However, the statement "transmitter on dummy load—QRM clears, therefore transmitter is adequately screened and filtered" is sadly wrong for fringe areas. It is possible to run a transmitter with quite a high level of harmonic content on its cabinet, in close proximity to a tv receiver, with no apparent effect. Immediately an aerial is connected to the rig, all hell is let loose in the neighbourhood. A similar situation existed at the G3HVA shack before double screening was applied to the pa. It is essential, therefore, that the probe test (either with a tv receiver or harmonic indicator) be applied before the dummy load is dispensed with.

Finally, in case anyone doubts the need for adequate shielding, here are a few figures. Luton, where the tests were carried out, is 35 miles from the Crystal Palace transmitter. It needs only a 2μA harmonic level at the atu, using the indicator described, to obliterate the picture on BBC 1. The average leakage detected due to poor control shaft mounting is 1–2μA per control and a conservative figure for untreated meter holes and dial apertures is 8–10μA. Coaxial and other connections applied directly to the chassis of a transmitter without the precautions described in my article can easily render a full-scale reading. Try measuring your rig sometime!

The Bermuda Amateur Radio Contest for 1970

Dates: Phone, 0001gmt 20 June to 0200gmt 21 June;
cw, 0001gmt 18 July to 0200gmt 19 July.

Bands: 3·5, 7, 14, 21 and 28MHz.

Exchanges: Amateurs in the USA, Canada and the UK will transmit a two figure number representing the RS report plus their state, province or county. CW participants will transmit a three figure number representing the RST report plus their state, province or county. VP9 stations will give RS or RST reports plus parish. USA and Canadian stations may exchange reports with UK and VP9 stations only. UK stations may exchange reports with USA, Canadian and VP9 stations only. USA and Canadian stations may not exchange reports with another USA or Canadian station; likewise UK stations may not exchange reports with other UK stations.

Points: Each contact must be complete and will count three points.

Scoring: The score for USA, Canadian and UK stations will be the number of complete contacts times three points, times the total number of Bermuda parishes worked on all five bands; ie a USA or Canadian station having made a total of 500 contacts with UK and Bermuda stations and the following Bermuda parishes: 28MHz—three parishes; 21MHz—six parishes; 14MHz—three parishes; 7MHz—two parishes; 3·5MHz—two parishes; the score would be 500 contacts times three points = 1,500 points, times 16 parishes = 24,000 points final score. A UK station completing 500 contacts with USA, Canadian and VP9 stations would score in exactly the same manner.

Equipment: Any number of transmitters and receivers will be allowed and competitors may use the maximum power permitted. However, all stations participating must be single operator only.

Awards: A trophy will be presented to the winner of each mode. A certificate signed by His Excellency The Governor of Bermuda will be sent to the highest scoring station in each call area as follows: USA and Canada: W1 through W0 and VE1 through VE7 including VO. UK: G, GD, GM, etc.

Presentations: Round trip air transportation for two plus one week's accommodation at the Top of the Town Hotel will be provided to enable the overall winners to attend the Radio Society of Bermuda's Annual Banquet, to be held on 22 October, and to receive their awards.

Log instructions: Keep all times in gmt. All contestants to compute their own scores and check logs for duplication to assist the contest committee. Print name and call on each log. All contestants must sign a statement that the rules and regulations have been observed. Official log sheets can be obtained by sending a card to: Contest Committee, Radio Society of Bermuda PO Box No 275, Hamilton, Bermuda.

Note: Should there be a tied score, the decision of the contest committee will be final. All logs must be received by the contest committee of the Radio Society of Bermuda not later than 15 August 1970.

The following abbreviations of parishes will be used on cw:

Sandys	SAN	Smiths	SMI
Devonshire	DEV	Hamilton	HAM
Pembroke	PEM	Paget	PAG
Warwick	WAR	St George	GEO
Southampton	SOU		

FOUR METRES AND DOWN

A monthly account of vhf activity and news compiled by JACK HUM, G5UM*

D-I-Y

At more or less the same time as these pages go to press, someone will be travelling home from Twickenham carrying with him the symbol of supreme prowess in vhf building—The 1962 VHF Committee Challenge Trophy. This trophy, which has as its purpose the encouragement of home construction of metre-wave equipment, was put up by the Society's VHF Committee eight years ago, and it is awarded annually at the VHF Convention. Judging of entries is customarily done by two distinguished invitees at the convention.

To assert that it is in the area of vhf and uhf where most home building is done today would be rather less of a wild guess than might be supposed. It seems to be a fact that when local radio club constructors' competitions are held, metre-wave submissions tend both to be in a majority and to sweep the board when it comes to prize winning. Certainly the annual VHF Convention competition never fails to attract outstanding examples of the art.

* * *

It is sometimes said that amateur radio home construction is a declining art. But then it always has been: the decline dates from the time when men stopped fashioning variable condenser vanes with the help of tinsnips because they found they could actually buy them in the shops; or perhaps from the time when they could obtain over the counter a solid block of ht battery to power the one-lung transmitter at home instead of being compelled to connect together a host of flat torch cells with clips—the resultant contact resistance must have been *positively* fabulous.

The decline became even steeper—the angle must have tilted quite 10°—by the mid-'thirties when ready-made commercial superhet receivers with real bandspreading insinuated themselves into the shacks of the well-heeled; the remaining 2·9k of British amateurs (there were about 3,000 of us then) remained content with the good old home-built trf in that era of depression when £4 pw was a good wage.

They say the decline in amateur radio do-it-yourself has grown steeper than ever in recent years because to build the complicated equipment capable of meeting present standards is so time consuming as to leave no man hours to spare for going on the air. Constructing and communicating do not mix: you can do one or the other but not both at the same time—*pace* G3JKY who is able to sort components with one hand while twiddling the bug key with the other, and *pace* those who address themselves to a spot of soldering while awaiting a turn in the local net. It seems that to enjoy any expectation of ever going on the air *some* of the gear in the radio room must perforce be bought, not "done yourself".

Fortunately where vhf is concerned, much of the essential equipment *can* be built at home rather than bought. To get going on "Two" these days with a one-off-the-kitchen-table transmitter capable of bringing every credit to the personal callsign is, in the opinion of many, easier than making and commissioning a multi-band rig for hf. This may well explain the accelerating rate of increase of Class B licensees: it really is easier to get going on "Two" than on "Ten".

What emerges from off the kitchen table is more often than not a basic but quite clean sounding rig of standardized design. (We are firmly excluding in this context adaptations of "professional" rigs: cannibalize them and start from scratch). It is when complication sets in—essays into mixer/vfo techniques, sideband or whatever—that the consumption of time gallops. And it is then that the ordinary member, gazing wistfully at marvels of design and construction like the G2AIH ssb transmitter for 70cm (see *Radio Communication* Nov/Dec 1969) or the G3HBW transceiver with three phase-locked oscillators in it (winner of the Constructors' Trophy at the 1968 VHF Convention), becomes all too aware of the limited ration of expertise and man-hours he has at his command.

Which is a pity. Much of what is being built if worth *hearing about* over the air is worth *seeing*, either locally at the radio club constructors' competition or nationally at the VHF Convention or the RSGB Show.

How to persuade the ordinary constructor, as well as the extraordinary, to exhibit what he has built is something which should be exercising the minds of all who feel that the submerged nine-tenths deserve to be brought out into the light of day. Grading exhibits in terms of originality of design and excellence of finish is the time-honoured formula for producing the highly developed next-generation devices without which the amateur construction movement would atrophy. A different formula seems to be required to bring forward the present-generation devices which most people build which may not be world shaking but which offer much to engage the interest.

To get discussion started on this point we offer the following suggestion: when at the local club's annual constructors' contest the initial selection has been made of the first prize-winner (he generally becomes trophy-holder for the year), group all remaining worthwhile entries together and select, say, three by ballot to receive secondary prizes or certificates. By this means all participants will feel they stand a chance of an award.

What seems evident is that, unheralded and unsung, home construction of metre-wave equipment continues on a large scale, impelled by the urge that is as old as amateur radio itself—that producing with one's own hands the means for one's own communication offers fulfilment of an exceptionally satisfying kind.

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

Two more "firsts" on 23?

Two contacts on 1296MHz made from GD3TPF/P are believed to be the first GD to GW and GD to G to be made on the 23cm band. Any prior claimants are asked to say their piece now. As has been mentioned here before, any information about early records on *any* of the centimetric bands is welcome at all times, both to keep the record straight and indeed started, where lumens have been concealed under bushes for too long.

It was on 22 March that the Cambridge University Wireless Society's expedition to the Isle of Man worked GW3XAD/P (59 both ways) and it was on 23 March that the same station, GD3TPF/P, worked G3XAD/P, this time on cw at 559 both ways. Both contacts were at the 100-mile limit from favourable locations in decidedly unfavourable weather: "Keeping the dish pointing in the right direction with 100 mph gales to contend with was not easy," reports Steve Cripps, G3TPF. Even so, at least one station in a less favoured location, G3NKL of Preston, logged the 23cm signal (RST339).

In spite of conditions—in every sense—the GD portable worked as far as Suffolk on 70cm: G3LQR no less. He was also the best dx on "Two". This on the key; which provides another quote from Steve Cripps to the effect that "Had many more people plugged in their keys and used them at the bottom ends of the bands more QSOs would have been made."

He asks that thanks should be given to all who helped make this rather arduous expedition the success it was ". . . in particular Willie McLintock, G3VPK, whose Honda generator obediently churned out power the whole time without giving any trouble whatsoever."

The dx front

Good news for those who want to work Gibraltar on "Four" during the present period of favourable propagation is that ZB2BO will not be leaving The Rock at least until the end of this year's Sporadic "E" season. He is using 70·2, 70·26 and 70·47MHz in that order of preference. And although the beacon transmitter went back to the UK some time ago, the keyer is still to hand: "I will run it into my 4m tx when I'm around," says ZB2BO.

* * *

As for Sporadic "E", here is a queerity reported by G3PFR of Warrington. Between 1406 and 1423 gmt on Sunday, 1 March he noted the presence of several strong cw stations in the lowest 100kHz of the band, all exhibiting flutter, and virtually non-directional on the 10-element beam apart from a slight peak to ESE. Among them were UA3CW and OE3VR, which at 2m represent extreme dx. At the same time GB3VHF was registering "ten over nine", clearly indicating that something was afoot. This "lift" was evident both on the HW100 and on a separate receiving system. It dropped out as abruptly as it began.

Earlier that day G3PFR had noted strong bursts of solar noise in the 2m band, both during the GB2RS news bulletin from Sutton Coldfield and about an hour later. Any other reports?

* * *

Meteor-shower forecast: the Aquarids are due between 1 and 13 May, not normally very productive of dx. They are rated by an observer as "very swift meteors with long paths". Nevertheless, a cw watch on 144·1MHz might be worth keeping.

* * *

Coming back to the great events of 8 March (that Aurora), G3JKY describes how a presage of what may occur on "Two" is sometimes provided on the lower frequency bands. He says, "During the 144 Open Contest I was operating in the BERU Contest (Cries of 'Shame' from the vhf types). When I heard GW3OAY and VO1AW on 14MHz with partially scratchy notes followed by G3FXB and G5RP with no normal note at all, I went over to 144. In spite of many calls I wasn't able with 10W to raise anyone, but 'gotaways' included half a dozen different countries. I guess 10W isn't much use against higher power when the advantage of selectivity is removed. At times GI3RXV, G3JYP and EI6AS were on at once and their signals just merged."

A 'gotaway' for EI6AS was LX1SI: the QRM from the UK blotted him out just as he began to call—and it would have been an EI to LX "first"! Albert Latham notes that WWV was broadcasting ionospheric disturbance warnings the day before. In all, 13 countries were heard or worked from Dun Laoghaire.

* * *

Much of the monitoring work done at G3WBQ in Surrey is on 4m and up, meaning the television frequencies below our 70MHz band. These, during The Great Aurora of early March, produced in conjunction with 4m "anomalies" four full log pages to go to the Scientific Studies Committee. Examples: the Ventnor pipsqueak transmitter (50W) and almost everything upwards in Band 1 went auroral, with special interest in the tv transmitter at Gort in Ireland, apropos which Trevor Brook remarks: "Its frequency of 59·75MHz is of great interest as it is also the lowest USA television sound frequency, using similar 40–50kHz fm. On this channel USA stations have been received twice during the last year in Scotland by Ar. Peak time for America is probably about 2330gmt (they do have all night and breakfast tv)."

Where "Four" was concerned the value of the amateur beacons was demonstrated by the emergence of EI4RF (70·325MHz) while GB3SU at Sheffield went totally auroral, reports G3WBQ. And GB3GM peaked at 12dB above noise.

Under normal conditions G3WBQ detects much dx via meteor scatter. What happens to it when Aurora intervenes? He reports: "The effect of meteor scatter absorption which has been noted often on GB3GM showed up here for the first time convincingly on the more southerly sited Meldrum, near Aberdeen, on 8 March. There was a marked aural lack of meteor pings and a sharp reduction in the number of upward spikes on the pen recordings."

At Storrington Ron Ham detected a large group of sunspots on 8–9 April that induced a noise storm on his recordings on 136MHz. This *might* have turned 4m auroral during the 11–12 April contest, but so far as one could observe, failed to do so.

* * *

"Is anyone interested in trying for the first two-way transatlantic 144MHz QSO without the use of the Moon or an artificial satellite?" The challenge comes from W2CUX, Orville Burg, of 210 Walter Street, Apartment F, Linden NJ 07036—and he has a superbly equipped station with which

to make the attempt. The transmitter, delivering 400W to a pair of yagis with 16dB gain, has worked into 30 of the US states down as far as W5ORH in Oklahoma, 1,430 miles by meteor scatter.

On the receive side one of the two available solid state converters has a claimed noise figure of 0·7dB. It uses dual gate fets.

As a Technician Class operator who must remain above 145MHz, W2CUX offers 145·01MHz as a working frequency, but would of course listen in our low end cw segment for replies.

Expeditionaries

EI2AX/P will be the callsign of the G3BA/G3BHT expedition to the Republic of Ireland later this month, 23 to 30 May, from 1900 to 2300bst daily, with an early morning session at the good dx time of 0700 to 0800bst, with cw and A3 on 145·5 and sideband on 145·41MHz. The sked list will have been made up by now, but a quick postcard to G3BA, 141 Russell Bank Road, Four Oaks, Sutton Coldfield, might find a slot available in it.

Later in the summer the Verulam Amateur Radio Club will be mounting another of the expeditions of the kind which in the past have been much appreciated by members seeking those last few cards required to give the 30 needed for the RSGB 2m award. They will be visiting Westmorland, Cumberland, Northumberland, Durham and possibly one other between 9 and 13 August, with four experienced vhf operators on hand to keep G3VER/P on 144·098 telegraphy and phone on 145·42MHz nightly from 2030bst. Says G8BNR, "All contacts will be skeds, but there will be the last 15 minutes of each hour free for all." So the thing to do is to write to him in good time for a schedule if you want one: Dick Wells, 279 Hatfield Road, St Albans, Herts.

Spots to watch

Here is another regular session on "Four" to add to that initiated by the West Riding group (page 250 last month). Look for some A3 on the A3 highway from G3ADZ/M to the following schedule: Monday and Thursday 0645–0815bst, Wednesday 1715–1845bst, and Friday 1600–1730bst during journeys between Petersfield and Kingston. Dennis Haylock is using a TW4 on 70·26MHz and offers phone or cw, mobile to mobile or mobile to fixed. "Four Meteorites" who would like a schedule with him from the top of Hindhead should write him at "Bowyers", Steepmarsh, Petersfield, Hants—or better still intercept him on 70·26 MHz and ask him to wait when he reaches the summit.

EI get-together this month

From Robert Williams, EI7AF, come details of a VHF Convention and Mobile Rally which he is organizing at what is for UK operators especially the convenient time of Sunday 24 May—the spring holiday weekend—and for EI and UK men generally the convenient place of Birr in the centre of the Republic of Ireland.

"Everyone is welcome, visitors and holiday-makers alike," say EI7AF, who advises application to 31 Main Street, Birr, Co Offaly, for tickets no later than 16 May. Costing £2 2s each, they offer lunch (1300bst), a lecture session, high tea, and diversions for the ladies which include a talk on beauty care or a drive through the Slieve Bloom Mountains by Mini-bus. Another attraction is nearby Birr Castle, the grounds of which are open to the public at a small admission fee.

There is a comprehensive and attractive afternoon programme which ties in happily with the presence of G3BA and G3BHT in Ireland on their latest vhf expedition, for both will be there to give the main lecture. Another well-known vhf man, Albert Latham, EI6AS, will also be present. The lecture session starts promptly at 1420bst.

Other attractions will include a bring-and-buy-sale, a display of home constructed vhf equipment, a free draw on the Convention ticket, and a bookstall with the *EI-VHFer* and RSGB publications available.

Talk-in will operate from 1000bst on 70·2MHz and 3·675MHz.

All this will centre on the County Hotel in Birr. And here visitors may stay overnight 22, 23 and 24 May if they wish—only 30s bed and breakfast per person so long as bookings are made promptly via EI7AF.

After Australis Oscar . . .

After the success of Australia's first amateur radio satellite, what next? Britain's "Project Trident", of course. And in the USA, where AMSAT has just reached its first birthday (congratulations to all OMs from us over here), there are plans for repeater satellites using higher-powered transmitters, ". . . to encourage participation by a large number of amateurs with much less effort on their part," as AMSAT president, K3JTE, puts it in the March *AMSAT Newsletter*.

The next American satellite will be called AMSAT Oscar B prior to launch and Oscar 6 after launch. It will be a long-life multichannel repeater device. To quote further from the *AMSAT Newsletter:*

AMSAT, with the co-operation of members in the Washington, DC area, will be responsible for the basic spacecraft; other member clubs or groups will build several experiment modules to be carried on board the spacecraft. The experiment modules will consist of two complete transponder (repeater) packages, as well as sub-systems like the command decoder, telemetry multiplexer and encoder, and power conditioning unit.

Specifications for the spacecraft and experiment modules are being drawn up and will be available shortly. Clubs responding to this "call for experiments" should use the specs as guidelines for the design and fabrication of the proposed modules, since the modules will be tested for compliance with the specs before being accepted by AMSAT. . . .

Opportunities for participation in this project exist on several levels. Right now, members with expertise in transponder design, solid-state circuitry and similar fields can be of great assistance in reviewing or supplementing the draft specifications. Member clubs and other groups might consider the design and construction of a transponder or another sub-system, but those without experience in the area should note that this is not a task to be undertaken lightly. Later on in the project we shall need lots of help in assembly and in testing. All members and member clubs who want to participate in the effort towards this new long-life multichannel amateur satellite are encouraged to contact Jan King, Perry Klein, or George Kinal, K2MBU.

The address of AMSAT is PO Box 27, Washington DC 20044.

. . . and during Australis Oscar

Back here in Britain the devoted work done by G2AOX, Bill Browning of Hendon, as Oscar co-ordinator was rewarded when on launch day, 23 January, he was the key figure in enabling AO5 plotting to commence at a time when the satellite was out of range of both the USA and Australian ends on the first few orbits. As a matter of history the following from G2AOX should be recorded:

"At 1125 gmt on 23 January George Jacobs, who was at the Goddard SFC, phoned me here. We held the call and I heard the last five minutes of the count down, and was able to set my chronometers to the exact time of the launch. We held the call for 20 minutes until it was obvious that all was OK and according to programme. I heard it here from 1244 to 1306, on both the vhf and hf bands. The telemetry was resolved during the pass by the Marconi frequency digital counter, and by 1315 I had contacted Reg Wigg, G6JF, who was running the rtty link, and the following message was sent to W3KV:

'A–O–5. Here are figures from G2AOX AOS 1244 LOS 1306 current 66mA volts 20, int temp 22 ext temp 30 hf tx on but weak.'

"This was passed to AMSAT at once, and then relayed to Melbourne, as the band had closed here by then. We here kept in regular contact with USA and Melbourne every day, via amateur radio only and not by a leased cable line!"

Bill Browning goes on to say that reports have been coming in almost daily. All have to be very carefully checked, as many have errors that would throw the computer averages right out; eg, suddenly quoting bst and then going back to gmt, wrong dates and/or orbit numbers, or no orbit numbers at all. All these have to be corrected before G2AOX sends them on to Melbourne. To date he has received reports from 18 European countries plus Rhodesia.

The last hearing at G2AOX of the vhf transmitter in AO5 was orbit 278 on 14 February, and of the hf transmitter on 8 March.

And now it is time for G2AOX to take it more easily, as he deserves to do, being retired and not in particularly good health. Willing to do predictions for future amateur satellite orbits, he seeks the aid of someone who would take over the paper work side, including the distribution of circulars. This strikes us as the sort of job one or two active retired members might care to take on. Any prepared to do so should contact Bill Browning at 47 Brampton Grove, London NW4.

Self help with beacons

One sometimes wonders what the non-vhf members of the Society must think about the proliferation of metre-wave beacons which the monthly beacon-box on this page displays, for they have every good reason to ask why there should be Society expenditure on services of benefit to only part of the membership. The same thoughts can of course be put into reverse: quite a few of the general services which the Society provides are not required by all of the membership. So back we come to the policy of meeting most of the needs for most of the time, as successfully implemented by the Council, taking care that minorities do not get overlooked, whether these be dx chasers on 14MHz or 144.

There is a good vhf beacon chain in this country, and it is run on a shoe string. To begin to pay recognition where it is due would call for the compilation of a list of all who help, either with site leasing, equipment provisioning and all the often complicated ancillaries that go along with the sending set, such as keyers, all at minimal charge to the Society.

And so one could go on to give acknowledgement to a profusion of sources (and resources) whence beacon aid comes, not forgetting the back-up team of beacon keepers who accept the Society's invitation to look after the local one in the clear eyed knowledge that the thing will fail only when the road to it is impassable.

So when Council considers the latest application to establish a metre-wave beacon service it knows in advance that a great deal of self-help will have preceded the proposal.

* * *

Britain's first 2m beacon dates back a dozen years to the time of the IGY, the International Geophysical Year, when an automatic sender, GB3IGY, set up at the magnificent site of G5KW in Kent did more than provide important vhf propagation over a long term. By helping also to sharpen metre-wave workers' realization of the value of a permanent frequency marker, it served as the prototype of the beacon chain we know today. Now there are services on 4m and 70cm, as well as on 2m where the concept began.

Because the service is widely regarded as "A Good Thing" there is just the lurking danger of getting into a "beacon happy" state. The enthusiasm which prompts the thought that "it would be jolly useful to have a vhf beacon in *our* district", although perhaps shared by others who enjoy the present service, needs to be set against the wider national need and the thought that perhaps on the "lower vhfs" the country is adequately beaconized already.

Here lies a problem for the future. Amateur transmitting technology is likely to be best served by more activity in the ultra-highs. This means more frequency markers on bands like 70cm and 23cm would be useful. But each band offers characteristically shorter range than those below it in the frequency spectrum, meaning more beacons will be required to give any sort of reasonable coverage—just like uhf BBC2 *vis a vis* vhf BBC1: many more transmitters are needed to fill a given service area.

But that is not all. Beacons on the ultra-highs serve fewer people than beacons on the very highs—and however many shoestrings you seize they are bound to cost *something*.

To give financial blessing to a service likely to be enjoyed by a tenth of the membership would call for an act of

BEACON STATIONS

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3ANG	Craigowl Hill, Dundee	145.950 MHz	A1	S
GB3CTC	Redruth, Cornwall	144.13 MHz	A1	NE
GB3GW	Swansea	144.250 MHz	A1	ENE
GB3GM	Thurso	70.305 MHz	A1	N/S
GB3GEC	W. London	434.000 MHz	F1	N/W
GB3SC	Sutton Coldfield*	433.50 MHz	A1	N/S
GB3SU	Sheffield (temporary location)	70·695 MHz	A1	Omni
GB3SX	Crowborough,Sussex	28.185 MHz	A1	E/Omni
GB3SX	Crowborough *	70.699 MHz	A1	Omni
GB3VHF	Wrotham, Kent	144.500 MHz	F1	North-West

* Not operational

altruism on the part of the Council of the day, and a realization by the membership at large that because the ultra-highs hold greatest potential for the development of amateur radio electronic communication, beacons in this part of the spectrum have an important part to play in furthering it.

* * *

As for current beacons, GB3GM on Scotland's north coast is back in commission, reports beacon keeper GM3SFH, and is radiating on 70·305 and 145·996MHz to the following cycle:

GB3GM four times in	46 seconds
Continuous carrier	56 seconds
GB3GM twice in	23 seconds
Off	15 seconds

The cycle is repeated alternately north and south into switched aerials. The value of a beacon close to the auroral belt is obvious hence the provision of a northerly beam heading. And the value of a beacon keeper such as GM3SFH is equally obvious, for in Caithness where the weather is horizontally polarized and nearly always S9, getting to beacon sites is almost literally a labour of love.

* * *

From that well known hf bands dx man G3FNJ of Harrow come details of 2m beacon facilities which he has picked up from Athens. It appears that since early March SV1AB has been transmitting a daily schedule as follows: 1300–1400gmt, beaming north from Athens; 1400–1410 listening; 1410–1500 beaming north west; 1500–1510 listening; 2000–2100 beaming north; 2100–2110, listening; 2110–2200, beaming north west; 2200–2210, listening. Transmitted signal: dx de SV1AB sent automatically on 144·102MHz with 50W into two stacked 9 element yagis.

We understand SV1AB will continue this schedule throughout the summer until October. He has already received one report of S7 from Yugoslavia.

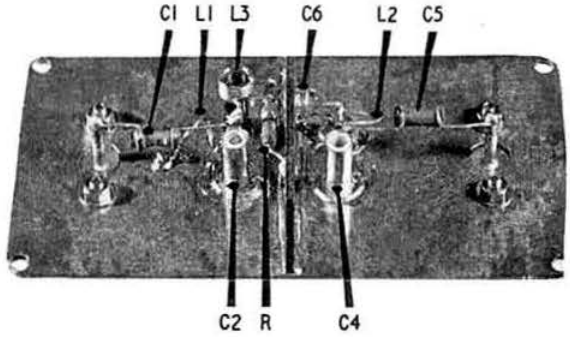
* * *

By early April test signals from the new 4m beacon GB3SX on the South Downs had been heard as far north as West Yorkshire (G3RLE). Distant listeners please send reports to G3FZL or G5UM.

Fraser Shepherd

Although the passing of GM3EGW on Easter Monday is recorded under "Obituaries" in another part of this issue, "Four Metres and Down" should not fail to pay its own tribute to one who had done so much to promote vhf activity north of the border. Fraser Shepherd combined enthusiasm, authority and approachability in a rare amalgam that earned respect from experienced dx operators—for he was among the best of them—yet encouraged the newcomer to seek his counsels on how best to get started on the metre wavelengths.

Enthusiasm bubbled over whenever GM3EGW was persuaded to stand up and speak at technical lectures and after convention dinners. No wonder he was much in demand on these occasions.



The mechanical layout of the fet preamplifier for 432MHz described by G8AVX in Tech Corner last month is well shown in this illustration. Compare details indicated with the circuit diagram given on page 251.

The vhf/uhf membership in Scotland has lost a figurehead. To them, as well as to Fraser's family, this column offers its sincere sympathies. Those of us farther south are going to find it hard to believe that when "Two" opens up, the brisk crystalline telegraphy of GM3EGW will no longer be among the first to emerge.

Xtal Xchange

Offering 12010kHz fundamental in exchange for overtone crystal to produce 144·7 to 145·1MHz. G8BUR, Andrew Marshall, 33 Brookbridge Lane, Datchworth, Knebworth, Herts.

Tech corner

From G3JGO/G3XIW (RSGB TVI Clinic, Slough, Bucks)
We were interested to see the comments in April "Four Metres and Down" about tvi and the 70MHz band, and hope the following contribution may be of further interest:

The television i.f. band of 32–40MHz is in sub-harmonic relationship with 4m, and in particular the colour sub-carrier i.f. is 35·066MHz. We met one case where this gave trouble, and where 70·1MHz was terrible, 70·2 so-so, but 70·3 clear. Reducing the amount of 35MHz radiation from the transmitter saw it off. Black and white television sets on Channel 33 were not affected.

Certain commercial transmitters available to the amateur radiate far too much 192MHz (4 × 48MHz) for comfort. We believe the Burns FL2 filter has proved effective in several cases; there is also a tvi tip in the pipeline on the virtues of double tuned circuits early in the transmitter.

We do get the strong feeling that a lot of amateurs have gone vhf to avoid tvi, or indeed any sort of interference. Sample comments: "What, a lpf on 2m?" or "I only get tvi when I overmodulate in order to work G so and so." Even so, with all-transistor front ends to tv receivers and untuned masthead preamps (devil's invention!) we foresee some vhf types migrating back to 160m.

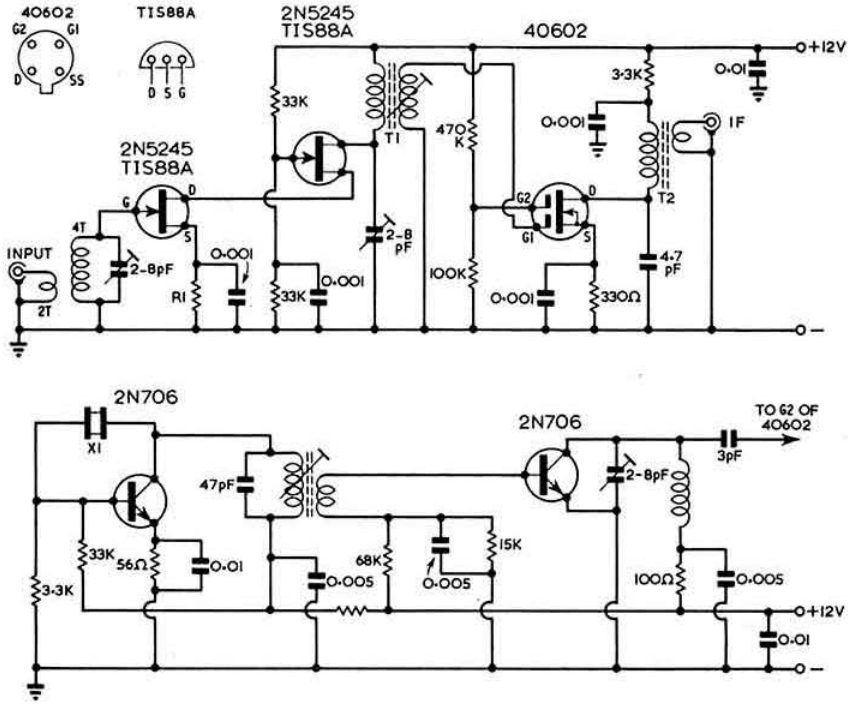


Fig 1. Circuit diagram of G8CYK 2m converter

From G8CYK (Bill Poel, Brentwood, Essex)

The diagram shows a 2m converter circuit which is the result of extensive tests and can be highly recommended as an almost sure-fire design.

The front end uses two fet devices in a cascode configuration somewhat similar to that advocated by G3MNQ in an earlier "Tech corner" note. No neutralisation seemed necessary if the connection between the two FETS was kept very short. Each can be a TIS88A or 2N5245. The output from the second is coupled via the transformer, which has four turns primary and four turns secondary on a $\frac{3}{8}$in Aladdin former slug tuned. The dual gate mixer feeds an i.f. transformer of whatever value it is desired to select. This could be 4–6MHz if a 35MHz crystal is used at X1.

The oscillator chain is a straightforward pair of 2N706. If it is decided that the first one should go off at 35MHz then the second one can multiply to 140MHz. Its output is taken to Gate 2 of the 40602 mixer.

How the converter may be laid out mechanically on a 4 by 3in chassis is shown in Fig 2.

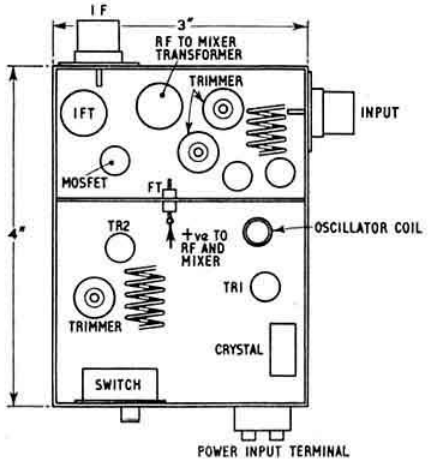


Fig 2

What they say

"While the vhf-ers at Castletown were being blown off the hill, the Cambridge University's hf station at Peel was knocking off 2,000 stations, which is not bad going for 10 days!"—G3TPF, describing the expedition to GD-land.

* * *

"Now established in Ireland with television transmitting equipment, I'm negotiating a licence with the EI authorities—part of the North Kent UHF Group are coming over this year for a dxpedition if reciprocal licences can be obtained—G8ATI/G6AEE/T, Julian Warden, now at 75 Finian Park, Shannon, Co Clare.

* * *

"I would like to echo other people's pleas for stations to state their QTH and beam headings when calling CQ, and also to indicate in which direction they are tuning"—G3MCS.

VHF Personalities No 15

G8CMB, Ken Robinson of Sheffield

"So-and-so worked all Europe on 2m from his site 600ft up." Well, perhaps he should. There is at least one 2m operator who is glad to work anything from a site 600ft *down*. He is G8CMB, and his location is in one of the deepest parts of a city remarkable for the fact that every approach to its centre is downhill. In fact, in the good old days of electric traction it was a constant source of wonderment to visitors to Sheffield that the trams managed to cling to the tracks at all, much less surmount the summits.

To see the nadir of amateur vhf locations pay a visit to G8CMB, truly 600ft down in a valley running northwards out of Sheffield (he is about four miles from the city centre). In his first three months on the air after he got his ticket in the spring of 1969 only half a dozen contacts could be made on "Two". Across the valley to a near neighbour like G8BRT is a reasonable path; a bit farther to G3LLE is a marginal one. Even the 150W and 60ft aerial at G3LLE produce a signal no more than 3dB above noise at G8CMB. And a GB2RS news bulletin on "Two" has never penetrated the home station. As for television, until an aerial costing £35 was installed there was no picture.

Another hazard besides lack of site height is local noise, contributed by a large local steel works with heavy QRM-producers such as arc-furnaces, by an adjacent electrified railway and by two sets of high voltage overhead cables passing within 50yd of the QTH.

As a practical working electrician G8CMB believes in building (not brewing) as much of his amateur station as he can. Hand in hand with a good noise factor from his converter goes an Eddystone EA12 receiver, which, he says, is the only item in the station on which he has spent a considerable sum—but then he was in need of a good i.f. strip in a location like his.

Clearly, the only way for G8CMB to enjoy his amateur radio to the full was to go out portable. It did not take long to construct the appropriate lightweight equipment that was to transform completely the impact which his call-letters made upon the outside world. After driving to a point no more than a mile from the home QTH, he worked 500 stations in 14 weeks, spread over eight countries and 48 counties. This order of performance put him well in the running to be one of the earliest G8C - - licensees to apply for the RSGB "Four Metres and Down" operating award. In spite of a QSL return rate of only 15 per cent, enough cards were mustered to permit the claim to be submitted before 1970 was very far advanced.

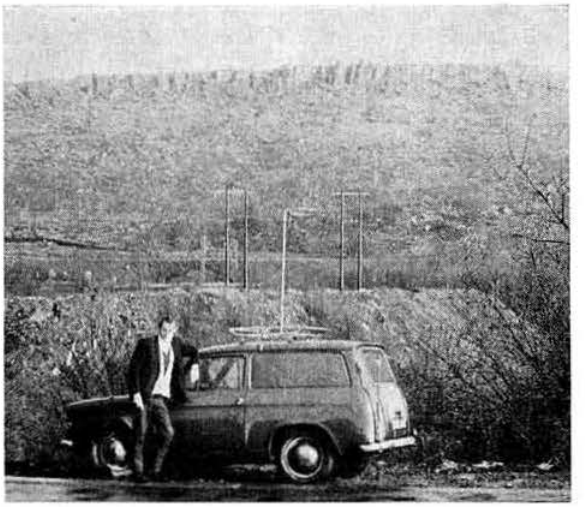
"H'm, but just lately I have been receiving G8CMB as if he were well sited and not down in a hole. How come?". Indeed you have. Ken Robinson has just acquired himself a new QTH on the south side of his city that is almost as good as the other one was poor. So from now on the story should be a very different one.

Ken's relaxed operating philosophy is well described in these words of his: "Though I have been very pleased to work dx from my stroke P site, the thing that surprises me most is that I find the dx comes, if it's about, without playing rubber-stamp, DC band type QSOs, as so many of the stroke P class seem to do. I have often sat on the hill nattering happily to a local for an hour or more right through the dusk temperature inversion and haven't worried about what

Under construction by G8CMB: a 50W transmitter for 145MHz with which to go portable on the hills outside Sheffield

I might have missed. Operating—I enjoy it as it comes; equipment—I am never satisfied or content and am always trying to improve the gear."

A loyal RSGB member, he likes to say: "Leave the organizing to those with experience of it. I'm just a humble member like the rest." Yet it happens to be true that people such as G8CMB, in whom learning amateur radio the hard way is joined with native Yorkshire good sense, can exert a beneficial effect upon RSGB affairs and progress to a greater extent than they sometimes believe to be possible.



How to cope with an "impossible" vhf site: go portable! This is the view looking across the valley from the QTH of G8CMB of Deepcar, Sheffield. Directly opposite is an 11,000V electricity line. Behind it is an electrified railway. And three quarters of a mile away an escarpment towers 600ft above the valley floor. G8CMB has the answer to all this: get away from it "Stroke P". In this picture he and his 2m equipped van are about to go

THE MONTH ON THE AIR

A monthly feature by JOHN ALLAWAY, G3FKM*

STILL more reports are being received of callsigns being pirated on one band or another. GM3XYG's call is being used by "G3XYG" on 20m (he only operates on 80 and 2m), "G3XTY" is active on 160m and "G3XOI" has appeared on 20 and 40m. In addition to this, "Mike Scratcher" and his mentally distorted friends continue to cause deliberate interference on 80m. Your scribe feels that many of these operators must be known to others who live near to them and can identify them by the strength of their signals or by recognition of signal or voice characteristics. There is absolutely no justification for shielding these individuals who are doing great dis-service to the cause of amateur radio. Readers may well share the opinion of the writer that the valuable time of the MPT could be better spent in dealing with unlicensed operators than in sending inspectors to visit legal operators who are alleged by a foreign government's agency to have operated outside their authorised frequency limits.

DXers will be sorry to hear of the deaths of two well-known amateurs. Tony Willis, ex-G3TKY/VS6FS/ZL2AJW/9J2NW etc, and his wife were killed recently in a motor accident in Uganda. Everett Atkerson, W4ECI, better known as "Ack" and one-time QSL manager for expeditions undertaken by W4BPD and W9WNV, became a silent key on 7 March following a heart attack.

G3FKM would be interested to receive claims for the record of making the first G/MM to G/MM contact. So far the first known was between G3RSP/MM and G3SWH/MM at 2109 on 18 January 1969—details of earlier QSOs would be appreciated.

Top band news

G3GWD has recently been granted a licence to operate from Eire on 160m using the callsign EI2VCF. He makes frequent business trips, and likely areas for him to be heard from are Co Carlow, Co Cork, Co Galway and Co Limerick.

HB9CM's recent visit to Lichtenstein appears to have been a great success. He made contact with five stations in the USA, and logged over 150 European stations. HB9CM has also now worked HR2HH and 5Z4KL for two more "firsts" on the band.

Stew, W1BB, reports that W0NFL listened on 160m during the recent total eclipse of the sun, which took place at mid-day local time. There appeared to be an opening for dx similar to that which normally takes place half an hour before sunset, and stations in W4, W8 and W9 were heard.

As a result of their successful expedition to Kinross, GM3FSV and GM3OGJ have decided to make a further expedition, this time to West Lothian. They intend to be there on 29, 30 and 31 May and to be active between 1800 and 0100 on 1830 kHz (+ or − 5) cw and 1865 or 1875 kHz ssb. The cw station will use the GM3FSV/A callsign and the ssb station GM3OGJ/A.

Arrangements for G3KRH (Dick) and G3ONS (Tod) to operate /A from the county of Perth are now complete. Dick and Tod will be in the county of Perth from 30 May to 6 June. In the evenings they will be working ssb and cw on 160, and by day they will be touring and fishing—so its more a holiday than a serious expendition.

News from overseas

Fred Powell, 3V8AL (W4KIL, TL8AL, TT8AP, 5U7AL, TY6ATE), writes to say that he is being plagued with QSL cards for contacts with "TY6ATE." The pirate who is using Fred's call gives his name as Dave or Fred, and mentions WA3HJD as his QSL manager. There is as yet no WA3HJD, and WN3HJD knows nothing about the arrangement. Activities seem to have been during February and March this year and beam headings suggest that the culprit is located in central USA or Canada. All Fred's African licences are still valid and his QSL manager is W4WHF, to whom enquiries should be directed.

Roy, ZM1AAT/K, currently very active from the Kermadec Is, reports that he has now made over 10,000 QSOs since his arrival on the island last year, He has worked many UK stations on 15, 20 and 40m but has had no luck on 10m. At the time of writing he had contacted only one G station on 80m—G3HCT. Roy has a G5RV aerial at 80ft and also a 1000ft long wire aerial for the lf bands (including 160m). QSLs should be sent via ZL2AFZ.

Contrary to information given in January *MOTA*, VK6LJ wishes readers to know that he is not due to visit Tonga and is in fact firmly rooted in Western Australia for the foreseeable future. Jim is an ex-G (G3HJF) and says that it is hard work trying to work stations in the UK. He frequently calls "CQ UK only" and is lucky if he gets any takers other than the DLs, UAs, etc, who obviously have not understood his call. This makes him ask, "Where are the Gs?" One or two turn up during contests, call in shyly, are astonished to get a reply, sign quickly and retire, it seems, covered in confused embarrassment! Jim pleads for stations to put up a simple beam, aim it at Australia on the long path, and fire up the rig for half an hour every morning before work. . . . There are literally dozens of VKs who have emigrated from the UK and who are overjoyed to talk to someone back "home", and it seems that many Gs would be flattered if they could hear all the VKs calling them at the end of every contact. Jim wishes to send his regards to all the other IAL amateurs and also to other members of the PMG courses at Norwood Technical College during 1958-60.

VR1O has not been very active recently but hopes to be on the air more during the remainder of the year. He has made 3,000 QSOs so far from Tarawa, mostly on 14, 21 and 28MHz. David says that VR1Q will be leaving the Gilberts in late April, leaving only Bob, VR1L, on Ocean Is, and himself to represent the country. However, four more expatriate staff

will be arriving towards the end of the year, two from New Zealand and two from the UK, so one or more of these may be licensed. There is a possibility that David may go to Christmas Is (VR3) and operate for a few days. With reference to the VR3 area it seems that VR3C, Phil Palmer, is still on Fanning Is as manager of the copra plantation but is no longer very active. The callsign VR3AA was issued to KH6FNB, who expected to visit the University of Hawaii's research station on Fanning Is for a few days early in April. David hopes to work many UK stations via the path over the north pole on 14 and 21MHz this spring, and will be returning to his G3NRA call between December 1970 and March 1971.

Mort Wolfson, VE3ACD, reports that he now acts as QSL manager for all the active VP2V stations—namely VP2s VI, VJ, VO, and VV. He also acts on behalf of AP2MR, FK8AU, FY7YD and VP2VP. Logs are available for VP1LB, VP1LL, VP1JKR, VP2KD, 4X4TP, 4X8TP, 4X0TP and IZ6KDB, who are now all QRT. Mort hopes to return to Tortola or another Caribbean QTH for the 1970 CQ WW DX Contest and to spend a lot of time on 40 and 80m. Mort's address is 305 Rosemary Rd, Toronto 10, Ont, Canada.

Ray Vosper, formerly VS9ARV, VS9KRV, VS9HRV, VS9PRV, MP4BQK, DL5YT, DL5TY/LX, DL5YT/PX, and now G3VIY, ask for QSLs for any of these callsigns to be sent to him at the following address: W.O.II R. Vosper, Sergeants' Mess, School of Signals, Blandford Camp, Blandford Forum, Dorset. He will be there for three years.

GC8HT asks for all QSLs for him to be sent to G8HT (see *QTH Corner*). Those from North and South America should be sent via W6UNP.

G3VDO/MM was the first European amateur to visit JA3XPO—the official EXPO 1970 station at Osaka, and reports receiving a very warm welcome. The station is to be found near the following frequencies: 1,910, 3,505, 7,005, 14,050, 21,050, and 28,050kHz cw, and 3,550, 7,050, 14,150, 14,205, 14,255, 21,250, 21,305 and 28,550kHz on ssb.

EDR (Bornholm section) International Amateur Meeting

This will take place between 12 and 19 July at Lyngholt camping site which is located on North Bornholm. There will be camp stations active on all bands between 2 and 80m on cw, a.m., ssb and teletype. It is hoped that operating permits will be issued by the Danish authorities to visiting amateurs. The camp appears to be extremely well provided for with full facilities, and anyone needing further details should contact OZ4EDR who will be found on 3,780kHz at 1030 every Sunday.

The Ex-G Radio Club

Readers will be sorry to learn that Reg Cherrill, W3HQO, has been ordered by his medical advisers to reduce his work load and has resigned from the post of president of the club. He will, however, continue to act as editor of the *Bulletin* for a further year. Reg is to be congratulated on all the hard work which he has put in over the years to make the club the success that it is. The new president is Roy Hearsum, W8LUZ, and Don Rayner, W3CTR, has been re-elected hon secretary.

Contests

World Telecommunication Day Contest

0000 to 2400 16 May (CW section)
0000 to 2400 17 May (Phone section)

All bands 1·8 to 28MHz. The contest is being sponsored by the Brazilian Ministry of Communications and the objective is to make the largest number of QSOs with the largest number of ITU zones. There is only one category—single-operator, multi-band —and only 18 hours of the 24 may be used, the six-hour rest period may be taken in several parts none of which must be less than one hour. Stations exchange RS/T and ITU zone number (for UK this is 27). QSOs with stations in one's own country count no points, with others in the same ITU zone one point on 10-40m and two points on 80 and 160m. In other ITU zones in the same continent, QSOs on 10, 15 and 20m count two, on 40m three, and on 80 and 160m four points. In other continents values are three, five and six, respectively. Stations may be worked on more than one band but each zone may be counted only once for multiplier credit.

The ITU Trophy will be awarded to the national association of the country whose ten top scorers average the highest score (or all entrants if less than ten). Gold, silver and bronze medals will be given to the three highest world scores in each section, and diplomas to the first three entrants in each country. Logs should give time, callsign, number sent/number received, band, continent, zone multiplier and points, and should be posted before 30 June to: Ministerio das Communicacoes, Setor de Radioamadorismo do Dentel, Rua Miguel Couto 105–21° andar, Rio de Janeiro, ZC-26, Guanabara, Brazil.

DARC Field Day

1700 6 June to 1700 7 June

This contest runs simultaneously with RSGB NFD and has similar rules. However, there are four categories of entrant depending on power input. A few rule sheets are available from G3FKM.

YL International SSBers QSO Party

0000 16 May to 2400 17 May

Full details of the rather complicated rules of this contest are available from Woody Bennett, W0GNX, 8939 East 31st St, Kansas City, Mo, USA 64129.

Full scores of the **1969 CQ WW WPX SSB Contest** have now been received UK scores were as follows:

	Single operator	
GC3UML	**(All band)**	**653,415 points**
GM3SDZ	**,,**	**95,480 ,,**
G3TKK	**,,**	**85,722 ,,**
G3XBY	**,,**	**81,810 ,,**
G3WTV	**,,**	**50,061 ,,**
GD3AIM	**,,**	**38,340 ,,**
G2AJB	**,,**	**15,130 ,,**
GW3VBX	**,,**	**8,978 ,,**
G3NSY	**(14MHz)**	**26,631 ,,**
G3NLY	**(7MHz)**	**47,880 ,,**
GM3VTB	**(3·5MHz)**	**2,280 ,,**

Multi-operator, single transmitter

G3SSO (G2HDU, G3s FXA, PEO, SNN, G8KG)—**1,095,680 points.**
GB2SM (G3s JUL, NYY, PAQ, CRP, VJG, WPK, JLB, YCQ, JEA, UFM, TEX, YFF and OHP)—**842,122 points.**
G3WYX (G3s HTA, RUV, RUX, TJW)—**786,796 points.**
GW6GW (GW3s WVG & XNI)—**77,575 points.**
G3EEO (Club group)—**61,744 points.**

Congratulations to the certificate winners (listed in bold type). As mentioned in an earlier *MOTA*, **G3NLY** was world top score on 7MHz, and **GM3VTB** world sixth on 3·5MHz.

Dxpeditions

WB2RLK, WB2WOU and VE1ANE will be using the callsign FP0LK from **St Pierre** during the month of June. They hope to be on all bands 10 to 160m on both cw and ssb.

According to the *West Coast DX Bulletin*, two HW32 transceivers have been supplied by K3RLY and WA5REU for use in the South Pacific area. They will be taken by ZK1AJ to Manihiki, where one will be left for use by ZK1MN. The other will go to ZK2AF on Niue or to 5W1AR to hold for future use by ZM7AF on the Tokelau Is.

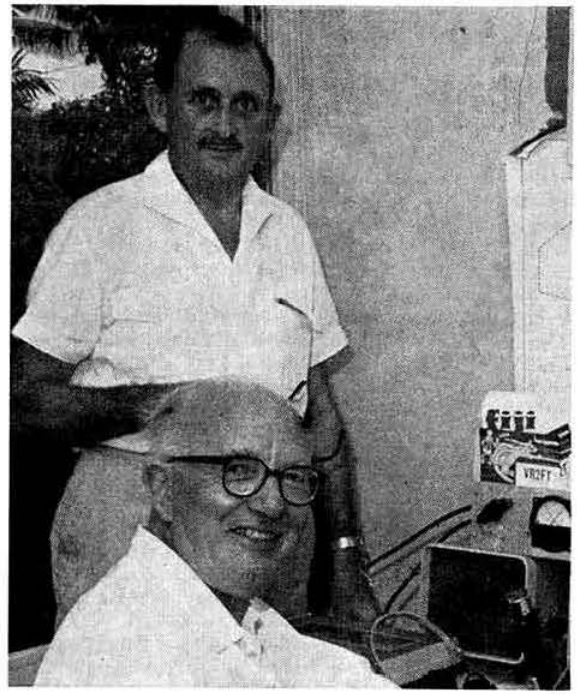
From F5QQ (GD5APJ) comes the news that WB2VAE, F5HN/W4, F2QQ and he hope to operate from **Clipperton Is** sometime during July. A fifth operator may join them and the callsign will probably be F0NH/FO8. The operation should last for a week, and a seaplane is being hired to land them on the laguna in the middle of the island. This will involve them in enormous cost, and donations will be very welcome; they should be sent to Nicholas A. Neuhaus, WB2VAF, 160–42 85th Street, Howard Beach, NY 11414, USA. Ron emphasises the fact that they doubt very much whether any other licence will be issued in the future for operation from the island.

Unless delayed by bad weather the trip to **Aves Is**, scheduled for 30 April to 3 May, will be over by the time this reaches readers. YV0s AI, BBW, BPJ, CIY, EL, LA and PP were expected to be active on all bands and all QSLs should be sent via DOTM.

Limerick Radio Club's annual expedition this year visits Bere Is (off southwest Eire) and EI0AO will be active on all bands 160 to 10m on both cw and ssb from 30 May to 1 June.

Edgar Wagner, G3BID, reports that he intends to operate /M and possibly also from a fixed station in **Corsica** during the period 5 to 30 May, approximately. Although the callsign has not been confirmed, Edgar's call last year was F0RT and this may well be used again. QSLs should be sent via W2CTN.

Gus Browning, W4BPD, has now received his VQ9 licence renewal and notice that his hired boat is ready in northern Madagascar. As soon as his FR7 licence arrives he hopes to leave and he may well be active from the Indian Ocean area by the time this appears. Users of transceivers are asked *not* to call on Gus's frequency but to call in the proper place and say "transceive" at the end of each call—extra time will then be given for re-tuning. All QSLs should be sent to W2MZV.



During his recent round-the-world cruise, G6XJ (seated) renewed acquaintance with Les, VR2FT (alias G3HZG) at his home in Samabula, Fiji

DX news

DXpedition of the month news is that QSL cards have recently been sent out for contacts with AX9XI and 4M1A on 10 and 15m, and for KV4FZ, W0VXO/KV4, DJ6QT/CT3, CW0AA, ON8CT, AX3BM and CN8HD for CQ Contest QSOs. Logs have still not been received from CN8GE, CR5SP, ZD9BE and 3V8MOL.

Jacky, VQ8CFB, is due to leave St Brandon in June and may possibly be on the air from Rodriguez Is as VQ8CFR during August.

CE0TS is a new station on the air from Easter Is. He has Drake equipment and a TH3 beam. He is said to be the manager of the only hotel on the island.

The Pacific DX Net now looks for European stations on Saturday mornings on 28,600kHz at about 1100. Net co-ordinator is 4X4UF.

At the time of writing, VS6DR was in Europe en route for the USA. Maurice, VS6AA, is due back in the UK in June on his way to another assignment.

A new station on Rhodes is SV0WU—this is a re-issued call. Favourite frequencies seem to be 14,245 and 21,295kHz ssb after 1700. Another new call is TJ1AW, which belongs to K4PHY who is at present in Cameroon and active on all bands 80 to 10m on both cw and ssb.

In the Solomon Is VR4BC is reported as being active daily around 14,130kHz from 0900, and VR4EK and VR4EL should be active again now. VR4EZ is presently in New Zealand. Two new stations are expected on soon and they expect to operate on 40 and 80m.

W1LVQ wishes to point out that credit for contacts with OJ0, Market Reef, applies to QSOs made on *any* date, not only those since 1 March 1970 which was the first date they could be submitted to ARRL for DXCC credit.

7P8AB is said to be due to leave Lesotho soon and to be moving to South Africa. This will leave 7P8 without any amateur population. CR3KD is reported to be keeping skeds with US stations on 21,380kHz at 2200 on Mondays, Wednesdays and Fridays. ZD9BN, Gough Is, has a sked with ZD9BM at 1930 on Saturdays on 14,210kHz but will probably have left the island by now. A new operator on the island has the call ZD9BO and will be there until October, but possibly may not be very active.

The prefixes ZV, ZW, ZX, ZY and ZZ were used by Brazilian stations during the CQ WW WPX Contest. YM1AL has been reported on 14 MHz cw giving his location as Turkey and asking for QSLs via DL7FT.

VR5LT has been reported on 14MHz ssb and is said to be running low power. He is VK6LT, whose callsign was unfortunately confused with VK6LJ's (see "News from Overseas") and he is asking for QSLs via VK6WT.

ZM7AF is active from the Tokelau Is but is presently crystal controlled on 7,060kHz a.m. He cannot copy cw or ssb and runs low power.

QTH Corner

A2CAZ	K1JHX, 648 East St, New Britain, Conn, USA.
CE0TS	via CE3TS, Juan Orrego V, Casilla 14654, Santiago, Chile.
C31CT	via DL8RH, Hans-W Roesler, Eiche 3, 583 Schwelm, W. Germany.
CT3AW	via DJ2IB, Andreas Nagel, Panoramaweg 1, 7501 Spielberg, W. Germany.
EI0AO	via EI5BX, 18 Elm Place, Rathbane, Limerick, Eire.
F0RT/FC	via W2CTN, 159 Ketcham Av, Amityville, NY11701, USA.
FB8WW	via F5QE, Jean-P Vauchelle, 45 Av J-Jaures, 94 Vitry, France.
FR7ZX	A. Demarle, Bras Panon, Riviere des Roches, Reunion Is.
GC8HT	G8HT, Ridge Mount, Shell's Lane, Colyford, Devon.
HB0XGR	via DL4CE.
KC6ES	E. T. Sugiyama, Koror, Palau, Western Caroline Is 96940.
KC6RS	via W6MMG, Alexander Newbold, 2712 Belmont Canyon Rd, Belmont, Calif 94002, USA.
DL4RM/LX	via DL8RH (see C31CT).
M1B	(after 1/11/69) via WA3HUP, Mary Crider, 105 June Dr, Camp Hill, Pa 17011, USA.
SV0WU	I. Murphy, US Embassy-VOAR, APO, NY 09223, USA.
TF2WLW	via K3EST, Robert Cox, 4312 Rowall Dr, College Park, Md 20740, USA.
TJ1AW	via K4ZCP, Leslie Murphy, PO Box 626, Hickory, NC 28601, USA.
PJ9GF	via WB4GTS, F. K. Williams, Box 19252, Washington, DC 20036, USA.
PJ9JT	via W1BIH, John Thompson, PO Box 1, Torrington, Conn 06791, USA
ex-VK9LB	Jeff Liebgold, c/o Barry Research, 934 E. Meadow Drive, Palo Alto Calif, USA.
VK9NI	A. A. McCullagh, Hibiscus Flats, Norfolk Is, S. Pacific.
VK0HM	via W7PHO, W. H. Bennett, 18549 Normandy Tce SW, Seattle, Wash 98166, USA.
VP2EX	via W4ZRZ, James Long, PO Box 6742, Birmingham, Ala 35210, USA.
VP2MT	via W2GQN, Sheldon Weil, 114 Phylis Ct, Elmont, NY 11003, USA.
VP2MY	via W1IXL, Jim Hawkes, RFD 1, Gofftown, NH 03045, USA.
VP8LK	via G3NOM, 32 Parkland Av, New Mills, Stockport, Cheshire.
YV0AI etc	via DOTM, Box 7388, Newark, NJ 07107, USA.
ZD8OE	via W4SFA, Oscar Eswine, 40 Barton Av, Rockledge, Fla 32959, USA.
ZF1ME	via W8QQW, 900 Wallwood Drive, Copley, Ohio 44321, USA.
5R8AR	via WB4GQH, F. Morgan, 7711 SW 20th St, Miami, Fla, USA.
5U7AI	via DK3KB, Grafenmuehlenweg 169, 5 Koeln-Dellbrueck, W. Germany.
5U7AW	PO Box 1001, Niamey, Niger Republic.
5V4JS	Josef Schmitz, PO Box 33, Atakpame, Togo.
9J2RQ	via G3VYF, M. R. Lee, 11 Sturrocks Vange, Basildon, Essex.

RSGB QSL Bureau, G2MI, Bromley, Kent. BR27 NH.

1970 Countries Table

	1·8 MHz	3·5 MHz	7 MHz	14 MHz	21 MHz	28 MHz	Total
G3JVJ	4	38	10	17	14	12	95
G8VG	3	19	22	23	37	37	141
BRS25429	3	96	74	119	111	104	507
A6148	5	78	11	37	28	68	236
A6248	4	59	54	150	102	73	442
A5489	0	59	11	76	49	27	222
A6278	3	44	36	76	24	29	212
BRS27880	2	44	24	80	50	43	243
A6904	10	21	30	109	92	45	307
BRS30694	5	23	24	59	46	17	174
A6265	2	60	52	145	110	101	470
A6098	1	9	11	19	20	5	65
ORS31427	—	9	7	168	94	86	364

(This month's table is in order of 1.8 plus 3·5MHz scores)

GB3SX

Readers' attention is drawn to the Society's hf beacon GB3SX which is to be found on 28,185kHz. The power input is 25W and a three-element yagi beam (usually pointing eastwards) or a vertical antenna is used. The beam was turned to the west during the ARRL contest to act as an indication of propagation conditions. Reports, which are of greater value if they cover repeated observations, should be sent to the beacon keeper A. Taylor, G3DME, Altadena, South View Rd, Crowborough, Sussex.

Awards

World Radio Club Award

For nearly half a century listeners have been reporting to broadcasters on transmission reception. In return, the BBC and other broadcasters have sent cards to verify correct reporting.

Now, in addition, BBC External Services offer an award to listeners who correctly report on a number of BBC transmissions received from different transmitting sites. The reports will be analysed by their engineering staff and the certificates will be issued by the programme, *World Radio Club*, This award scheme applies to a part of one frequency schedule period only—3 May to 30 June 1970.

To qualify for the award, listeners must give evidence of reception of three BBC transmissions from each of the following:

Great Britain and the Atlantic, East Mediterranean and Far Eastern relay stations. These 12 reports (which must be received in one envelope before the end of July) should contain the following information: location, date, time, frequency and a few words about the programme content. In return, the award will contain the four verifications required by the serious dxer.

To be eligible for the award, a dxer must be a member of *World Radio Club*, the programme for dxers and short-wave enthusiasts which is broadcast in BBC World Service on Sundays at 0815 gmt, Thursdays 1245 gmt and Fridays 2345 gmt. To become a member you need simply write to World Radio Club, BBC, Bush House, London WC2.

Radio Amateur Friends of Ockenden

Donations received from applicants for the Ockenden Venture Certificate during 1969 and passed on to the funds of the Ockenden Venture amounted to £40. The total collected over the years now comes to over £270 which is a very well worthwhile effort. Four classes of certificate are now issued and full details may be obtained (sae, please) from G2FUX, 53 St Ives Park, Ringwood, Hants, BH24 2JX.

Band reports

As is to be expected the lf bands have now started to produce less dx and more static but conditions on 80m may allow some summer long distance working in the late evening if last year's experience is repeated.

Many thanks to the following for sending in logs and supplying information: G2BW, G2HKU, GW3AX, G3AAE, G3GVV, G3HB, G3HCT, G3IGW, G3JKY, GM3UCI, G3WCY, G3WNT, G3YHD, G5JL, G8VG, BRS2098, BRS17567, BRS25429, BRS27880, BRS30231, BRS30694, A6098, A6148, A6248, A6265, A6658 and A6958. Calls listed in italics were cw loggings, all others ssb.

1·8MHz. 0000 *OY1R, 9H1BL.* **0700** *ZB2BO.* **2200** *4U1ITU.*

3·5MHz. 0000 6Y5SR. **0400** HK0BKW. **0600** *CN8DW,* CR4BC, HI7CAF, HR2PEV, HC2GG/1, OA4NLA. **0700** ZLs. **1900** AP2MR, FK8BO. **2000** *AX3APN,* AX9DY (Papua), AP2AD, HS5ABD, KL7DTH/KG6. **2100** DU1FH, VS6DO, 4S7PB, 9L1RP, 9Q5LC. **2200** CR6LV, UA0BP, VQ9AL, ZC4AK, 5H3KJ. **2300** TU2CB, VP2s SY, VI.

7MHz. 0100 PZ1CU, 9Y4MM, **0400** HC8GS, VP2VI. **0500** *CE8AA, LU1ZA,* PZ1AH. **0600** CR4BC, HK0BKW, HT2DX, *KH6EFW, PY7AWD/0, XE1RV.* **0700** VK2AVA. **1900** EP2DX, *FR7ZX, ZD5X,* 6W8DY, *9J2RQ.* **2000** *5H3s KJ, LV.* **2300** *AP5HQ,* EA9EO, VP5NB.

14MHz. 0300 YN1SN, YV8BT. **0500** KJ6CF, ZS2MI. **0700** AX0KW, HC8GS, HT1DW, VR5LT, ZM3PO/C. **0800** AX9RH (Norfolk Is), KS6DJ. **0900** CE0AE, VK0HM. **1400** HB0QN/M (QSL to HB9QN). **1500** *YM1AL.* **1600** JY1, VK0HM, 9K2CF. **1700** ET3DS (QSL via VE3DLC), SU1MA. **1800** AX9XI, FB8WW, HV3SJ. **1900** AX9KY (Cocos Keeling Is), KL7BJW, *UA1KED,* YB6AAH. **2000** AP5HQ, FP8CT, JW1CI (Bear Is), ZD7SD. **2100** AX0KW, EA8GZ (QSL to VE7BWG), VP8HZ, XE3RE, 6Y5SR. **2200** TR8MC, VP8HZ. **2300** CE3ZN, HC8GS, *TA2E,* TJ1AW, XW8AX, 9V1OI.

21MHz. 0000 HK0BKX. **0600** KM6DQ. **0700** FB8YY. **1000** FK8BB, *ZM1AAT/K.* **1100** KX6FJ, KS6DH, VP2LX. **1300** AX9AC (Papua). **1400** JX5CI. **1500** JY1, MP4TDA, *SU1IM.* **1600** AX9KY, *VS9MZ,* YB3DC (Box 27, Surabaja), YB7AAH (Borneo). **1700** 5V4JS. **1800** *FM7WH,* FR7ZW, *KH6IF,* WA7NIN (Nev). **1900** SU1EA (on a.m.), ZD9BM. **2000** ZX3XQ.

28MHz. 0800 YA1RG, VR2DK. **0900** KG6AAY. **1000** FB8XX, *HS5ABD,* TR8DG, *ZM1AAT/K* (Kermadec Is), 4S7PB, 9L1RL. **1100** AX9RY, *KL7CL,* KX6HW, ZD9BM. **1200** AX9s DM, PN, FR7ZD, MP4MBC. **1500** AX9CK, VQ9EP, 9G1GG. **1400** ET3ZU (Box 379 Asmara), *TA2AE.* **1500** FR7ZW, HS1AB, TJ1AU, VK9BB, VQ8CW, YA1EXZ (Box 638 Kabul). **1600** EA9AB, JW1CI, VP5TH, XW8CS, 5T5BG, 8P6BU. **1700** HK0BKX, ZD9BM, **1700** HK0BKX, ZD9BM, 9J2RQ (QSLs listener reports 100 per cent). **1800** CP1IS, LU2DAW (Op VP9KO on 28 March), VP2EX, VP8s JC, KF, KT, ZD3K, W6s and W7s. **1900** CR4BC. **2000** VP8KO (Port Stanley on 14 March).

Many thanks to all correspondents and especially to **DX' press** (*PA0TO*), **DX News Sheet** (*Geoff Watts*), the **DX'ers Magazine** (*W4BPD*), the **Florida DX Report** (*W4FRO*) the **DX'er** (*K6YGS*), **NARS Newsletter** (*5N2AAF*), **Long Skip** (*VE3DID*), **On the Air** (*ON4AD*), the **West Coast DX Bulletin** (*WA6AUD*), and the **Ex-G Radio Club Bulletin** (*W3HQO*). Please send all items for **June** issue **to reach G3FKM** no later than **11 May,** for **July** issue by **8 June,** and for **August** issue by **13 July.**

Propagation Predictions

Conditions of the ionosphere classify May as a typical summer month. In the northern hemisphere the F2 MUFs are relatively low during day-time, but do not fall as far during the night as in winter.

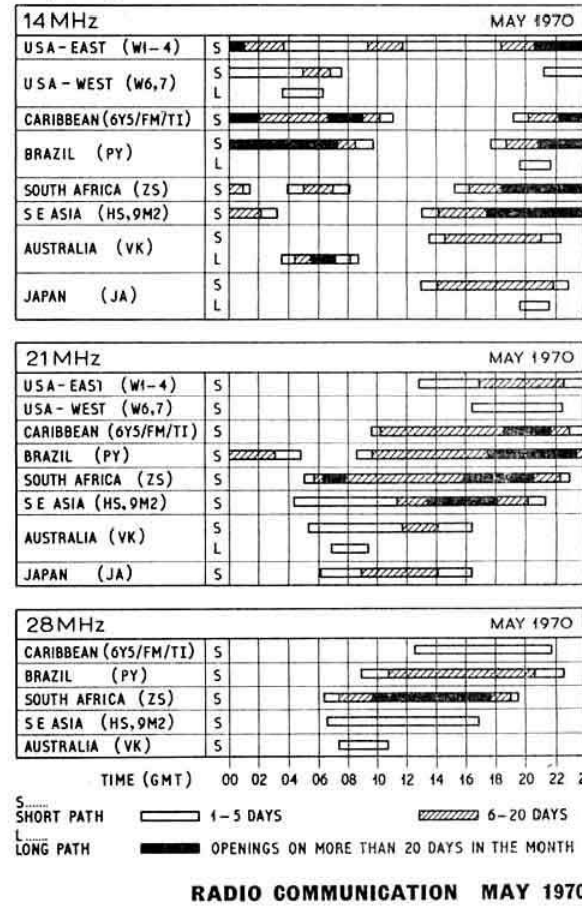
On **28MHz** the low F2 MUFs will lead to worsening conditions, especially in traffic with North America and Japan, which will be virtually impossible during the summer months. Some contact might be possible with Africa and parts of South America. A small compensation for poor dx conditions on this band will be sporadic short skip conditions for distances up to about 500–2,000km. These short skip conditions are possible on relatively high frequencies because of a Sporadic E layer of high frequencies.

These summer conditions will also lead to a further worsening of dx conditions on **21MHz.** The band will stay open longer in the evenings as the days lengthen, but traffic with western North America will be only occasional. The peak time for this will be late afternoon and early evening.

14MHz will remain open all night, especially for traffic with South America and parts of Central and North America. The short skip conditions, mainly afternoon and early evening, will lead to rise of QRM on this band. Dx traffic free from interference will be possible during night time and early morning. Under especially good conditions traffic to western North America and Japan will be possible via the long path. Australia should be workable via the long path in the morning.

Dx conditions on **7** and **3·5MHz** will worsen because of shorter nights, atmospheric disturbances and QRM. Basically dx conditions will only be possible when the path lies in darkness. This applies especially to 3·5MHz. There will be good opportunities for local traffic without disturbance by the dead zone.

The provisional mean sunspot number for March 1970 from the Swiss Federal Observatory was 101 with activity concentrated at the beginning and end of the month. The predicted smoothed sunspot numbers for July, August and September are 87, 85 and 83, respectively.



SOCIETY AFFAIRS

A brief report of the Council meeting held at Society HQ on 16 March 1970

Present: *Dr J. A. Saxton (President, in the Chair), Dr E. J. Allaway, Messrs R. J. Hughes, A. F. Hughes, A. F. Hunter, G. R. Jessop, L. E. Newnham, C. H. Parsons, J. R. Petty, W. A. Scarr, R. F. Stevens, G. M. C. Stone, J. W. Swinnerton, F. C. Ward, E. W. Yeomanson, (members of the Council), R. G. B. Vaughan (general manager) and A. W. Hutchinson (editor).*

Messrs J. O. Brown and A. C. Morris attended the meeting by invitation to advise Council on financial matters.

Apologies for absence were received from Messrs B. Armstrong and N. Caws.

Channel Islands Morse test
Mr Stevens reported that the Ministry of Posts and Telecommunications had now replied to his letter concerning approval of the senior telecommunications officer at the Guernsey Airport to take Morse tests. The Ministry stated that as an official visited the islands four times a year and could take tests during his visits no untoward delay should occur.

World Telecommunication Day
Mr Stevens explained that World Telecommunication Day was intended to celebrate the anniversary of the foundation of the International Telecommunication Union on 17 May 1865, and he understood that a number of special stations would be in operation on the amateur bands to mark the occasion.

Council approved the setting up of two special stations, and it was agreed that QSL cards should incorporate suitable publicity information.

Zone G meeting
Mr Hunter reported that the Zone G meeting had taken place.

Membership and affiliation
It was resolved:

(i) to elect 177 corporate members and 37 associate members;
(ii) to grant corporate membership to 11 associates;
(iii) to grant corporate membership to 27 applicants contained in subscription applications received through various overseas organizations;
(iv) to waive the subscriptions of four members due to blindness or other disability.

No application for affiliation had been received during the preceding month.

Certificates and awards
Mr Stevens submitted the draft of a report from the Awards sub-Committee in connection with awards and certificates. He explained that it had been necessary to make certain changes in the conditions of award, and it was proposed to have a six-month overlap between the old and new conditions. He also submitted designs prepared by Mr D. E. Cole for the new RSGB certificates. After discussion, Council approved the report from the Awards sub-Committee.

A suggestion by Mr A. W. Smith (Region 12 RR) that the RSGB produce a Book of Awards was discussed. Mr Stevens explained that RSGB had published a Book of Awards in 1956. There were now some 900 awards and information was currently available from a number of sources, and he felt that little useful purpose would be served by RSGB entering this field. RSGB awards were given adequate publicity in the *CHC Directory*, as were awards issued by other national societies, but it might be practicable to produce a feature in *Radio Communication* giving sources of information on awards.

Amateur frequency allocations
Mr Stevens reported that severe pressure on the 70 and 23cm bands was occurring from authorities interested in both space communication and land mobile services. As a result of representations by the President, a meeting would be held at which he and Mr Stevens would participate, together with officials of the Ministry of Posts and Telecommunications, to discuss questions of amateur frequency allocation.

It now seemed important that a representative from RSGB should serve on the UK delegation to the forthcoming space conference to represent the interests of amateur radio. The IARU Region 1 had funds to support such a venture, and Mr Stevens had no doubt that a UK representative to the space conference could obtain financial backing from this source.

Minutes of committee meetings
Council approved the minutes of the VHF Contests Committee (26.2.70), Finance and Staff Committee (27.2.70), RAEN Committee (31.1.70) and the VHF Committee (23.2.70).

Concerning a minute of the TVI/GPO Liaison Committee meeting on 6 February, it was reported that following further representations to the Ministry of Posts and Telecommunications, the Ministry had been unable to accede to the request for separate prefixes for Guernsey and Jersey.

Other business
Mr Ward reported that it was proposed to organize an ORM at Ilkeston on 30 June. A business meeting and afternoon function would be followed by a dinner and dance. It was intended that this venture should be self supporting, and Mr Ward emphasized that, in connection with the raffle, it was proposed not to solicit the support of commercial organizations. Council approved, in principle, the holding of the proposed ORM.

Council was in session for 3½ hours

SPECIAL EVENT STATIONS

This is Crawley, 16-31 May

In connection with this display of local activities in Crawley, Sussex, organized by the Crawley Council of Social Service, GB3TIC will be operated by G3OUX, G3IDF, G8BOV and others on behalf of Crawley Amateur Radio Club.

The station will be established in St John's Church Hall, Town Centre, Crawley, which will be open to the public from 10am to 5pm on 23 May.

Marconi-Kemp Commemoration, 17 May

In May 1897 Marconi and Kemp conducted a series of highly successful tests in radio communication from Lavernock Point, Glamorgan; Flatholme Island in the Bristol Channel; and Brean Down, Somerset. During these tests, radio signals were transmitted for the first time across water and radio communication was established for the first time between two countries.

These tests are being commemorated annually by the Barry College of Further Education Radio Society which will be establishing two stations, GB3FI on Flatholme Island and GW3VKL/P at Lavernock Point, on 17 May. Both stations will operate from 160m to 10m (ssb and cw) and 2m (a.m.). A special QSL card will be issued to all stations contacted.

The station at Lavernock Point will be located at the Lavernock Point Holiday Camp, by kind permission of the directors who have agreed to make the camp's facilities available to visitors to GW3VKL /P. It is an ideal venue for the family, and the Barry College of Further Education Radio Society hopes to meet many old and new friends there.

Canterbury Becket Festival, 19-26 July

As part of the Canterbury Becket Festival, commemorating the 800th anniversary of Thomas Becket's murder in Canterbury cathedral, local amateurs will be running a festival station with callsign GB2CF.

It is proposed to run the station 24 hours per day during the period of the festival on all lf and hf bands, and possibly on 2m as conditions permit. QSOs, which will be QSLd with a suitable card, will be most welcome.

D. L. Smith, G8CUC, is co-operating with G3LCK, G3XDV and G3WXQ in this venture.

Annual General Meeting

Minutes of the 43rd Annual General Meeting of the Radio Society of Great Britain held at the Royal Society of Arts, John Adam Street, Adelphi, London WC2, on Friday 4 December 1969 at 6.30pm.
Present: *The President (Mr J. W. Swinnerton, TD, BSc Econ)in the Chair, the immediate past-President (Mr J. C. Graham), Mr E. W. Yeomanson (executive vice-President), Dr J. A. Saxton (President-elect), Messrs B. Armstrong, A. F. Hunter, E. G. Ingram, H. E. McNally, L. E. Newnham, R. F. Stevens, G. M. C. Stone, F. C. Ward (members of the Council), Mr R. G. B. Vaughan (secretary/general manager), Mr A. W. Hutchinson (editor), Mr T. F. Howard (accountant) and 73 corporate members.*

Apologies for absence was received from Mr N. Caws (hon treasurer), who was indisposed, and a number of other members.

Notice convening the meeting
The secretary read the notice convening the meeting.

Minutes
Mr E. N. Hurle moved and Mr W. H. Allen seconded and it was resolved that the minutes of the 42nd Annual General Meeting as published in the April 1969 issue of *Radio Communication* be taken as read, confirmed and signed as a correct record.

Annual report
The President moved and, no questions being asked, it was resolved that the Annual Report of the Council as published in the October 1969 issue of *Radio Communication* be received and adopted.

Supplementary report
The secretary read a supplementary report of the Council covering the period from 1 July 1969 to early December 1969.

Report of the honorary treasurer and audited accounts for the year ending 30 June 1969
The President announced that Mr N. Caws, the honorary treasurer of the Society, was indisposed and could not be present. Mr B. Armstrong, chairman of the Finance & Staff Committee, would speak in place of Mr Caws.

Mr Armstrong then presented the report of the honorary treasurer and the audited accounts, explaining many items in the accounts in detail. He proposed and Mr R. Glaisher seconded that the report of the honorary treasurer and the audited accounts of the Society for the year ended 30 June 1969 be approved and adopted.

The President then asked for questions on the accounts.

Mr A. W. Rix asked for further explanations of the difference between the items marked "Council and Committee Meetings" and "Council and Committee Members". Mr Armstrong explained that the item for "Council and Committee Meetings" covered the costs of holding the meetings, and the item "Council and Committee Members" referred to travel and subsistence expenses.

Mr Rix asked whether all meetings were now held at headquarters, and Mr Armstrong answered in the affirmative.

Mr R. Ham asked for further information concerning the item "Agency Fees and Advertising for Staff". Mr Armstrong explained that the expenditure of £450 represented advertising charges and agency fees in connection with the acquisition of staff for headquarters.

Another member noted that outstanding debts to the Society had increased to an amount in excess of £9,000, and enquired whether Council were satisfied with this situation. Mr Armstrong explained that with the increasing turnover, the Society faced considerable difficulty in calling in money promptly. Council were certainly not satisfied at present, and every effort was being made to improve this situation.

Mr C. Newton enquired whether he could raise the question of financial policy. The President said this was out of order.

Mr Newton then drew attention to the part of the honorary treasurer's report, where it was stated that difficulty had been experienced in obtaining suitable and competent staff. Mr Newton felt that more explanation was needed, or that this statement should be removed from the report. The President assured Mr Newton that no reflection on the abilities of individuals had been intended.

Mr J. P. Hawker asked, in view of a statement in the December issue of *Radio Communication* concerning staff, that it be noted that no editorial staff had been dismissed.

The President then put the resolution to the meeting and it was carried unanimously.

Election of Council for 1970
The President announced that it gave him great pleasure to report in accordance with Article 10 of the Articles of Association, that the Council had appointed Dr J. A. Saxton to the office of President for 1970.

The President reported the result of the ballot to fill the three vacancies which would occur among ordinary members of Council on 31 December 1969. This was as follows:

Dr E. J. Allaway	G3FKM	1,496
Mr A. E. Dowdeswell	G4AR	1,038
Mr J. C. Graham	G3TR	1,478
Mr L. E. Newnham	G6NZ	1,523
Mr E.W. Yeomanson	G3IIR	1,607

He then formally declared Messrs Allaway, Newnham and Yeomanson elected, and thanked the unsuccessful candidates for taking part in the election.

The President announced that the vacancy arising on 31 December 1969 for a Council member elected on a zonal basis for Zone D was to be filled by Mr W. A. Scarr, G2WS, who had been returned unopposed. He then formally declared Mr W. A. Scarr elected.

The President also announced that the following members of the 1969 Council were not required to stand for election in their respective offices:

Mr J. W. Swinnerton	G2YS	Retiring President
Mr N. Caws	G3BVG	Honorary treasurer

Members of Council: Mr B. Armstrong, G3EDD; Mr R. J. Hughes, G3GVV; Mr A. F. Hunter, GM3LTW; Mr E. G. Ingram, GM6IZ; Mr G. R. Jessop, G6JP; Mr H. E. McNally, GI3SXG; Mr J. R. Petty, G4JW; Mr R. F. Stevens, G2BVN; Mr G. M. C. Stone, G3FZL; Mr D. M. Thomas, GW3RWX; Mr F. C. Ward, G2CVV.

In conclusion, the President thanked the scrutineers for the work carried out in connection with the Council election.

Auditors
Mr Armstrong proposed and Mr R. J. C. Broadbent seconded and it was resolved that Edward Moore & Sons be re-appointed auditors for the year to 30 June 1970 at a fee of £220.

OTHER BUSINESS
Panel of scrutineers
The President announced that in accordance with Article 58 it was necessary to appoint a panel of 10 corporate members from whom three scrutineers for the 1970 ballot for Council would be drawn. The following submitted their names: Messrs R. J. C. Broadbent, G3AAJ; G. S. Fitton, G3RAA; Mr M. A. C. McBrayne, G3KGU; Mr A. J. Gould, G3JKY; R. Glaisher, G6LX; H. A. Bailey, BRS30664; A. Gordon, G3XOI; D. Thom, G3NKS; Mr E. N. Hurle, G3RZN; Mr J. Alderton, G8AEB.

This terminated the formal business of the Annual General Meeting at 7.40pm.

INFORMAL DISCUSSION

The President then opened the meeting for an informal discussion on any matters that members wished to bring up.

Mr Patterson, GI3KYP, said that he wished to put on record the thanks of the membership to the retiring Council members, Messrs Etherington, Graham and Twist. All present paid tribute to the three retiring members of Council for their efforts in the past.

Mr Corsham congratulated all those responsible for the production of *Radio Communication* for the continuing success of the journal. However, he felt strongly that the recent omission of "Letters to the Editor" had deprived the membership of a means of expressing opinion on matters of interest.

Mr Stevens, G2BVN, agreed that it had not been possible to publish "Letters to the Editor" for some time, due to lack of space. In addition, many difficulties had been experienced in production of the journal due to staff changes. Many recent issues had been produced under near emergency conditions, and it was hoped that a more consistent editorial policy could be adopted now that a permanent editor (Mr A. W. Hutchinson) had been appointed.

Mr R. Glaisher, G6LX, asked whether the President could explain the new scheme of representation.

The President explained that up to the present time, the Council members elected on a zonal basis had no direct responsibility for the zone represented. It was now intended that the zonal Council member would become a "zonal manager" having powers of co-ordination and direct responsibility for the regions making up his particular zone. The zonal manager would co-ordinate the efforts of the existing regional representatives, and in addition it had been decided that the zonal manager should set up, by agreement, the best system of representation, taking account of the circumstances in particular zones. It had been realized that no one system of representation could hope to work properly and adequately under the vastly differing circumstances existing, for example, in the south east of England as compared with the north of Scotland.

Mr Shepherd, GM3EGW, wished to express his appreciation of the hard work done by members of Council, particularly Mr Caws, in keeping the Society's financial affairs in order. However, he felt that the accounts made very poor reading, and that the Society should not rely on sales of publications to make up for an inadequate subscription revenue. Profit from sales of publications should be used to provide additional facilities and services, not to support the basic activities of the Society.

Mr Newton, G2FKZ, supported Mr Shepherd's statement.

Mr Bluff, G3SJE, felt that remarks published in the December issue of *Radio Communication* implied that the subscription would have to go up. This did not appear to agree with statements made by Mr Armstrong.

The President explained that Council had carefully considered the matter of an increase in subscription, but that it had been decided to take no action at present. Considerable difficulty had been experienced at the Society's headquarters during the year, and it had been felt that improvements in headquarters organization and the service offered should be obtained before increasing the subscription. Council was unwilling to increase the subscription rates and yet lose overall income due to a reduction in membership.

Mr A. C. Morris said he was concerned by a number of aspects of the accounts. He did not think that the Society's current expenditure on administration should be covered by the profit from publication sales. Such profits should be used to redeem the Lambda debenture issue. To carry out such a policy it was clear that an increase in the membership subscription should be made as soon as possible. Mr Morris was also of the opinion that the Society should pay a realistic rent to the Lambda Investment Company in coming years. Allowing for further increases in administration costs Mr Morris estimated that a deficit of some £2,500 was to be expected in the year 1969-70, even allowing for increased sales of publications. In his view, an increase in subscription rates of at least 10s was necessary, assuming the present profit on publications could be maintained.

Mr Gordon said that he had conducted an unofficial poll at his local club, and the general opinion was in favour of a subscription increase.

Mr Shepherd asked whether it was possible to put a motion to the meeting proposing an increase in subscription rates. The President explained that a Special General Meeting would be necessary to consider such a proposal, but that he was prepared to allow an informal test of opinion on any suggestion which Mr Shepherd was prepared to make.

Mr Shepherd and other members suggested sums between £3 and £3 10s.

The President then asked members present for their opinion on the suggestions, and an informal show of hands revealed that only one member would be against such an increase. The President said that he felt sure that members of Council would bear in mind the opinions expressed at the Annual General Meeting for discussion at an early date.

The executive vice-President, Mr E. W. Yeomanson, reminded members that a Special General Meeting would be required to amend the Articles of Association and approve any increase in subscription rates. Should such a meeting be held he hoped that sufficient members would attend to make up the necessary quorum of 50 members.

Mr Wheeler, BRS26461, asked whether the space occupied by titles of articles in *Radio Communication* could be reduced. In this event, it might be possible to publish "Letters to the Editor" more frequently. Mr Stevens explained that it was sometimes necessary to "lose space" in the final make-up process.

Mr Hawker, G3VA, said he was worried about the Society's apparent willingness to rely on one commercial publishing organization as the sole American outlet. Mr Stevens pointed out that our sales of publications in the USA had very substantially increased since the commencement of our association with *Ham Radio Magazine*.

Mr P. G. Martin, G3PDM, had submitted a number of written questions on subjects connected with *Radio Communication*. Mr Martin was concerned at the increase in the time taken for technical articles to be published in the journal. He felt that this period had increased from about three months to 11 months, and that as a result material was out of date prior to publication.

Mr Stevens explained that the delay had not really increased at all. It was necessary to adjust the publication dates of articles to give balanced coverage, and it was often necessary to delay publication where two or more articles had been received dealing with the same or similar subjects. In addition, the number of articles submitted for publication had proliferated in recent years, and for this reason the delay might increase in future. Due to staff changes, the journal had been produced in difficult circumstances for some time, but this situation had now been remedied with the appointment of a permanent editor. Technical articles could not be published over a shorter time cycle than three months, due to the need for checking and normal editing processes. Many societies and journals operated with a substantially longer delay.

Mr Martin had also asked why contributors could not be paid for articles on acceptance rather than on publication, and Mr Stevens explained that it would not be realistic to pay for articles on acceptance due to the enormous amount of checking and preparation work involved. The Society's policy was that payment could be made on receipt of corrected page proofs.

Mr Martin posed a further question concerning the opinion of some members in the north-east of England that unsuitable articles had been published. He wished to know what proportion of articles submitted to the RSGB ready for publication were in fact turned down.

Mr Stevens replied that one in four articles submitted were rejected for various reasons.

Mr Martin's final question concerned the tendency to increased length of recent articles. He asked whether more space could not be made available to main items by using smaller print for the more mundane material published towards the back of each issue of *Radio Communication*.

In reply Mr Stevens said that in the last seven issues an informal analysis revealed that 29 articles had been published, 21 of these articles had been of five pages or less, while eight were of more than five pages. In the December issue of the journal, the last 20 pages had been set in seven point type. This size was commonly accepted as the minimum for normal magazine use.

At this stage Mr Fitton remarked that he felt the meeting was wasting time on matters which could be adequately answered in correspondence between Mr Stevens and Mr Martin, the President agreed to terminate further discussion.

Mr Fitton asked whether wider distribution of *Radio Communication*, ie via bookstalls, had been considered, as he felt it could be an aid to recruitment.

The President explained that considerable difficulties existed in offering *Radio Communication* for sale, as the distribution facilities and arrangements required for putting the journal on general sale would result in an enormous increase in costs, and it might run contrary to Council's endeavours to enlarge the membership.

In reply to a question from Mr Glaisher, Mr Stevens said that the Society hoped to increase advertising revenue in the future.

Some discussion followed on the change of name from *RSGB Bulletin* to *Radio Communication*. The President allowed an informal vote on this matter, and a large majority were in favour of *Radio Communication*.

Trophies

At the close of the informal session, presentations of the Societies' trophies were made by the President.

Silent keys

It is with regret that we record the deaths of the following radio amateurs:

Mr J. F. Harman, BRS28195, of 20 Charles Street, Grays, Essex.

Mr J. H. A. Roberts, G3KDF, of 5 Saxon Road, London N22

Mr T. A. Shaw, G3KTS, of 149 Station Street, Burton-on-Trent.

Mr W. Gray, GM4NK, of 26 Allands Avenue, Inchinam.

OBITUARIES

Maurice Child. . . 1888–1970

It is a sad occasion when one is called upon to compose an obituary citation on the passing of so great a figure in the foundations of the amateur radio movement as Maurice Child, who died on Thursday 9 April 1970 at the great age of 82.

Few can now remain who, as in his case, saw as a teenager in the 'nineties the experiments of Marconi between Poole in Dorset and the Isle of Wight. This experience evidently inspired him, and he developed his knowledge so that later he was able to take an appointment as a professional operator at the coast station GLV, and on the steamer service between Liverpool and the Isle of Man. His anecdotes of this period were fascinating indeed.

Later he founded the London Wireless Training College at Earl's Court, London, where he contributed much to the profession of wireless operating and kept open house for the London amateurs of that time: McMichael, MXA; Klein, RKX; Perrier, PFX; and others now almost forgotten.

He held one of the experimental licences issued by the Post Office in 1906 for transmissions up to 10 miles, no callsign or power being mentioned. (Sir Ambrose Fleming only had a licence for five miles!) He was an extremely precise and expert constructor, and it is hoped his whole collection of apparatus will be transferred to RSGB for posterity.

He became 2DC (No "G") immediately after the 1914-1918 war and, although not greatly attracted by general communication or dx, maintained contact with the amateur movement giving help, guidance and lectures; the latter always remembered for the interest and delightful humour they contained.

Up to the time of his death he was a devoted and greatly respected member of the Guildford and District Radio Society with which all amateurs will join in sympathy in the loss of such an outstanding personality. He became secretary of the T & R section of RSGB in 1925 under the presidency of Sir Oliver Lodge and helped to guide the section through that exciting period which raised the status of amateur radio to the highest level it ever attained.

A final interest of his should be mentioned. He was deeply interested in model locomotives and possessed a magnificent 9in gauge steam example—*Taurus*—which he took about and demonstrated, wherever there was a track, at various fetes and exhibitions —the last at Stoke Park, Guildford, shortly before his death . . . a remarkable occasion at four-score and two years.

Our very sincere sympathy goes to his wife, Mrs Anna Child, in her bereavement.

Hail and farewell, Maurice.

W.K.A.

* * *

J. E. Harman, BRS30186

The sudden death of Jack Harman on 24 February came as a profound shock to his many friends in the Eastbourne area. Aged 49, he had been keenly interested in vhf since pre-war days, having started his receiving activities on the then 5m band.

With the coming of 2m he turned his attention to this band and put in countless hours of patient and rewarding listening. In the early 'fifties Jack constituted the very able receiving half of what could be rightly called the G3DIV/A combination, and will be remembered by many who operated on 2m in those days. It was from his QTH that several "firsts" to Europe were made on 2m and 70cm.

Although not professionally engaged in radio, Jack had that rare intuition and know-how that enabled him to produce over the years many successful vhf converters and from them achieve top performance.

Likewise his knowledge and feel for vhf propagation conditions were always acute and he rarely missed an "opening."

His passing has left us all with a deep sense of loss.

P.J.P.

J. Fraser Shepherd, GM3EGW

Fraser Shepherd, GM3EGW, perhaps the best known of all Scottish vhf operators, died suddenly in his home on Monday 30 April at the early age of 45. He was, however, a truly balanced amateur enjoying activities on top band, the dx bands and vhf alike. He was equally balanced in his life outside amateur radio, combining an intensely active business life with numerous social commitments in his home town of Dunfermline. There is no doubt that the pressure arising from this contributed to his untimely death.

He could be relied upon to speak convincingly and sincerely at any occasion and was always in demand at society conventions and meetings. Those who attended the 1969 AGM in London will recall his stern warnings concerning the state of the Society's finances. But he could equally bring laughter to many with his rare gift for after dinner speaking.

The Council of the Society were represented at the funeral by A. Hunter, GM3LTW, zonal Council member for Scotland.

The following were also present: GM3s, AYR, CIG, ENJ, FYB, HYX, IQL, MOR, OWU, PMB, SBC, GM8FM, GM6XI and GM8CHN.

In all respects he will be sadly missed and his loss is indeed greater when he had so much yet to offer. The Society, Council and his many friends extend their sympathy to his wife Helen and his three children.

G.M.C.S.

* * *

H. Beadle, G8UO

It is with deep regret we record the death on 7 March 1970, after a short illness, of Harry Beadle, G8UO, at his home 12 Cartmel Road, Keighley.

Harry, who was licensed in 1937, made many friends on the air both at home and in many countries abroad. He worked mainly cw, until about five years ago when he started to use phone also. He was active on the air right up to his death and had regular skeds on 40 and 20m every week. Harry was very keen and efficient with his QSL cards and designed many of his own, including ham radio cartoons.

Our deepest sympathy is extended to his widow.

P.A.

* * *

Owen McCusker, GM3CFU

Owen McCusker passed away peacefully at his home in Edinburgh on 17 March 1970.

He was first licensed pre-war as 2CFU and obtained a full licence on his discharge from the RAF at the cessation of hostilities. He joined the staff of Ferranti Ltd in Edinburgh and was later highly respected for his work as a shop steward.

A long-serving member of the RSGB, Owen was also a member of the Lothians Radio Society and, although not very active in recent years, he was a consistent supporter at field days. He was president of the "Lothians" in 1964/65.

Among those present at his funeral were GM6SR, GM6XI, GM3DXJ, GM3FGJ, GM3KIG and GM3OWU.

Our deepest sympathy goes to his widow and family.

V.W.S.

* * *

John A. Sang, ex-GI6TB

Many amateurs, both GI old-timers and visitors to Northern Ireland, will learn with regret of the recent death of Jack Sang, who was the first honorary secretary of the Radio Transmitters' Union (NI), and always an enthusiastic member. Never a very active operator, he was nevertheless a most popular and hardworking team-member at National Field Day and many other group efforts.

Every inch an engineer, as befits one in a line of distinguished engineers, he was a quiet cultured man who will be remembered by all who met him as indeed a gentle man.

T.P.A.

YOUR OPINION

The Editor
Radio Communication

Sir—Last year you published two excellent articles advocating the use of 72Ω twin feed line for certain antennas in preference to coaxial feed lines.

At that time it was difficult to obtain the heavy duty 72Ω twin, only the tv feed line with 20 gauge conductors being readily available.

Now I understand that 72Ω twin with 18 gauge conductors will soon be available again. This is more robust and has lower attenuation at rf. The attenuation figures are as follows.

Freq (MHz)	Attenuation in dB per 100m	Approx attenuation dB per 100ft
3·5	1·6	0·49
7	2·3	0·7
14	3·3	1·0
21	4·1	1·25
28	4·7	1·45

Yours faithfully
E. Wagner, G3BID

The Editor
Radio Communication

Sir—I feel that I must write in praise of G3HBW's 2m mosfet converter as published in the June 1969 issue of *Radio Communication*. I constructed one of these converters, which functions excellently, and congratulations must freely be given to A. L. Mynett for this fine little unit.

I would mention a point which might help some of those who have been unfortunate enough not to obtain very good results from this unit. Namely, that the Osmor QA8 coil I obtained just could not be made to resonate, even with a brass slug substituted for the dust iron one at 5MHz, so a modified manufacturer's surplus coil which did has been substituted. With the coil changed this converter functioned first time. If layout and instructions are followed implicitly, as G3HBW has stated in his second article, no trouble should be experienced provided the correct wire gauges, etc are used.

A further point which later arose, and was not one caused by either design or layout, was that for no accountable reason three successive Mullard BF180 transistors, after functioning perfectly for a week or so, gradually gave an increase in noise level until no signals could be received and they each had to be changed. As I only had three of these transistors I tried a BF115 and found that this functioned well and gave very good results but obviously with a little higher noise level. I would be interested in any comments as to why my three "pucker" BF180 transistors gave up the ghost. I have now obtained a further three BF180s and am not inclined to risk another one until I can find the answer.

My converter runs from an integral 9V battery.

Yours faithfully,
Colen W. Harlow, G8BTK

The Editor
Radio Communication

Sir—After listening to the excellent technique, operation ability and manner in which G3WPO is currently conducting the G-9H1BL dx contacts on 1,850 kHz, I felt compelled to write and ask you to put on record my own appreciation and, I am sure, the appreciation of the many other top band enthusiasts who, because of G3WPO's efforts, have succeeded in establishing two-way contact with Malta on 160 for the first time.

This is surely a shining example of how to avoid the anarchy of the "pile up" although, of course, the technique would not work on the hf bands.

Yours faithfully
G. A. Partridge, G3CED

The Editor
Radio Communication

Sir—We deplore the change in rules for VHF NFD 1970 which, for the first time, exclude the uhf/shf bands above 1,325MHz. We do so on the following grounds.

1. The decision appears to have been made by Council without any consultation of members or clubs; indeed the only indication has been a suggestion in the last VHF NFD report buried among several others on what to do with VHF NFD.
2. The decision is arbitrary and illogical. Strictly speaking, if it is to be a vhf event it should include only the 70 and 144MHz bands, if vhf/uhf then the 432, 1,296 *and* 2,304MHz bands also should be included.
3. Most important of all is the matter of philosophy. Surely those responsible for the well-being of the hobby should take the lead in encouraging openness of mind so that the ordinary enthusiast should feel it possible to take that next step and learn from it? The alternative is technical sterility. So far vhf has been delightfully open-ended and free from barriers inhibiting people from having a go.

In this respect, VHF NFD has a special significance and is not just another contest. It probably involves directly more people, both as operators and camp-followers, than any other event in the calendar. It is therefore an excellent opportunity for people to see, to hear, and to hear of the operating of shf equipment (which ironically can be far simpler than that for vhf) under the competitive conditions of a contest. Merely this will tend to take shf out of the "specialist" class into the "possible" class.

The decision by Council is a negation of this spirit and therefore to be regretted: surely the barrier between dx and vhf already is one too many. We suggest that this decision be reversed and the shf bands be restored to VHF NFD: this will at worst do no harm and, we think, will do considerable good.

Yours faithfully,
D. S. Evans, G3RPE
A. L. Mynett, G3HBW
H. W. Rees, G3HWR
D. J. O'Connor, G3CLF

The following reply to the above letter has been received from the secretary of the VHF Contests Committee:

The Editor
Radio Communication

Sir—The rules for VHF NFD were discussed at some length by the VHF Contest Committee before the draft was passed to Council for approval. The reasons for the exclusion of the 2,304MHz and higher frequency bands were:

1. There was an apparent lack of genuine interest in these bands in the 1969 event. Of the total of 118 entries, only four included operation on 2,304MHz. Two of these four did not appear to be club entries as their scores were not combined with any other station's. Several groups mentioned that it was hardly worth operating on the bands above 1,296MHz and this was taken to mean that they would have operated if an attractive multiplier had been offered.
2. It was felt that the average club was stretched to its limit to equip and operate three stations, as only two groups had used four different callsigns as permitted by the 1969 rules. One group even went so far as to suggest that operation should be limited to two stations, as for HF NFD. The VHF Contests Committee's first concern is that contests should be as fair as possible, rather than that they should increase activity on any particular band. It was, agreed, therefore, that it would be appropriate to revert to a maximum of three stations.
3. The first weekend in October had been scheduled for an IARU Region 1 uhf/shf contest to include operation on 432MHz and above. It was hoped that UK uhf/shf enthusiasts would take part in this contest, possibly with the help of vhf operators who would not be available to them during VHF NFD due to the high level of activity on the vhf bands.

I would like to draw attention to the Microwave Contest scheduled for 14 June. Rules for this new event appear in this issue (p 337). It is to be hoped that this will help to increase interest in the bands above 1,296MHz.

A. J. Gould, G3JKY.
Secretary, VHF Contests Committee

MOBILE RALLY NEWS

Northern Mobile Rally, 17 May

At Moor Grange School, Parkstone Avenue West Park, Leeds 16, off north side of A6120 half mile west of junction with A660.

The rally starts at noon and there will be competitions, displays, trade stands, a surplus stall, and a prize draw at 4pm.

There will be no charge for entry and parking on the site will be free. A talk-in station will be in operation on 160m and possibly also on 4m.

Contact G3MGI QTHR for further information.

Amateur Radio Mobile Society's Annual Rally 5 July

At the RAF/USAF Air Base, Alconbury, Hunts.

This year's event will be a carnival rally, the carnival being a USAF promotion in conjunction with their Independence Day festivities. As usual, there will be facilities for overnight camping and caravans, and there will be a large trade show.

Worcester & District ARC Mobile Rally, 12 July

At Hill County Secondary School, Upton-upon-Severn, Worcestershire.

Fancy dress competition, games and sports for the children. Model aircraft flying display, weather permitting. Prizes for the best dx (mobile) and the best mobile installation. 160m frequency measuring competition, plus the usual junk stalls, trade stalls, refreshments and raffles.

Scarborough Mobile Rally, 19 July

At Burniston Road Barracks—Northside. Official opening 2pm. Talk-in stations 10am to 2pm: 160m, G4BP/A; 80m, G3HFW; 2 metres, G3NRS. Demonstration of electronic equipment by Royal Signals to mark their 50th anniversary. Local attractions; beach, zoo, miniature railway, Peasholm Park, NAAFI and free car park on site. G8KU, QTHR.

Derby Mobile Radio Rally, 16 August

At Rykneld School, Bedford Street, Derby. Thirteenth annual event. Admission and parking free. Ample accommodation if wet.

Three talk-in stations in operation 10am to 3pm: G3ERD/A on 160m, G2DJ/A on 4m and G8DBY/A on 2m. Trade stands, junk sale and prize draw, band concert and children's events. G3FGY, QTHR.

Contests calendar

10 May—DF Qualifying Event, Grimsby. (New date)
30–31 May—432MHz Open
6–7 June—HF NFD
14 June—Microwave Contest (1,296MHz and up)
14 June—DF Qualifying Event, Salisbury
21 June—70MHz Portable
28 June—DF Qualifying Event, High Wycombe
4–5 July—Summer 1·8MHz
4–5 July*—144MHz Open
11–12 July—High Power HF Field Day
19 July—DF Qualifying Event, Stratford
26 July—432MHz Open
9 August—DF Qualifying Event, Chelmsford
10 August—144MHz SSB
15–16 August—70MHz CW
5–6 September*—VHF NFD and IARU Region 1 VHF Contest
13 September—80m Field Day
20 September—DF National Final, Slade
3–4 October*—IARU Region 1 UHF/SHF Contest
10–11 October—28MHz Phone
24–25 October—7MHz CW
7–8 November—7MHz Phone
7–8 November*—144MHz CW
14–15 November—Second 1·8MHz
6 December—144MHz Fixed Station

*To coincide with IARU Contests

Mobile rallies calendar

10 May—Ealing and District Amateur Radio Society Rally.

17 May—Northern Mobile Rally. Organized by the Northern Amateur Radio Mobile Society.

14 June—1st Elvaston Castle Mobile Rally. Elvaston, Derby. Organized by the Nunfield House Community Association Amateur Radio Group, G3EEO. Further information from P. Neal, G3WFU, QTHR.

14 June—Tenth Anniversary Rally at HMS *Mercury* organized by RNARS and the Portsmouth and Fareham Radio Clubs. Further information from J. Allen, G3DOT, QTHR.

20–21 June—Anglian Mobile Radio Rally, Suffolk Showground, Ipswich. Further information from D. W. N. Thomas, G8BVE, QTHR.

21 June—University College of Swansea Amateur Radio Society's Annual Rally, Singleton Park, Swansea.

28 June—Longleat Safari Mobile Rally, Longleat House, Near Warminster. Organized by the City & County of Bristol RSGB Group. Contact G3PQE.

5 July—Cornish Radio Amateur Club Rally, St Ives. Further information from J. Farrar, G3UCQ, QTHR.

5 July—Amateur Radio Mobile Society's Annual Rally and Carnival. RAF/USAF Air Base, Alconbury, Hunts.

12 July—Upton Mobile Rally organized by Worcester and District ARC, Hill County Secondary School, Upton-upon-Severn. Contact G3VJN.

12 July—WADARC Mobile Rally, Hill County Secondary School, Upton-upon-Severn, Worcestershire.

19 July—Scarborough Amateur Radio Society Rally, Burniston Road Barracks, Scarborough.

26 July—White Rose Mobile Rally. Allerton High School, King Lane, Leeds 17. Organized by the Pudsey & District Radio Club. Further information from K. Wells, G3WIX, QTHR.

26 July—Saltash and District ARC Rally, Saltash School, Wearde Hill, Saltash. GB3SAL will operate as talk-in station on 160m and 2m. G3XWA.

2 August—City and County of Bristol RSGB Group Mobile Picnic, Ashton Park, Bristol. G3ULJ.

9 August—Woburn Abbey Mobile Rally.

9 August—Stratford-upon-Avon Mobile Picnic

16 August—Torbay Amateur Radio Society Mobile Rally, Newton Abbot Rugby Ground. Contact G3GDW.

16 August—Derby Mobile Rally, Organized by Derby and District Amateur Radio Society. Rykneld School, Bedford St, Derby. Further information from T. Darn, G3FGY, QTHR.

20 September—Peterborough Mobile Rally. Contact D. Byrne, G3KPO, QTHR.

Mid-September— RSGB Scottish Mobile Rally Region 14.

Looking ahead

10 May—Scout Rally Camp, Ampthill Park, Beds. Special event station by Bedford & District ARC.
20 May—Lecture at the IEE by Dr J. A. Saxton, President RSGB.
20 June—Region 4 ORM.
3–5 July—Exhibition station at the Willenhall Comprehensive School's Annual Garden Fete.
19–26 July—Special event station at Canterbury Becket Festival.
25–26 July—British Amateur Television Club Convention. Cambridge.
19–22 August—RSGB Exhibition, New Horticultural Hall, London.
11 October—RSGB Scottish VHF Convention, Dundee.

CONTEST NEWS

First 1·8MHz Contest 1970

The First 1·8MHz Contest of 1970, held on 14–15 February, attracted a total of 55 entries from contestants in 28 counties. This was welcomed as an improvement, compared with 1969 when 40 entries were received.

Subject to approval by Council the Somerset Trophy goes to Brian Jones, GW3WRE/A, with a score of 706 points. He operated from Nash Point Lighthouse with a modified DX100 and a Hammerlund HQ170. The runner-up, F. L. Curtis, G3SVK/A, totalled 689 points using a Codar AT5 and a HRO from a site near Oakham in Rutland. A close struggle for third place resulted in W. R. Steverson G3JEQ, getting 587 points with his homebrew tx (807 pa) and SX28, a margin of four points over S. Mickel, GM3WDF/A, with H. J. M. Box, G6BQ, six points lower.

The Maitland Trophy, which is awarded to the Scottish entrant with the highest aggregate of points in this contest and the Second 1·8MHz Contest 1969, has been won by S. Mickel, GM3WDF/A, with a total of 1,033 points from the two contests. He operated from a site in Dumbartonshire alongside the Forth/Clyde canal, using a KW2000B connected to a 1,200ft long end-fed aerial. The runner-up, J. Balfour, GM3PFQ, amassed 888 points using a Geloso Exciter/PA and an S640 from his home QTH in Kirkcaldy, while A. Givens, GM3YOR, also in Kirkcaldy and the only other Scottish competitor to submit an entry in both contests, had a total of 224 points.

Comments on conditions seemed to indicate that they improved after being fair at the start. A study of the leading logs showed that over 220 Gs were active. The majority of comments expressed satisfaction with the rules and how much they had enjoyed the contest.

Once again the standard of logs was very good, with a small minority not using the official log sheets. There was a marked improvement in the matter of claiming points for duplicate contacts. Very few were found (one entrant marked a duplicate *very* clearly—and then claimed six points!) but there were rather more claims of six points for the seventh contact with a county.

The Contests Committee acknowledges with thanks check-logs from G3KPJ, G3VBF, G3VJZ, GI3VYZ, OK1DIM and OK1KRS.

RESULTS

SOMERSET TROPHY

Posn.	Callsign	Cnty.	Pnts.	Posn.	Callsign	Cnty.	Pnts.
1	GW3WRE/A	GN	706	28	G3JLE	OX	363
2	G3SVK/A	RD	689		G3WXS	GR	363
3	G3JEQ	SY	587	30	G3KPU	NM	359
4	GM3WDF/A	DU	583	31	G3YPK	LD	357
5	G6BQ	KT	577	32	G3RSD	LN	346
6	G3FM	SY	569	33	G3XFG	KT	340
7	G3HZL/A	MX	564	34	G3XEI	GR	330
8	GW3XJC	GN	558		G8PB	EX	330
9	G3PSM	LN	552	36	G3UJX	CH	320
	G3XTJ	LD	552	37	G3YMH	MX	315
11	G3SKC	MX	540	38	G3KZR	LR	306
12	G3UPV	WE	539	39	G3XIP	WK	298
13	G3ORY/A	SF	502	40	G3XNS	SX	292
14	G3WRF	BE	498	41	G3YGR	LD	277
	GI3VIR/A	DW	498	42	G3TLF	YS	276
16	GM3PFQ	FE	492	43	G8RZ	CD	252
17	G3XEP/A	YS	480	44	G3WSN	EX	244
18	G3TNO	SX	477	45	G3CWW	YS	226
19	GM3UKG	BF	442	46	G2FNK	MX	171
20	G3JVJ	WK	433	47	GM3YEH	AY	132
21	G3GMK	HE	421	48	G3XQX	LD	114
	G3YDX	CL	421		GM3YOR	FE	114
23	G3TR	SY	417	50	G3WDS	CD	102
24	GI3JEX	DW	382	51	G3PYC	SX	96
25	G3VIP	LN	381	52	G3ULY	CD	36
26	G3SZG	HE	375				
	G3XDY	LN	375				

MAITLAND TROPHY

Posn	Callsign	Second 1·8MHz 1969 Score	First 1·8MHz 1970 Score	Total
1	GM3WDF/A	450	583	1033
2	GM3PFQ	396	492	888
3	GM3YOR	110	114	224

Other Scottish scores

GM3FXM	602	–
GM3NCS	460	–
GM3UKG	–	442
GM3YEH	–	132

Entries not accepted

Callsign	Claimed score	Reason
G3KAC	699	Multi-operator General Rule 5(a)
G3FJE/A	240	Multi-operator General Rule 5(a)
G2DC	489	Late entry; General Rule 8(f)

February 1970 70MHz Fixed Station Contest

Posn	Callsign	Score	QSOs	Cnty	Best dx km	Comments on conditions
1	G3VPK	173	47	EX	325	Well below average
2	G3TDH	156	56	BD	222	Abominable
3	G3RLE	139	28	YS	333	Below average, activity low
4	G6HD	92	44	KT	285	Not good. Dx heard but not worked
5	G3EKP	74	23	LE	275	Very poor. Little activity
6	G3GVM	63	18	HE	330	Fair. QSB on dx stns
7	G3YFM	57	23	BE	131	Poor
8	G3WMR	52	37	LD	270	Same as ever
9	G3TDR	48	32	MX	94	Fairly quiet at times
10	G3VNQ	46	23	LE	310	Abysmal. Activity even worse!
11	G3HBG	42	24	SY	96	Poor
12	G3XUS	37	15	SX	125	Ugh!
13	G5UM	34	10	LR	130	Below normal
14	G3XMG	28	24	LE	55	Very bad. Activity much worse!
15	G2FNK	20	20	MX	97	Not very good to north or west
16	G3WWF	19	15	YS	62	Worst ever
17	G3GZJ	7	1	CL	190	Poor!
			Listeners			
1	BRS28005	89	30	SX	125	
2	BRS30386	12	12	SY	65	

Only four of the entrants in this contest got off the first page of their logs, which is some indication of activity and conditions. At least 150 stations are known to have been active, 51 in "ZL", 32 in "YN", 21 in "ZN", 19 in "AL" and lesser numbers in other QRA Locator rectangles. Six GI stations are known to have been on the band as G3EKP worked five of them, and a sixth, GI3HCG, was heard by G3GVM on the south coast.

Top scorer was Willy McClintock, G3VPK, who repeated his performance of last year. In second place is Reg Stevens, G3TDH, of Bedford. Both operators made nine less contacts than in the 1969 event. Subject to Council approval, both will receive certificates of merit.

An interesting set-up was that of G3YFM, where a pair of 2N3634s running at 25W input fed a 4 over 4 aerial at no less than 70ft above ground. At the other end of the scale was G2FNK, who enjoyed his first 70MHz contest with the help of a modified BCC equipment purchased at a club "junk sale" and a 4-element aerial in the loft.

G3WWF of Leeds regrets that the contest was not held a week later as contacts he made under non-contest conditions on the following Sunday would have been worth more than his 19 points. G3RLE suggests that in view of the low level of activity, an open contest be substituted for the fixed station event. This will be considered by the VHF Contests Committee when the Contest Calendar for 1971 is discussed.

Thanks go to G3TDM, G3VFD/P (the dreaded Ysbyty Ystwyth Group!) and G3VPS/P for their check logs, and to BRS28005 and BRS30386 for their entries for the 1970 VHF/UHF Listeners' Championship.

Rugby Practice Double DF Contest

To provide an opportunity to revive old sets, or try out new sets before the df season proper started, a direction-finding contest was arranged in the Rugby area for Sunday, 8 March.

Nine teams assembled at Cawston Loop, eagerly awaiting the first transmission at 1330.

Transmitter "A", G3TYP/P, was located in Wappenbury Wood, about six miles west of the start. Access to the transmitter was down a steep snow-covered track. The operator, Ian Jackson, concealed himself in the back of his Landrover, with a 100yd aerial across the wood behind him.

Transmitter "B", G3NDM/P, was located on a disused railway track about six miles east of the start. The track removers had conveniently left a number of deep trenches across the track, and Bryan Mahony concealed himself and his equipment in one of these.

Due to an unintentional unbalance of signal strength at the start, all but one competitor went to the "A" station first. A fair amount of "wood bashing" took place on the way to the transmitter, and tracks in the snow proved that at least some competitors were not convinced that Ian was in the Landrover.

Access to transmitter "B" was along the track from Lilbourne station, which meant that each and every competitor had a mile to walk in full view of the transmitter crew.

The first competitor to arrive was Eric Mollart, complaining that he got lost in Rugby as an excuse for his late arrival.

Other competitors arrived at intervals, to be greeted with a barrage of snowballs.

Results			Time at "A"	Time at "B"
1	E. Mollart	Oxford	1420	1533
2	R. Vickers	Stratford	1545	1438
3	J. Gage	Oxford	1440	1550
4	M. Hawkins	Chelmsford	1452	1618½
5	W. North	High Wycombe	1503	1618½
6	R. Hoffman	Rugby	1524	1619
7	D. Newman	Rugby	1505	1919½
8	R. Tyler	Oxford	1455	1620
9	B. Bristow	High Wycombe	1452	1630

Organiser: G3TYP/P, I. Jackson; G3NDM/P, B. J. Mahony.

Affiliated Societies Contest 1970

The total of 41 acceptable entries was slightly down on last year, but it seems that the influenza epidemic, which was at its height at the time of the contest, was responsible.

The winner was the Surrey Radio Contact Club, G3SRC, with 145 contacts and a score of 1,502 points.

Close behind in second place was the Reigate ATS 'B' station with 132 contacts earning 1,492 points.

In third place was the Government Communications HQ ARC which made 137 contacts and 1,464 points.

Each and every log needed going over even more carefully than usual to ensure that the final scores were accurate. Generally speaking the leading stations' logs had few errors, but the further down the list one goes the errors in copying incoming reports increase a great deal. It is likely that some mistakes are made in transcribing the logs. By and large the logs were neatly written but as usual there are a few who use odd bits of paper and write in what looks like sanscrit!

A lot of stations and particularly the leaders, used big aerials, and transmitters varied from home brew to KW2000. Conditions on the first day were not very good but improved quite a lot during the second session. A number of clubs put two stations on the air, and one even had three active. It seems that some non-AFS stations were signing AFS one night or part of the time. All this has been taken into account in working out final scores and all stations have had the same treatment. The differences between the claimed scores and final scores are nearly all due to mistakes in copying reports or getting callsigns wrong. Some contestants think that the last hour of each session was not needed. This may be true but without the flu and with a larger entry things might have been different; even so some stations made 15 or more contacts in the last hour each day.

The following entries were not acceptable:

Portsmouth & District RS 'A' Station—Late entry and sent to wrong address;
Worthing & District ARC 'A' Station—single operator;
South Shields & District ARC—single operator;
BOAC Speedbird Club—single operator;
G3SFG/A—no cover sheet or declaration;
G3OHB/A—no cover sheet or declaration.

The logs of these stations were most useful as check logs and the committee thanks them for sending in the logs.

Only one official check log was received and this was from D. E. Emery, G8CAX, (soon to be a G3 plus 3) an excellent and most useful check log with very full details of equipment and aerials. The committee thanks Mr Emery and hopes to get an entry from him in the 1·8MHz contests later this year.

The winners, Surrey Radio Contact Club, will receive the Edgeware Trophy and a certificate, and Reigate ATS and Government Communications HQ ARS will receive certificates.

Posn	Club	Call sign	Score
1	Surrey Radio Contact Club	G3SRC	1502
2	Reigate ATS "B" Station	G3FM	1492
3	Govt Comm HQ ARC	G3SSO	1464
4	Grimsby ARS "A" Station	G3XDY/A	1449
5	Midland ARS	G3MAR/A	1402
6	Mid-Sussex ARS	G5RV/A	1388
7	Fareham & D ARC "A" Stn	G3VEF	1371
8	Purley & D RC "B" Stn	G3SJX	1368
9	Sheffield ARC	G4JW	1357
10	Wirral DX Assn.	G3OKA	1341
11	Addiscombe ARS	G3VYI/A	1287
12	Purley & D ARC "B" Stn	G3TWJ	1249
13	Crawley ARC "B" Station	G3TNO	1237
14	Leyland Hundred ARC	G3GGS	1235
15	Cray Valley RC	G3RCV	1232
16	Maidstone YMCA ARS	G3TRF	1224
17	Reigate ATS "A" station	G3REI/A	1217
18	Crawley ARC "A" Station	G3WSC	1185
19	Fareham & D ARC "B" Stn	G3VXM	1156
20	Edgware & D RS	G3ASR/A	1120
21	Chesham & D ARS	G3MDG/A	1112
22	RNARS	G3BZU	1080
23	Clifton ARS	G3GHN	1035
24	Crawley ARC "C" Station	G3XNS/A	1026
25	Worthing & D ARC "B" Stn	G3LQI	1014
26	IBM Lab ARC	G3YXR	1006
27	Echelford ARS	G3UES/A	995
28	Moray Firth ARS	GM3TKV/A	965
29	Chippenham & D ARC	G3VRE	964
30	Wirral ARS	G3NWR	963
31	Bishop Wordsworth's School	G3XVB/A	950
32	Glasgow University RC	GM3WDF/A	914
33	Shefford & D ARS	G3FJE/A	875
34	Conway Valley ARC	GW3HGL	859
35	Wimbledon & D ARS	G3WIM/A	816
36	Scarborough ARS	G4BP	794
37	Bangor & D ARS	GI3XRQ	600
38	Bristol ARC	G3TAD/A	598
39	Bromsgrove & D ARC	G3VGG/A	486
48	Grimsby ARS "B" Station	G3RSD	244

28MHz Telephony Contest 1969

The following was regrettably omitted from the results of Receiving Section published in March: **Disqualified, (Rule 4) A6482, D. J. Browning.**

June 1970 70MHz Portable Contest

0900 to 1700gmt on 21 June

All entries and checklogs must be sent to the adjudicator addressed to: VHF Contests Committee, c/o G2AXI, 33 Whitedown Road, Tadley, Basingstoke, Hants.

The following general rules as published in the January issue of *Radio Communication* will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8c, 9a, 10, 11, 12a, 13–24.

June 1970 Microwave Contest

0900 to 1800gmt on 14 June

All entries and checklogs must be sent to the adjudicator addressed to: VHF Contests Committee, c/o G8AYN, 108 Gascoigne Road, New Addington, Croydon, Surrey, CRO ONE

1. Scoring contacts may be made on any amateur frequency above 1GHz, but lower frequencies may be used for setting up contacts.

2. Contest exchanges will be as follows:

On the 1·3GHz band—RS or RST report followed by a serial number, QRA locator and QTH;

On other bands—RS or RST report followed by a serial number and details of equipment in use (eg 2C43 1N21C 6ft dish).

Serial numbers begin at 001 on each band. This information may only be passed on the band for which points are claimed. It should all be logged.

3. Scoring will be as follows:

On 1·3GHz band—2 points per kilometre;

On the 2·3GHz band—3 points per kilometre;

On other bands—5 points per kilometre;

Crossband contacts will score half points.

In addition to the above, the following general rules as published in the January issue of *Radio Communication* will apply: 1, 2, 3, 4b, 6b, 7b, 8d, 9a, 10, 12a, 13–24.

July 1970 144MHz Open Contest

1800gmt on 4 July to 1800gmt on 5 July.

All entries and checklogs must be sent to the adjudicator addressed to: VHF Contests Committee, c/o G2HIF, 20 Harcourt Road, Wantage, Berks.

The following **General Rules,** as published in the January issue of *Radio Communication*, will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8a, 9a, 10, 11, 12a, 13-24.

July 1970 432MHz Open Contest

0900gmt to 1600gmt on 26 July.

All entries and checklogs must be sent to the adjudicator addressed to: VHF Contests Committee, c/o G3LAS, 7 Barclay Close, Hertford Heath, Hertford.

The following **General Rules,** as published in the January issue of *Radio Communication,* will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8d, 9a, 10, 11, 12a, 13-24.

DF Qualifying Event—High Wycombe

Date: 28 June 1970.
Map: OS Sheet 159 (The Chilterns).
Assembly: 1300bst for start at 1320bst.
Location: Approximately one mile west of Flackwell Heath village NGR 878907. Frequencies and callsigns will be announced at the start.

Intending competitors are asked to notify Mr C. A. Vernon at Durlston, Whitepits Lane, Flackwell Heath, High Wycombe, Bucks, of the numbers in their parties requiring tea not later than 20 June.

DF Qualifying Event—Salisbury

Date: 14 June 1970.
Map: OS Sheet 179 (Bournemouth)
Assembly: 1300bst for start at 1300bst.
Location: Picket Post NGR 192058. Frequencies and callsigns will be announced at the start.

This event is being organised by Salisbury ARS, and intending competitors are asked to notify A.C.A. Newman, G2FIX, of the numbers in their parties requiring tea, His address is: 74 Victoria Road, Wilton, Nr Salisbury, Wilts.

Please advise G2FIX as soon as possible, and in any case not later than 7 June.

Rules for the RSGB 28MHz Telephony Contest—10-11 October 1970

Radio amateurs throughout the world are again invited to take part in the annual RSGB 28MHz Contest for single operator stations.

1. The **General Rules** for RSGB HF Contests, published in the January 1970 issue of *Radio Communication* will apply.

2. When 0700gmt on Saturday 10 October to 1900gmt on Sunday 11 October 1970.

3. Eligible entrants.

Home section. RSGB members resident in the British Isles.

Overseas section. Licensed amateurs in all parts of the world except the British Isles.

4. Contacts may be made using any telephony system for which the entrant is licensed, on the 28MHz band.

5. Scoring. British Isles stations may not work each other for points. Overseas stations may only claim points for contacts with British Isles stations (G, GC, GD, GI, GM, GW).

British Isles stations. Each completed contact will score five points. In addition, a bonus of 50 points may be claimed for the first contact with each new country. For the purposes of scoring, the RSGB countries list will apply, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as a separate country.

Overseas stations. Each completed contact with a British Isles station will score five points. In addition, a bonus of 50 points may be claimed for the first contact with each British Isles country-numeral prefix, ie G2, G3, G4, G5, G6, G8, GC2, GC3, GC4, GC5, GC6, GC8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GM2, GM3, GM4, GM5, GM6, GM8, GW2, GW3, GW4, GW5, GW6, GW8. Contacts with GB stations will score five points only.

6. Entries must be addressed to the RSGB HF Contest Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey, England.

7. Trophy. The Whitworth Trophy will be awarded to the leading home section entrant.

Rules for the RSGB 28MHz Telephony Receiving Contest—10-11 October 1970

1. Eligible entrants. The contest is open to short-wave listeners throughout the world. All entrants agree to be bound by these rules. Only the entrant may operate his receiving station for the duration of the event. Holders of amateur transmitting licences are not eligible to take part.

2. Duration. The contest will start at 0700gmt on Saturday 10 October and end at 1900gmt on Sunday 11 October 1970. The RSGB 28MHz Telephony Contest for transmitting amateurs will take place during the same period.

3. Entries. (*a*) To count for points, logs must show, in columns: (i) Date/time gmt; (ii) Callsign of station heard; (iii) Report and serial number sent by station heard; (iv) Callsign of the station being worked; (v) Bonus points claimed; (vi) Total points claimed.

(*b*) Entries should be set out on *one side only* of foolscap or International A4 size paper, must be postmarked not later than 26 October 1970 and must be addressed to RSGB HF Contests Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey, England. The name of the contest must be shown clearly at the top left hand corner of the envelope. Log sheets are available from RSGB headquarters.

(*c*) All entries must contain the following declaration:

"I declare that this receiving station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the RSGB shall be final in all cases of dispute. I do not hold an amateur transmitting licence.

Date..... Signed.....

4. Scoring. British Isles entrants may only log overseas stations working UK stations in the contest. Overseas entrants may only log British Isles stations in contact with overseas stations in the contest. A station, whether fixed, portable, mobile or alternative address, may be logged only once for the purposes of scoring. CQ or test calls will not count for points.

British Isles entrants. Each complete log entry will score five points. In addition, a bonus of 50 points may be claimed for the first station logged in each new country. For the purposes of scoring, the RSGB countries list will be used, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas entrants. Each complete log entry relating to a British Isles station heard will score five points. In addition, a bonus of 50 points may be claimed for the first station heard in each British Isles country-numeral prefix, ie G2, G3, GM4, etc, as listed in Rule 5 for the transmitting contest.

5. Awards. The Metcalfe Trophy and a certificate will be awarded to the leading British Isles entrant. In addition, certificates will be awarded to the British Isles runners-up and to the 1st, 2nd and 3rd overseas entry.

6. The Council of the RSGB reserves the right, on the recommendation of the Contests Committee, to reject any entry that is consistently inaccurate.

IARU Region 1 VHF, UHF and SHF Contests

Contests held in IARU Region 1 on the 144MHz and higher frequency bands fall into two categories, regional (or international) and sub-regional (or national). Regional contests are judged by the organizing society, which may be any of the societies in Region 1. Sub-regional contests are organized and judged by the national societies, but are arranged to co-incide.

There have been some changes in the programme for 1970. The May UHF/SHF Contest has been deleted and two new contests, one regional and one sub-regional have been added. These are a uhf/shf 24-hour contest (including portable operation) on 3-4 October and an all-band cw contest for the night of November 7-8. The popular vhf/uhf 24-hour contest (including portable operation) remains on September 5-6 and the RSGB vhf/nfd will co-incide with this. The rules for the RSGB event have been framed to encourage the maximum number of people to enter the IARU event. (The main difference is in scoring, as other societies in Region 1 firmly retain the one point per kilometre system).

There is no RSGB event to co-incide with the October uhf/shf contest, but RSGB will receive entries and publish details of UK results. Certificates will be awarded to the leading UK entrants in each section.

Other RSGB events which do co-incide with contests held by other societies in Region 1 are the July 144MHz open and November 144MHz cw contests. It should be noted that on these dates there are also 432MHz and 1,296MHz contests taking place on the Continent.

The organizing society for the 1970 international events is SRAL (Finland). NRRL (Norway) will judge these events in 1971, while 1972 will see the turn of RSGB.

UK amateurs are particularly requested to support the international contests.

Rules for September 1970

IARU Region 1 VHF/UHF Contest

The following rules have been extracted from the general rules for IARU Region 1 vhf/uhf contests:

1. Eligible entrants. All licensed radio amateurs resident in Region 1. Multiple operator entries will be accepted provided only one callsign is used. Contestants must operate within the letter and spirit of the contest and at no greater power than permitted in the ordinary licences of their country. Stations operating under special high power licences do so *hors concours* and cannot be placed in the contest proper.

2. Sections.

(i) Fixed stations 144MHz
(ii) Portable/mobile stations 144MHz
(iii) Fixed stations 432MHz
(iv) Portable/mobile stations 432MHz

Portable/mobile stations may not change their location during the event.

3. Date and time. 1800gmt on 5 September to 1800gmt on 6 September

4. Number of contacts. Each station can be worked once only on each band, whether fixed, portable or mobile. If a station is worked again on the same band only one contact will count for points, but any duplicate contacts should be logged without claim for points and should be clearly marked as duplicates.

5. Types of emission. Contacts may be made on A1, A3, A3j or F3.

6. Contest Exchanges. Code numbers exchanged during each contact shall consist of the RS or RST report, followed by a serial number commencing at 001 for each band and increasing by one for each successive contact on each band. This exchange must be immediately followed by the QRA Locator of the sending station. (Example 579021YG46E.) QTHS may also be exchanged if desired.

7. Scoring. Points will be scored on the basis of one point per kilometre. The final claimed score must be shown at the top part of the first sheet.

8. Entries. Entries must be set out as shown in the example below. (See notes and VHF NFD Rule 19) They must be postmarked not later than 21 September and must be addressed to: Secretary, VHF Contests Committee, 60 Merlin Grove, Beckenham, Kent, BR3 3HU. Late entries will not be accepted.

9. Disqualification. Entrants deliberately contravening any of these rules will be disqualified. Minor errors may result in loss of points. Errors in callsigns and code numbers will be penalised by deducting the following percentage of claimed scores for both stations.

One error: 25 per cent. Two errors: 50 per cent. Three or more errors: 100 per cent.

The claimed contact will be disqualified for

(a) an obviously wrongly stated QTH when no QRA Locator is exchanged, or (b) a time error of more than ten minutes.

10. Judging. Submission of a log implies acceptance of the rules. The decision of the organising society is final.

11. Awards. The winner of each section will receive a certificate. The top score on 144MHz, whether fixed or portable, will be awarded the Region 1 VHF Trophy. The winner in the remaining 144MHz category will be awarded the PZK Cup.

Rules for October 1970

IARU Region 1 UHF/SHF Contest

1. Eligible entrants. As for September VHF/UHF Contest above.

2. Sections. There will be two sections. fixed and portable/mobile, on 432MHz and every other higher frequency amateur band.

3. Date and time. 1800gmt on 3 October to 1800 gmt on 4 October.

4-7. As for September VHF/UHF Contest above.

8. Entries. Entries must be set out as shown in the example below. (See notes) They must be postmarked not later than 19 October and addressed to: Secretary, VHF Contests Committee, 60 Merlin Grove, Beckenham, Kent, BR3 3HU. Late entries will not be accepted.

9-10. As for September VHF/UHF Contest above.

11, Awards. The winner of each section will receive a certificate.

Notes

(1) In some countries it is customary to use a band identification letter (A for 144MHz, B for 432MHz and C for 1,296MHz, etc). Should this letter be used or not used, no penalty will be exacted.

(2) An RSGB cover sheet, Form 427, and RSGB log sheets may be used for entries. In this case of the September VHF/UHF Contest, entrants in RSGB VHF/NFD may enter both the radial ring score and the score based on points per kilometre on the same log sheet. (See also rules for VHF/NFD published in the March issue of *Radio Communication*, p180.)

Sample contest log sheet

Contest..... Date..... Claimed score.....
Section..... Callsign.....
Name .....
Home address.....
Location of station ..... Latitude .... Longitude....
Height above sea level in metres.... QRA Locator .....
Transmitter..... Input power.....watts ...
Operating frequencies..... Crystal or vfo .....
Receiver..... Aerials .....

Date/ time	Call-sign	Serial sent	Numbers received	QTH	Emission	Dist. km	Points claimed

Declaration.

I declare that this station was operated strictly in accordance with the rules and spirit of the contest and I agree that the ruling of the organising society shall be final in all cases of dispute.

Date..... Signed.....

HONORARY TROPHIES MANAGER

The RSGB has a large number of trophies, and work connected with them takes up considerable time at Society headquarters.

Have we a member (possibly retired) who would be prepared to act as honorary trophies manager and accept responsibility for maintaining records, arranging for engraving, etc ?

Any member prepared to help the Society in this way is asked to contact the general manager at RSGB HQ.

RADIO AMATEUR EMERGENCY NETWORK

by S. W. LAW, G3PAZ*

We have been taken to task yet again on the grounds that this column is "incomprehensible to the uninitiated". To talk our way out of this would take far more space than our allotment, so let us content ourselves this month with a very short resumé of our corner of amateur radio.

More than 15 years ago it became evident that radio amateurs could adapt themselves, by reason of their "self training in the art", to the transmission and reception of official messages when all else had failed. Since the terms of the licence under which they are allowed to operate categorically forbade this at that time, the RSGB went to considerable trouble to convince the government department concerned that a properly organised body of radio amateurs, pledged to use their skill and equipment when called upon, could be of great assistance to the authorities (and therefore the public) in times of emergency. The RSGB undertook to organise such a body under a voluntary basis if the PMG would give permission for amateurs to offer their services for the passing of messages for the relief of distress in times of disaster.

Thus it was that the transmitting licence was amended to permit this, and the RSGB formed the Radio Amateur Emergency Network to be administered by a committee composed of RSGB members who voluntarily give up their time and efforts for this purpose. Groups are formed all over the country under controllers elected by registered members and approved by the committee. Each group carries its own expenses and organises such exercises (also permitted by the licence amendments) as will ensure the efficient passing of messages for those bodies mentioned in the licence should the occasion arise. Air crashes, floods, missing children and shipwrecks have already tried and proved the mettle of certain groups, and the work still continues at all levels to further the scope of our usefulness to the community. We think RAEN is worth while; it is up to you.

Incident reports

An "Incident report book" is to be compiled by the RAEN committee and will be held and kept up to date on their behalf by G3MBQ. So that this may provide a true picture of RAEN activity, controllers are asked to forward full particulars of any and every incident giving rise to either a standby alert or callout in their area to G3MBQ or the RAEN committee hon chairman, G3BPT. Furthermore, it is suggested that any incident may also be submitted as an item for inclusion in the GB2RS News Bulletin broadcast on Sunday mornings. Write to GB2RS News, c/o RSGB, 35 Doughty St., WC1 N 2AE, to arrive not later than first post on Thursday of any week.

Controllers meeting

Any controller in the SE area who has not been appraised by letter of the controllers meeting to be held at RSGB HQ on 10 May, should contact HQ immediately if he wishes to attend. Accommodation is limited, but a good meeting is envisaged.

RAEN committee

The RAEN committee met on Saturday 4 April with an invited guest controller, Ted Pritchard, G3ODB (Kent). Spirited discussion took place on certain group progress and policies; it was agreed that G3MBQ should give an ear to 70·26MHz, in addition to other 4m frequencies, when operating "talk-in" at the conference at Northampton on 17 May; the printing of a new application form with up-dated information plus a publicity handout was considered; and the practicability of a quarterly newssheet to controllers worked out. Correspondence was dealt with, the usual other business items cleared and the committee closed after a session of just over five hours.

* 130 Alexandra Road, Croydon, Surrey, CRO 6EW

RAEN Group of the Month

by P. Balestrini, G3BPT (Chairman, RAEN Committee)

Bristol Raynet

Controller—B. J. Croker, G3ULJ; **deputy controller**—A. A. Uppington, G2BAR; **secretary**—E. J. Davies, G3SXY.

With headquarters based on the Bristol Amateur Radio Club, 41 Ducie Road, Barton Hill, Bristol 5, the Bristol Raynet has some 22 members. The area covered is North Somerset—from Weston-Super-Mare, the Mendips, northwards to Bath, Bristol, and South Gloucestershire—a radius of 15 miles from Staple Hill, ie the area covered by the Staple Hill division of the Gloucestershire Police.

The group has held a number of successful day and night radio exercises and communications have been maintained during the whole time from various mobile locations. Liaison with local user services has been established, notably with the Gloucestershire Police, Bristol Police and Bristol Red Cross. The controller reports that approaches have been made to the St John's Ambulance Brigade without success.

Bristol Raynet has published a well-produced "Manual" of excellent format which includes hints on operating and traffic handling, and a full directory of members giving details of fixed and mobile equipment, business and home telephone numbers. A useful *aide memoir* for mobile stations is printed and I make no excuse for reproducing this:

> Each station should have to hand a message pad and carbon paper, pencils and sharpener, local 1in Ordnance maps, a torch and battery, spare fuses and bulbs. Mobiles should carry a spare wheel and means for changing it in darkness, have petrol for 50 miles, a fully-charged battery, suppressed ignition, spare fan belt and tools.

Bristol's motto is "Be prepared", and its operated channels at present are 144·25MHz and 1980kHz. Thank you, Bristol Raynet.

CLUB NEWS

Items for inclusion in this section should be sent to regional representatives on 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

Special regional events:
28 June; Region 1 VHF Contest.
13 September; Region 1 Field Day.
Details for the two contests will be circularized in due course to local representatives and ASRs.

Merseyside Luncheon Club—First Monday in every month, 12.30 for 12.45, HMS *Landfall*. Please advise *G3VQT* or *G2AMV* of attendance.

Ainsdale—13, 27 May (Visit by regional representative), 10 June, 8pm, The Morris Dancers, Scarisbrick.

Allerton (Liverpool) Scout Amateur Radio Society, North West Region—First and third Thursdays each month, 8pm, Liverpool County Scout Headquarters, Richmond Street, Liverpool.

Blackburn (East Lancashire ARC)—4 June (Construction competition and any questions), 7.30pm, Edinburgh House, Shearbank Road, Blackburn. Further details from *G4JS*.

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

Bury (B & RRS)—Second Tuesday in each month with an informal meeting on the fourth Tuesday, 8pm, The George Hotel, Private Room, Market Street, Bury. Club secretary: *G3VVQ*, 411 Holcombe Road, Greenmount, Bury.

Cheshire (Mid Cheshire ARC)—Every Wednesday. 7-8pm, RAE course by Ken Starnes, G3JWK, Alan Rigby G3FGI, and Brian Moore, G8CFY. Technical Activities Centre, Winsford Verdin Grammar School, Grange Lane, Winsford.

Chester (C & DARS)—5 May (Net night on 160 and 2m), 12 May ("Tape recorders," by G8AYW), 19 May (Outside activity), 26 May (Pre nfd meeting), 2 June (Net night on 160 and 2m), 8pm, YMCA, Chester. Further details from *G8AYW*.

Douglas (D & DARS)—Second and fourth Wednesday each month, 7pm, 19 Rosemount, Douglas. Further information from W. T. McEvoy at the same address. Telephone Douglas 6146.

Eccles (E & DRC)—Tuesdays, 8pm, Bridgewater School, Worsley Lancs. Thursday—Club top band net, 2030gmt.

Leyland Hundred Amateur Radio Group—Please note change in net night arrangements. They are now Thursdays, 160m at 2000gmt, 1915kHz; Saturdays, 2m at 1900gmt, 145·8MHz.

Liverpool (L & DARS)—Tuesdays, 8pm, Conservative Association Rooms, Church Road, Wavertree. Secretary: J. James, *G3MCN* 448 East Prescot Road, Knotty Ash, Liverpool 14.

Liverpool (NLRC)—8, 22 May, 5 June, 8pm, Labour Party Headquarters, 13 Crosby Road South, Liverpool 22. Secretary: *Peter Jeffs*, 38 College Road North, Liverpool 23. Telephone 051-924 3020.

Manchester (M & DARS)—Wednesdays, 7.30pm, 203 Droylesden Road, Newton Heath, Manchester 10. Further details from *G3IOA*.

Manchester (SMRC)—Fridays, 8pm, Conservative Association Divisional Office, 449 Palatine Road, Northenden, Manchester.

North West VHF Group—Mondays, 8pm, in the Club Caravan, Greeba, Shady Lane, Manchester 23.

Preston (PARS)—14 May (Visit by regional representative), 28 May, 11 June, 7.30pm, "Windsor Castle," Private Room, St Paul's Square. Secretary: *George Windsor*, 26 St Gregory's Road, Preston.

Salford (Dial House Radio Society)—A society formed by GPO engineers meets Wednesdays, 6pm, 8th Floor, river end of Dial House. Any GPO engineer who is interested should contact the secretary at Dial House, Chapel Street, Salford 3.

Southport (SRS)—Wednesdays, 8pm, Sundays 2.30pm, The Esplanade. Secretary: *A. White*, 91 Poetland Street, Southport.

Southport (73 SSB Society)—Thursdays, 8pm. All meetings start with a talk on part of the RAE syllabus and are at 73 Avondale Road, Southport.

Stockport (SRS)—Future meetings will be held at the Blossoms Hotel, Wellington Road South, Stockport, on second and fourth Wednesdays each month. The change of venue has been caused by the brewery who hope to modernise the old QTH. It has been necessary to revise the lecture programme as a result. Watch this space for further details. New members and visitors are always welcome. Further details from the secretary *Pete Taylor, G8BCG*, QTHR.

Thornton Cleveleys (TCARS)—13, 27 May, 10 June, 8pm, St John's Ambulance Brigade Hall, Fleetwood Road North, Thornton, Nr Blackpool.

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

Westmoreland—Fridays, 7.30pm, 24 Park Road, Milnthorpe. All visitors welcome. Secretary: *Jim Forrester*, 44 New Street, Carnforth. The AGM was held on 20 March and plans made for future activities now that the society is well settled in its new club room.

Wirral (WARS)—First and third Wednesday each month, 7.30pm former Civil Defence Headquarters, Upton Road, Bidston, Birkenhead. Secretary: *Alf Fisher, G3WSD*, 34 Glenmore Road, Oxton, Birkenhead.

Wirral (Wirral DX Association)—Future programme relates to two major events, an expedition to Hilbre Island in mid June and provision of a station for the Roydon Park Scout/Guide event. Intending visitors should contact the secretary in advance of the monthly meetings which are always on the last Thursday at members' homes. Secretary: *G3OKA*, QTHR.

Region 2 RR K. Sketheway, BRS 20185

Barnsley (B & DARC)—8 May ("Frequency modulation on 2m," by P. Ackley, G3LRP) 22 May ("Colour tv," by P. Bottom), 7.30pm, King George Hotel, Peel St, Barnsley. *G3LRP*.

Bradford (BRS)—19 May ("Voyage to the east"—an illustrated talk by P. M. Madagan, G3RQZ), 2 June (Informal—Nfd briefing), 7.30pm, 10 Southbrook Terrace, Great Horton Road. Bradford.

Halifax (NHARS)—20 May ("Anodic treatment of Aluminium," by K. Walton, G3IKS), 3 June (Open/ragchew). A visit to Emley Moor tv station to look at the new colour system will take place on 6 May. The outstanding talk during last month was by David Pratt, G3KEP. The meeting place is still the Peat Pitts Inn, Ogden, which looks as though it will become permanent as the facilities are greater there than at the old meeting place, such as a large room for the giant sale of surplus equipment with G8CB as auctioneer. This will take place on 17 June. Other matters of interest are that there are some vacant dates for both of the W1BB lectures if any club wishes to borrow. *G3MDW*.

Hull (H & DARS)—1 May ("Practical demonstration on semiconductors", by G3SSA and G3AGX), 8 May (Swl night —J.Singleton), 15 May ("Maths," by G3LDB), 22 May (Construction night), 29 May ("Practical printed circuits", by G3PQY), 7.45pm, Unity Hall 593 Hessle Road, Hull. A visit is proposed to the GPO Radio Station at Rugby for Saturday 23 May. Details from the Secretary: Mrs M. Longson, 4 Chester Road, off Wold Road, Hull. *M. E. Longson*.

Scarborough (SARS)—Thursdays, 7.30pm, c/o RAF association, Fulbeck House, 3 Westover Road, Scarborough.

South Shields (SS & DARC)—8 May (Visit of Pete Martin, G3PDM—subject not yet fixed), 8pm, Trinity House Social Centre, Laygate, South Shields.

Spen Valley (SVARS)—7 May (Junk sale), 14 May (Visit to NSF Switches, Keighley), 4 June (Talk by I. Lamb, G6LD), 7.30pm, The

Grammar School, High St, Heckmondwike. Annual dinner on 9 May at Foxes Cafe, Cleckheaton. The guest of honour will be B. Sketheway, RR for Region 2. Tickets are 32s 6d each, available from Hon Sec N. Pride, G8BSX, 100 Raikes Lane, Birstall, Leeds. Meet at 6.30pm for dinner at 7pm.

Sunderland (SARS)—Meetings on the first and third Tuesdays of each month, 7.30pm, at Sunderland Technical College. *G3XID.*

York (YARS)—Thursdays, 7.30pm, in the British Legion, 61 Micklegate, York. The officers elected at the society's AGM were—Chairman: K. Cass G3WVO; Vice Chairman: W. H. Hodgeson G3WHH; Secretary: J. Rainbow (and not as stated in the March issue as J. A. Rainbow.)

Region 3 RR R. W. Fisher, G3PWJ

Birmingham (MARS)—12 May ("EME communications and meteor scatter" by J. Stace, G3CCH), open meeting to all clubs and interested members, 7.45pm. Midland Institute, Margaret Street, Birmingham 3. *G8BHE.*

Bromsgrove (B & DARC)—Second Friday of each month, The Royal Oak, Barley Mow Lane, Catshill, Bromsgrove.

Coventry (CARS)—1 May (Night on the air. RAE), 8 May (Inter club University challenge type quiz), 15 May (Night on the air. Morse class), 22 May (Visit to Bagington Airport), 29 May (Night on the air. Morse class), City of Coventry Scout County HQ, 121 St Nicholas Street, Radford Road, Coventry.

Dudley (DARC)—5, 19 May, 8pm, Central Library, St James' Road, Dudley, Club Station, Old Windmill, Vale Street, Upper Gornal, Dudley, Worcs. *G3PWJ.*

Hereford (HARS)—Every Friday, Civil Defence HQ, Goal St, Hereford. *G3RJB.*

Leamington (MWAE & RS)—4 May (Quartz crystals, bring yours for checking), 11 May (Cable pressurisation), 18 May (Open meeting) 8pm, 28 Hamilton Terrace, Leamington Spa. *G8ARZ.*

Lichfield (LARS)—First and third Friday of each month, the Swan Hotel, Lichfield. *G3NAS.*

Nuneaton (NARC)—Thursday evenings, Fortnightly, 8pm, The Grange, Caldecote, Nuneaton. *G2HAO.*

Redditch (EWARG)—7, 28 May (Visit to West Mercia police operations room, Hinlip Hall, Worcester. Assemble 8.15pm). Old Peoples Centre, Park Road, Redditch. *G3EVT.*

Solihull (SARS)—19 May (Questions and answers session), 7.30pm, The Manor House 126 High Street Solihull. The club will QSL 100 per cent for QSOs made on the two recent /P operations from Broadway and Chipping Norton. *G3YOY.*

Shrewsbury (SARS)—Every Thursday evening, 7.30pm, Shrewsbury School Signals Hut. *G3UDA.*

Stoke on Trent (NSARS)—Every Monday evening, 7.30pm, Harold Clowes Community Association Centre, Bentilee, Stoke on Trent.

Stourbridge (STARS)—5 May ("Simple sideband," by G3ENY), 19 May (Informal), 7.45pm, Shrubbery Cottage, Heath Lane, Stourbridge, Alderman Tye Scout HQ, South Road, Stourbridge, The club station G6OI is now established at the Alderman Tye Scout HQ and all formal meetings are now being held there. *G8CVK.*

Stratford (SoA & DRC)—15 May (Convert your old tv for 625 lines), 29 May (Final plans for nfd). 7.30pm, Halls Croft, Old Town, Stratford, The club is pleased that Mr Hunt, a local radio-tv dealer, has accepted an invitation to be its first Vice-President. In 1964 Mr Hunt gave the club free run of his shop, opposite Shakespeare's birthplace, for station GB2WS. G3RPJ is QSL manager for GB2WS (operation 1964) and GB3SUA and GB2GF (operation 1969) and there are plenty of cards left for claimants. Depatch through the bureau unless sae is sent. The ever popular boaster's evening was won by junior member Guy Morgan, son of G3YIK. Guy showed a homebrewed transistor tester. *G3RPJ.*

Sutton Coldfield (SCRS)—11 May ("Radio interference," by D. W. Morris, G3AYJ), 25 May (Natternite), 8pm, Sutton Town Football Club, Coles Lane, Sutton Coldfield. *G3XXJ.*

Wolverhampton (WARS)—4 May (Home-constructed equipment competition), 18 May (Annual dinner), 8pm, Neachells Cottage, Stockwell Road, Tettenhall, *G3UBX.*

Worcester (W & DARC)—Every Wednesday and Saturday evening, 7.30pm, Perdiswell Park, Droitwich Road. *G3VJN.*

Region 4 RR T. Darn, G3FGY

Ordinary Regional Meeting: Saturday 20 June, 2.30pm, at the Regency Rooms, Wharncliffe Road, Ilkeston, Derbys. Followed by dinner and dance. Particulars from Region 4 RR.

Thirteenth Derby Mobile Radio Rally: Sunday 16 August, Rykneld Schools Derby. Details from G3FGY "Sandham Lodge," 1 Sandham Lane, Ripley Derbys. DE5 3HE. Tel Ripley 2972.

Chesterfield (CDRS)—Second and fourth Wednesdays, 7pm. Recent lectures have been on colour television and transistor principles. Meetings are held at the Hunloke Adult Education Centre, Derby Road, Chesterfield. *G3VKK.*

Derby (NHCA)—Friday evenings. 1 May (Quiz—Derby and District Amateur Radio Society versus Nunsfield House Community Association Amateur Radio Group), 8 May (Night on the air), 15 May (Film show by G3ALA), 22 May (Open evening), 29 May (The maintainance and overhaul of the club's alternator, including films and talk). All meetings take place in Room 7, Nunsfield House, Boulton Lane, Alvaston, Derby. *G3LCV.*

Derby (DADARS)—1 May (Quiz night at Nunsfield House, Alvaston), 6 May (Surplus sale), 13 May (Film show), 20 May (Df practice night No 2), 22/26 May (Exhibition station at Chatsworth House, Derbyshire Boy Scout Gathering), 25 May (Exhibition station at the Derbyshire County Show, Elvaston Castle, near Derby), 27 May (Extraordinary general meeting). All meetings commence at 7.30pm, in the Clubroom, 119 Green Lane, Derby. Visitors cordially invited. *G2CVV.*

Grimsby (GARS)—14 May (Df hunt, meeting at Weelsby Woods, Grimsby, for start at 7.30pm). 28 May (Organisation for nfd). All meetings at the Clubroom, North Lincolnshire Photographic Society, rear of 50 Welholme Road, Grimsby. *G3XDY.*

Leicester (LRS)—No formal programme has been arranged for May, so that the club can concentrate on preparations for nfd and also on giving the club shack a face-lift. F. D. Rawcliffe, *G3UGM.*

Lincoln (LSWC)—Meetings are held on Tuesday at 7.30pm, No 2 Guardroom, Sabraon Barracks, Burton Road, Lincoln. Sec: *G. O. Connor*, 61 Steep Hill, Lincoln. Tel Lincoln 24113.

Melton Mowbray (MMARS)—15 May ("Electrical safety," lecture by D. W. Lilley, G3FDF). Meeting at 7.30pm, at the St John Ambulance Hall, Holwell Works, Asfordy Hill, Melton Mowbray. *G3NVK.*

Nottingham (ARCON)—7 May (Festival station GB3FON. Final arrangements), 14 May (Film show featuring Snowy Mountain Project), 21 May ("How to get on single sideband," by Mr J. Curnow, G6CW. Starts at 8.15pm), 28 May (Open night). The club will be operating GB3FON at the "Festival of Nottingham," Wollaton Park, Nottingham, from 11 to 26 July inclusive. Meetings are held on Thursdays, 7.30pm, at Woodthorpe House, Mansfield Road, Nottingham. *J. Smith.*

Region 5 RR S. J. Granfield, G5BQ

Bedford (B & DARC)—7 May (Final planning for special event station GB2BS—G3UQR), 10 May (Special event station—The Bedford and District ARC at the Scout Rally and Camp at Ampthill Park), 14 May (Film night: Micro circuits, colour tv and other interest films—G3XDU), 21 May (On the air with Swan 350—G2CLP), 24 May (The spring holiday net 3·650MHz at 10.30gmt of the clock), 24 May (Yes—its the same date: First df contest), 28 May ("Frequency measurements using the BC221," by G3XNG). 4 June (Tape recording for the Radio amateur. Hints and Kinks on reception re-transmission and licence regulations), 8pm, Dolphin Inn, Broadway, Bedford.

Bishops Stortford (BS & DARC)—18 May ("Capacitors," by J. Harris. Visitors especially welcome), 8pm. The British Legion Club, Windhill, Bishops Stortford, Herts.

Cambridge (C & DARC)—Meets on Fridays, RAE classes on Wednesdays. 7.30pm, Club Headquarters, Corporation Yard, Victoria Road, Cambridge.

March (M & DRAS)—Club meets on Tuesday evenings at Club HQ, Old Police Station, High Street, March, Isle of Ely.

Peterborough (P & DARS)—Meets at 7.30pm on the first Friday in May in the Electronics Section, Peterborough Technical College, Eastfield Road. Other Friday evenings at 8pm in the Club HQ, The Old Windmill, behind the Peacock Inn, London Road. On Sunday afternoons, picnics and sailing from the Clubs riverside site at Alwalton, behind the layby on the A1 and next to the Cruising Club HQ.

Shefford (S & DARC)—7 May (RAE revision by G3VMI,) 14 May (Tvi causes and cures—club), 21 May (Nfd operating), 28 May Df hunt—club). Thursday evenings, 8pm, Church Hall, Shefford, Beds.

Region 6 RR L. W. Lewis, G8ML

Cheltenham (RSGB Group)—First Thursday, 8pm, Great Western Hotel, Clarence Street, Cheltenham.

Gloucester (GRS)—Meetings on the second and fourth Thursday, 7.30pm, RAFA Club, 6 Spa Road, Gloucester.
South Bucks VHF Club—5 May ("Transistors in amateur vhf equipment"), 8 pm, Bassetbury Manor, High Wycombe.

Region 7 RR P. A. Thorogood, G4KD

Lists of new members in the region have now been sent to Clubs. If you have not received them please let me know.
Acton, Brentford & Chiswick (ABCRC) 19 May, 7.30pm, Chiswick Trades and Social Club, 66 High Road, Chiswick.
Addiscombe (AARC)—Second and fourth Tuesdays, 7.30pm, Toc H Hall, 158 Lower Addiscombe Road.
Ashford, Echelford (ARS)— 11 May (Arnold Mynett, G3HBW talking about transistor transmitters, vhf and uhf), 28 May (Geoff Stone, G3FZL, assisted by G3OOU, will talk about vhf developments and calibration equipment), 7.30pm, St Martins Court, Kingston Crescent, Ashford, Middx. Congratulations on the annual report—12 papers with a detailed report from all on the committee.
Barking (B & DREC)—Tuesdays and Thursdays, 7.30pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking.
Bexleyheath (NKRS)—Second and fourth Thursdays. 14 May (AGM), 28 May (NFD arrangements), 7.30pm, Congregational Church Hall, Chapel Road, Bexleyheath. 32 RSGB members and eight others attended the last meeting when C. H. Jones of Mullard Ltd gave a talk on modern transistors.
Cheshunt (CDRC)—First Friday of month, 7.30pm, Methodist Church Hall, opp Theobalds Station, Cheshunt. At the last meeting (the AGM), the following were elected: Chairman, G. L. Ghilds, G3XEW; Secretary, J. V. Beavan, G3GBL; Treasurer, D. Brett, G8ASB.
Chingford (RSGB Group)—Fridays, telephone 01-524 0308.
Chingford (SRC)—Fridays, 8pm, Friday Hill House, Simmons Lane, Chingford E4.
Civil Service (CSRS)—First and third Tuesday, 6.30pm. Civil Service Recreation Centre, Monck Street, Westminster.
Croydon (SRCC)—Third Tuesday, 7.30pm, Swan & Sugarloaf, South Croydon.
Crystal Palace (CP & DRC)—9 May ("TVI problems and cures," by Barry and Kay Priestley, G3JGO/G3XIW), 8pm, Emmanuel Church Hall, Barry Road, SE22. 17 RSGB and 12 other members attended last meeting and a varied programme, based on AGM wishes, were on amateur satellites in the future working Europe from car to car. Also second talk on grid dip oscillators and construction. Plans for nfd were also discussed.
Dorking (DR & DRS)—Second and fourth Tuesdays. 12 May (Informal meeting with activity in club shack), 26 May (Construction exhibition—members to bring their latest project, irrespective of age), 8pm, "Wheatshaft," Dorking.
Ealing (E & DARS)—Tuesdays, 7.30pm, Northfields Community Centre, Northcroft Road W13.
East London—No meetings until the autumn.
Edgware & Hendon (E & DRS)—11 May ("Transistors," by S. W. Amos), 25 May (No meeting—Bank holiday), 8 June (NFD inquest and junk sale), 23 June ("Tvi", by G3HVA). St Georges Hall, 51 Flower Lane Mill Hill, NW7. On 17 May there will be a df contest on Sunday afternoon.
Farnham, Bucks (Burnham Beeches RC)—Fortnightly Mondays, Farnham Common, Village Hall, Victoria Road.
Gravesend (GRS)—Mondays, 8pm, Community Centre, Cedar Avenue, Kings Farm Estate, Gravesend.
Guildford (G & DRS)—Second and fourth Fridays Guildford Engineering Society, Stoke Park.
Hampton Court (TVARTS)—First Wednesday, 7.30pm, The Three Pigeons, Portsmouth Road, Surbiton.
Harlow (DRS)—Tuesday (General), Thursdays (cw practice) Fridays (Junior), 7.30pm, Mark Hall Barn, First Avenue.
Harrow (RSH)—Every Friday, 8pm Roxeth Manor School, Eastcote Lane, Harrow.
Havering (H & DARC)—Fortnightly, 8pm, British Legion House, Western Road, Romford.
Hemel Hempstead (HH & DARS)—First and third Fridays 7.30pm, "Addmult" Sports Club, Hemel Hempstead.
Holloway (GRS)—Fridays (Club) 7.30pm, Whittington School, Highgate Hill, N19.
Ilford—Every Thursday, 8pm, 50 Mortlake Road (off Ilford Lane), Ilford.
Kingston (K & DARS)—13 May ("Biasing, coupling and decoupling, part 1, valve circuits," by hon secretary, G3GVU), 8pm, Penguin Lounge, 37 Brighton Road, Surbiton.
Leyton & Walthamstow—Tuesday, 7.30pm Leyton Senior Institute, Essex Road, E10.
London (UHF Group)—First Thursday, 7.30pm, Whitehall Hotel, Bloomsbury Square, Holborn, WC1.
Loughton—Fortnightly Fridays, Loughton Hall Rectory Lane (near Debden station).
Maidenhead (M & DARC)—Third Tuesday of month, 7.30pm Victoria Hall, Cox Green, Maidenhead.
New Cross—Wednesday and Friday, 8pm, 225 New Cross Road, SE14.
Paddington (P & DARS)—Thursdays, 7.30pm, Beauchamp Lodge, 2 Warwick Crescent, W2.
Purley (P & DARS)—First and third Fridays, 8pm, Railwaymans Hall, Side Entrance, 58 Whytecliffe Road, Purley.
Reigate (RATS)—First Wednesday, 7.45pm, George and Dragon, Cromwell Road, Redhill.
Romford (R & DRS)—Tuesday, 8.15pm, RAFA House, 18 Carlton Road.
Scouts (ARS)—Third Thursdays of month. 21 May ("Simple transmitters", by Don Shepperd, G3YNP), 29-30 May (Group weekend at the Thames Young Mariners), 7.30pm, Baden Powell House, Queensgate, South Kensington, SW7.
Sidcup (CVRS)—7 May ("Recent developments in vhf techniques", by G. M. C. Stone, G3FZL, 21 May (Natter night), 4 June ("Outside broadcasts," by W. E. Sutton, G3FEW). Congregational Church Hall, Court Road, Eltham, SE9. Last meeting 16 RSGB and 4 other members attended a talk by J. D. Ralphs of the Diplomatic Wireless Service and described developments of Piccolo and its effectiveness for communications in difficult circumstances.
Slough (SDR Group)—First Wednesday, 7.30pm, United Services Club, Wellington Street.
Southgate (SRC)—Second Thursday of month, 7.30pm, Civil Defence Hut, Bowes Road, N11.
St Albans (Verulam ARC)—6 May (Informal meeting and mast erecting demonstration), 7.30pm at Salisbury Hall, London Colney (G3VER will be on the air). 13 May (1970 special lecture. "Short Wave communication, past, present and future," by Mr C. Gordon, AMIEE. Visitors welcome, refreshments available), Town Hall, St Peters Street, St Albans.
Sutton & Cheam (SCRS)—Third Tuesday. 19 May (NFD discussion), 4 June (Committee meeting), 6/7 June (NFD), 8pm, The Harrow Inn, High Street, Cheam.
Welwyn (Mid-Herts ARS)—Second Thursday of month, 8pm, Welwyn Civic Centre, Welwyn.
Westminster (CSRS)—6pm.
Wimbledon (S & DRS)—Second and last Fridays, 8pm, St John Hall, 124 Kingston Road, South Wimbledon, SW19.
Wembley (GECARS)—Thursdays, 7pm, Sports Club, St Augustin Avenue, North Wembley. (This club is open to non GEC employees by invitation. Telephone ARN1262 for details).

Region 8 RR D. N. T. Williams, G3MDO

Canterbury (EKRS)—Details of meetings from *G3MDO*.
Crawley (CARC)—27 May (Formal meeting. "UHF for the amateur," by Derek Atter, G3GRO), 8pm, Trinity Congregational Church, Ifield. Visitors and prospective members welcome. 8 May (Annual dinner and dance at Airport Hotel, Crawley. Tickets from G3FRV, or the hon secretary G3YVR).
Dover (SEK YMCA ARS)—Meetings held every Thursday, YMCA, Leybourne Road, Dover.
Eastbourne (SARS)—4 May ("Question time"—for the assistance of those members taking the rae this May, followed by a talk on df techniques). All meetings at the Victoria Hotel, Latimer Road Eastbourne.
Maidstone (M YMCA ARS)—Tuesdays and Fridays, "Y" Sports Centre, Melrose Close, Loose, Maidstone.
Mid-Sussex (MSARS)—7 May ("Combating tvi," by a member of the GPO), 21 May (to be arranged). All meetings at the Marle Place FEC, Leylands Road, Burgess Hill.
Thanet (TRS)—3 May (Mobile Rally at the King George 6 Memorial Park, Ramsgate).
Tunbridge Wells (WKARS)—All meetings held at the Adult Education Centre, Monson Road, Tunbridge Wells.
Worthing (W & DARC)—10 May (Df contest on both 160m and 2m. Details of starting venue and time from G6KFH/T). Meetings held at the "Rose Wilmot" Youth Centre, Littlehampton Road, Worthing.
Worthing Schools (WSARS)—8 May (Constructional evening and Morse class), 15 May ("Aerials," by F. J. H. Charman, G6CJ) 22 May (Ragchew and Morse class).

Region 9 RR J. Thorn, G3PQE

Bristol, City & County (BARC)—Every Tuesday and Thursday. 13 May (Visit to Oldbury nuclear power station, 7pm at the main gate), 26 May (Vhf by J. A. Reynolds, G3PTO). Club HQ (G3TAD), 41 Ducie Road, Barton Hill, Bristol 5. *G3SXY*.
Bristol, City & County (RSGB Group)—18 May ("Those were the days," by K. Harvey, G5KT and E. Gaukrodger, G6GU). Nfd site at Lodge Farm, Iron Acton. G2ATU would welcome offers of any type of assistance. Make a date of 28 June to visit our annual Safari mobile rally, at Longleat Park, with your family. Another new date is 2 August when the first Mobile picnic will be held in the grounds of Ashton Court—join us for a brew up and a rag chew in hot sunshine. The Group have a tvi clinic of its own being run by G3XPJ so let them know your problems, and if cured, the remedy also for their files. *G3ULJ*.
Bristol, City & County (Shirehampton)—Every Friday at Twyford House, Shirehampton. *G3YIQ*.
Bristol, City & County (University ARC)—Every Saturday afternoon, Dpt of Physics Royal Fort, Woodland Road, Bristol. *G8ADP*.
Burnham on Sea (BOS ARS)—Contact *G3GIW*.
Cornish (CARC)—7 May (Potted talks—"Digital clock," by G3VGO and "Ex Service receivers," by G3POB). AGM was held in April and all the Officers of the Club were re-elected. Annual dinner is being held on 1 May at Redruth. Meet at SWEB Club Room, Pool, Camborne. *G3UCQ*.
Falmouth Club—Oddfellows Hall (near the Seven Stars), Penryn, 7.30pm. *G3OJN*.
Newquay Group—Treviglas School. *G3THT*.
Exeter (EARS)—5 May, YMCA St Davis Hill, Exeter. *Q3HMY*.
North Devon (NDARC)—13 May (Surplus Sale), 27 May (Informal Ragchew), 7.30pm, "Grinnis," High Wall, Old Sticklepath Hill, Barnstable. *G4CG* (*AR*).
Plymouth (PRC)—5 May (Annual General Meeting), 7.30pm, Club HQ (G3PRC), Virginia House, Bretonside, Plymouth. *G3SPI*.
Saltash (S & DARC)—1 May (Rally talk and general natter) 15 May ("More on transistors" by G3VVP), 29 May (Second visit to ITA tx station Caradon Hill. Names first to G3XWA,) 26 July (Club Mobile Rally). *G3XWA*.
South Dorset (SDRS)—8 May, Room E2, Weymouth Technical College, Newstead Road, Weymouth. *G3RZG*.
Taunton (T & DARC)—Every Friday, The County Control Centre, The Crescent, Taunton. *G3WPJ*.
Torbay (TARS)—Every Tuesday and Friday. 30 May (General Meeting), Club HQ (G3NJA), Bath Lane, Rear 94 Belgrave Road, Torquay. *G3GDW* (*AR*). *G3NQD*.
Wells (EMI Social Club)—Contact *G3MVA*.
Weston-Super-Mare (WSMRS)—1 May (General rag chew with arrangements for nfd, the aerials to be erected for the Club Station, and getting on the air at the school). The April meeting had two features, the showing of the "RSGB Newsreel, 1968" and a talk by C/T Robinson, from Locking, on an ic Morse typewriter that he is developing, a most interesting subject, very well presented. A visit was also recently made to the new Weston telephone exchange. No reminder monthly letters will be sent out till September. Meetings on the first Friday in each month, 7.30pm, Western School, Ellesmere Road, Uphill, Weston-Super-Mare. *G3GNS*.
Yeovil (YARS)—Wednesday. The Lodge, The Park, Yeovil. *G3NOF*.

Region 10 RR D. M. Thomas, GW3RWX

Blackwood (ARC)—Fridays, 7pm, Blanche Cottage, off High Street, Blackwood, Mon. *G6BK*.
Barry College of Further Education (ARS)—Thursdays, 7pm, College of Further Education, Colcot Rd, Barry, Glam.

The Society recently organized a very successful top band contest the results of which are awaited with interest. Commemoration of the Marconi-Kemp radio tests across the Bristol Channel of 1897 is being celebrated on 17 May. Please see separate notice under "Special event stations".

Cardiff (RSGB Group)—Monday 11 May (Film show), 7.30pm, TA Centre, Park St, Cardiff. GW3GHC.

Two dates should be noted in connection with the group activities (both subject to confirmation at the moment): A dinner dance at Bindles Restaurant, Cold Knap, Barry, on 30 May; the annual mobile picnic at Porthkerry Park, Barry, on 14 June. Details available from *GW3GHC*.
East Glamorgan Raynet Group—First Tuesday in each month, 7.30pm, Cardiff Emergency Services HQ, Womanby St, Cardiff. *GW3VNO*.
Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, Nr Merthyr, Glam. Secretary: *Mr Tribe*.
Port Talbot (ARC)—Meets on second Tuesday of each month, 7.30pm, Trefelin Club & Institute, Port Talbot.

The club enjoyed a lecture and demonstration at its March meeting by Mr Dave Thomas, GW3RWX, on tvi and the design of sophisticated types of filters. The demonstration was most impressive, and a large crowd kept the lecturer busy with questions. *GW5VX*.

Pontypool (ARC)—Meets on Tuesday at 7.30pm during school terms, at the Educational Settlement, Rockhill Rd, Pontypool, Mon. *GW3JBH*.
Pembroke (ARC)—Last Friday of each month, 7.30pm, Defensible Barracks, Pembroke Dock. *GW3LXI*.
Rhondda (ARS)—Meets at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glam. *GW3PHH*.
Sully & District Short-Wave Club—Tuesdays, 7pm, at the Annexe Sully Bowls & Social Club, 59 South Rd, Sully, Glam. Sec: *Glyn Maggs*, 3 Thorley Close, Cyncoed, Cardiff.
Swansea Telephone Area (ARS)—Fridays 7.30pm. Telephone Engineering Centre, Gors Rd, Townhill, Swansea, Glam. RAE Course, lectures and constructional projects are available. Sec: *M. D. E. Connor*, 54 Tolley Rd, Penlan, Swansea, Glam.
University College, Cardiff (ARS)—Meetings take place on Tuesdays at 8pm, in the Geology Dept, Main College. The Society station, GW3UWC, is very active, and an hf beam is now being installed. Secretary, c/o Students Union, Dumfries Place, Cardiff.
University College, Swansea (ARS)—18 June (AGM). Another meeting of importance is the mobile rally to be held on the lawn fronting, Singleton Abbey. University Campus, Singleton Park, Swansea. Further details of the Society activities available from Philip Regan (PRO), Students Union, University College, Swansea.

Region 11 RR P. Hudson, GW3IEQ

Conway Valley Amateur Radio Club—21 May (Surprise talk to be given by F. Wiseman, GW3GRY, and R. Jones, GW3MDK). Visitors will be very welcome. The Parade Hotel, Church Walk, Llandudno.

Region 12 RR A. W. Smith, GM3AEL

Aberdeen (AARS)—Fridays, 7.45pm, at 6 Blenheim Lane, Aberdeen. *GM3HGA*. Telephone Aberdeen 33838.
Dundee (RSGB Group)—Thursdays, 8pm, at 3 Magdalen Place (off Roseangle), Dundee. *GM3KYI*.
Inverness (IRS)—Thursdays, 7.30pm, at 4 Falcon Square (near railway station), Inverness.
Lerwick (LRC)—Tuesdays and Thursdays, 8pm, at Annsbrae House, Lerwick. *GM3XPQ*. Telephone Bixter 249.
Lhanbryde (MFARS)—Mondays, 7.30pm at St Andrews School, Lhanbryde, by Elgin, Morayshire. *GM3UKG*. Telephone Clochan 225.

Region 13 RR V. W. Stewart, GM3OWU

Lothians Radio Society (LRS)—14 May (Junk sale—please help by bringing at least one piece per head), 28 May (Construction contest. Nfd briefing), 7.30pm, in the Board Room, YMCA, St Andrew St, Edinburgh.

Region 14 RR N. G. Cox, GM3MUY

Ayrshire (Ardeer Recreation ARC)—5, 7, 12, 14, 19, 21, 26, 28 May, 7.30pm, Ardeer Recreation Club, Amateur Radio Section, Stevenston, Ayrshire. Details: J. F. McCreight, *GM3DJS*, 10 Auchenharvie Road, Saltcoats, Ayrshire.
Ayrshire (AARG)—3, 17, 31 May, 7.30pm, YMCA Howard Street, Kilmarnock.
Glasgow University (GURC)—8 May (Club night), 22 May (RAEN), George Service House, University Gardens, Glasgow, W2
Greenock (G & DARC)—1, 8, 15, 22, 29, May, 7.30pm, Watt Library, Union Street, Greenock.
Mid-Lanark (RSGB Group)—15 May, 7.30pm, YMCA, Brandon Street, Motherwell.

Region 16 RR W. J. Green, G3FBA

Basildon (VARS)—Thursdays, 7.30pm, The Scout Hall, Fairview Road, Vange, Basildon. *G3VOP*.
Chelmsford (CARS)—First Tuesday in each month, 7.30pm Marconi College, Arbour Lane, Chelmsford. *G3VCF*.

Colchester (CARS)—Wednesdays, 7pm, NE Technical College, Colchester, *G3VAG*.
Gt Yarmouth (GYRES): Gt Yarmouth Radio and Electronics Society—Fortnightly, 7.30pm, 98 South Market Road, Gt Yarmouth. Details: *G3HPR*. Tel Gt Yarmouth 62008.
Ipswich (IRC)—Details from *G3UJR*, QTHR.
Maldon, Essex (MYGRC)—Thursdays, 7.30pm, The Friary, Chequers Lane, Maldon, Essex.
Norwich (NARC)—4 May (Business meeting), 11 May (Informal), 18 May (G6CJ aerial circus), 7.30pm, Brickmakers Arms, Sprowston Road, Norwich. *Note:* The meeting on the 18 May will be at the Assembly House, Norwich. Further details from the Secretary of the NARC: *Gary Purcell*. Tel Drayton 459. (Norfolk code 9827-459).
Southend (SDRS)—Details from *G8BSB*.

Region 17 RR C. Sharpe, G2HIF

Basingstoke (BARC)—First and third Saturday in each month, 7.30pm, Chineham House, Popley Way, Basingstoke. *G3CBU*.
Chippenham (CDARC)—12 May (Second df hunt starting at 7.15pm), 19 May (Social and darts match with Bristol ARC at the Queens Head, Box), 26 May ("Design of tank circuits for solid-state p.a's", by G2HIF), 7.45pm, Boys High School, Hardenhuish Lane, Chippenham. *G3UTO*.
Fareham (FDARC)—3 May ("Chinese BC221," by G2QK), 10 May (Nfd dummy run), 17 May ("That's the ticket," licensing conditions by G3VFI), 24 May (No meeting), 31 May (Listeners' ladder—semi final and committee meeting), 7.30pm, Porchester Community Centre, Porchester, Fareham. *G3XIV*.
Maidenhead (MDARC)—4 May ("Radio aids in modern aircraft," by G3VXZ), 19 May (Informal. club station on the air), 7.30pm, Victory Hall, Cox Green Lane, Maidenhead, *G3VMR*.
N. Berks AERE (Harwell) ARC—Meetings on the third Tuesday in each month, 7.30pm, Social Club, AERE, Harwell. *G3NNG*.
Reading (RARC)—12 May ("Design of tank circuits for solid-state p.a's", by G2HIF), 26 May (Nfd evening, contest manager G3PGM), 7.30pm, The Victory PH, Tilehurst Reading. *G3NBU*.
Southampton (SARC)—Meetings every Wednesday and Friday, 7.30pm, Clubroom, 14 Nightingale Grove, Southampton. *G3GOY*.

An RSGB Region 4 ORM

will be held at the Regency Rooms, Wharncliffe Road, Ilkeston, Derbyshire on **20 June 1970** commencing at 2.30pm.

The RSGB Council will be represented by the President, Dr J. A. Saxton; Mr R. F. Stevens, Mr J. R. Petty and Mr F. C. Ward.

Talk-in stations will operate on 160 and 2m, and there will be trade stands, a bring and buy stall, and extra special raffle prizes. Refreshments available all day.

Derby and District Amateur Radio Society
will be holding
A DINNER AND DANCE
in honour of visiting Council members, commencing at 8pm.

Tickets at 25s each are limited and applications with remittance should be addressed to: T. Darn, G3FGY, "Sandham Lodge," 1 Sandham Lane, Ripley, Derbyshire.

MEMBERS' ADS

These advertisements are accepted free of charge as a service to members of RSGB. They must be submitted on the Members' Ads order form printed on the penultimate page of each issue of *Radio Communication*, or on a post-card similarly laid out. Each must be accompanied by a **recent** *Radio Communication* wrapper addressed to the advertiser, as proof of membership.

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 equipment offered for sale.

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

The closing date for each issue is the 7th of the preceding month, but no guarantee of inclusion in a specific issue can be given. No correspondence concerning this free service can be entered into.

See the current order form for further details.

FOR SALE

Equipment of the late G3SV will be sold on Saturday, 9 May at Orchard Manor, Fingrith Hall Lane, Blackmore, Ingatestone, Essex. Nothing disposed of before that date. Much of interest, particularly to clubs. NGR 605025. Sale commences at 2.15pm. Enquiries to G2ABC, QTHR.

Property of late G5CV: Rack mounted HRO with psu, hf and lf coils, £22 10s ono. Hansen swr meter, £4. Heathkit RA1 calib with 100kHz xtal, £2. WB spkr in cab, £1 15s. Eddystone bug, die cast case, £2. Early model Avo, £5. FL-8C filter, 10s. Eimac 4–125A, £4 15s. RCA 815,10s. Ex Navy coax relay, £1 15s. 1802kHz xtal, 5s. Hammerlund s/stator tx variable, 9s. Large auto trnsfmr, 230/110 + lower taps, £3. 0–300mA mc meter, 10s. Osram ACT6, £1. KT8C, 10s. HZP balun, 75Ω, £1. 26 assorted rx tubes, £2 lot. Transport by arrangement. Write G8LY, Spring Hill, Wappenham, Towcester. NN12 8ST.

KW 160 Mk2, mint cond, £16 10s or exchange Codar AT5 and 240V psu in mint cond. RF1U sig gen, mint cond, £14 ono. G3FK, 4 Brownsea Ave, Corfe Mullen, near Wimborne, Dorset.

AR88D with S meter, new valves, vy gd cond, £40 ono. 2m valve convtr, 24–26MHz i.f. (much dx heard), £3. Pre amp, 15s. HMV 17in tv, £2 10s ono. Four 807 valves, 4s each. 25W modulator UM2, two 6L6s, £6. Allen, "Rosswan," Dimmocks Lane, Sarratt, Rickmansworth, Herts. Tel Kings Langley 62438.

HA14 lin amp, HP23 psu plus blower, immac cond. £40. G3YRA, 13 Ranelagh Grove, St Peters, Broadstairs, Kent.

R107. Will enchange for typewriter in gd cond. Rx wkg perfectly. Buyer coll. Foll, Bell Close, Cross Lane, Marlborough, Wilts. Tel Marlborough 2349.

KW 2000A and ac psu, immac. Also dynamic mic, £160. Pye marine 2m 40W mains transcvr, offers. G3VGO, QTHR. Tel Newquay 2076 or 2912.

CR150, built in psu, bfo on panel, offers over £20. Creed 7B, silent cover tu, £15. Wanted; good gc rx. G3XSF, 32 Clifton Road, Halifax. Tel Halifax 60438.

101 ways to use oscilloscope, 13s. Carlile, 48 Alexandra Road, Lowestoft. Tel Lowestoft 2938.

Eddystone 740 with EF184 rf, £20. Delivered 50 miles free. G3KGR, QTHR.

Mininitter/M rig with psu and control unit. Any fair offers to G3IGW, QTHR.

BC221M, £15. CR300, £10. Cross-over aircraft meters, 100μA fsd, £1. Sunair (USA) atu inc 10in Air Dux coil, rotary switch, etc, £3 carr extra. GM3BQA, Woodlands, North Berwick, East Lothian. Tel N. Berwick 2519.

Vanguard tx, 10–160m, £30. CR300 with marine psu (24V–230V), £15. UM2, £2 10s. Uhf wavemeter, 27–127MHz, 1 and 10 MHz xtals, £5. Consider swop 50KΩpV multimeter, light weight gen cover rx, valve voltmeter, atu, *RSGB Handbook*, why. G3DCS, QTHR.

KW Valient tx, 50W 160–10m, inc psu, £20. R208, 10–60MHz, no psu, £2 10s. Sig gen, 100kHz–70MHz, 240V ac, £5. G3VEZ, QTHR.

Marriage forces sale of SB101 with cw filt, SB600 spkr, MH15 bridge, psu to match, KW E-Z Match, Shure 201 mic. Best offer above £200. G3VYJ, QTHR.

Quad electrostatic spkr, £25. Will deliver radius 50 miles of Wirral. Wigglesworth, 16 Ascot Drive, Wirral, Cheshire, L66 2NG. Tel 051-339 4656.

G2DAF rx, mech filt, Eddystone dial, prof metalwork. Will need attention, Also misc trnsfmrs, and meters, old BC348 rx. The lot £25 buyer coll. G3MGK, QTHR. Tel Frodsham 3372.

Stereo/mono headphnes, 3/16Ω, fitted comfy padded muffs, USA manufacture, £1 15 6d. Hi-fi spkr system, 17in × 24in × 12in cab, fitted 12in bass and 2in treble + X over network, £7 10s. Del reasonable distance free. D. Byrne, G3KPO, Jersey House, Eye, Peterborough. Tel Eye 351.

Codar mains powered Q mult. HRO + 4 coils, hdbk. Mains powered Class D wavemeter + hndbk. Eddystone 400X, all coils. Mains powered Q fiver. AR88LF chassis, suit rebuilt. Various manuals. What offers. Sae for details. Tilcock, 10 Blenheim Cres, South Croydon, Surrey, Tel 01-686 3280.

G2DAF lin amp less QY3-125s, new G line cab, £30. Psu extra, £15. Modified HRO + bs coils, 5MHz xtal cont convtr (1 coil), 2m convtr and 1 coil (4-6MHz i.f.), £30. Bush Radio, 10W hi-fi, medium and sw, walnut case, £15. G3LCS, QTHR. Tel Wolverton 3379,

Home/Mobile station: AT5, T28, mains psu in cab with built in spkr, key, 12V /M psu, rc unit in cab with built in spkr. Interchangeable 160 whip, 80 base. Mint cond, ready for air, £50 ono. G4PJ, 8B Fore St, Salcombe. Tel Salcombe 2809.

Pye Reporters, 6V, mint. 12V, mod for 4m, £4 each. 6V vibrator packs, one QRO, £2 & £3. Mod and driver transfmrs, 6V 10W, £3. Home brew gdo, uncalib, £2 10s. RCA xtal calib wavemeter TE149, £2 10s. 1000V QRO psus. Buyer coll. G3KLM, Laburnams, Chertsey Road, Chobham, Woking, Surrey, Tel Chobham 8483.

Cossor scope model 1035, double beam, £16. Wharfedale 9 cu ft corner spkr with 12in Wharfedale spkr, £12. 4 cu ft reflex cab with Wharfedale 8 in spkr, £8. PCR1 rx with int psu, £4. Chorley, 6 Calton Road, New Barnet, Herts.

Ex brdcast RCA tv camera comp with fb lens turret, recon orthicon, unused for four years, was wkg then but will probably need attention to make operational. Any offers? Buyer coll. G5YC, Imperial College Radio Society, Imperial College, Prince Consort Road, South Kensington, London SW7.

100W 70cm tripler pa, 70CM100, cost £65, spec on request, £32 10s. Late style KW Vanguard cab with complete rf side, £18. Katsumi EK9X electronic key, as new, £5 2s 6d. List of other items on request. G8AIH, QTHR.

Slot stereo tape replay unit for car, £20 ono. KW600 lin in immac cond, 15 hours use, £70. Buyer coll. G3TGF, QTHR. Tel Orpington 26802.

Electroniques QP166 coilpack; 3 i.f. trnsfmrs and bfo coil, 3 6BA6 valves, £10. Eagle mw/lw/vhf transistor tuner model FMT51, £12 10s (brand new). Both ono and comp with full data. Edgecock, 1 High St North, W. Mersea, Essex.

KW Vanguard, £35. Eddystone S640, £30. Class D wavemeter, £5. Pye highband transistor Ranger, £10. Sae for details. Wanted: TT11, urgent, Goodrum, c/o 31 Oulton Road, Lowestoft, Tel Barnham Broom 278 (weekends).

Valves for vhf: 958A, TT11, EF50, PC88, 6BQ7A, 6J6, EC52, A1714, RL18, 6AM4, M8248, 6J4, 5s each. EF80, EF91, 2s 6d each. 832, 832A, 10s ea. QQVO2/6, £1. State needs with sae. G2XV, 165 Cambridge Road, Great Shelford, Cambridge.

All components to make a 400W pep output lin amp and psu inc 4 new 6HF5, £10. G3BA trnsvtr complete, lin amp and psu partly wired £7. Drive for AR88, 10s. G2HCV, QTHR. Tel 01-954 2960.

Headphones: pair Browns "A" lr, £2; pair "D" hr, £1. TW 4m nuvistor convtr, 28MHz i.f. £5. Valves: Four STV 280/40, 15s each; one STV 280/80, £2. G6LL, QTHR. Tel Cottered 265.

RSGB Bulletin bound vols: 1969, 35s; 1968, 30s; 1967, 30s; 1966, 15s. *SWM*: 1967, 1966, 1965, 15s per year. All post free. Baldwinson, 33 Cherry Close, Tulse Hill Estate, London SW2.

Antenna noise bridge, new, guaranteed, with instructions, £10. G6XY, 22 Southbank Road, Kenilworth, Warks. Tel Kenilworth 52679.

HRO MX with psu, spkr, 9 coils, £18. CTX2, £6. Buyer coll. G3RYE, QTHR.

Trnscvr for 160 and 80m with mains and /M psus, £18. G3XVH, QTHR.

Wilcox-Gay master oscillator unit in orig cond, unmodified, unused. Also rf units 25, 26, 27. Offers. G8NQ, 51 Hereford Road, Monmouth. Tel Monmouth 2825.

Meters: 0–5 (2), 0–10, 0–50, 0–100 (3), 0–200 (2), 0–250, 0–500mA, mostly Weston, various diameters 1¼in–2¾in. Vhf tv turret (2) type 53. Vfo 2·4–13MHz (2), 100kHz xtal. Telcon low-loss K53B 300Ω tubular twin tx feeder. Offers please. G2DZ, QTHR.

DX100U tx, ex cond, £55. RA1 rx, wiring rough but works, £25 or will exchange for gd 2m rig suitable for /M operation. Onione, 61 Maulden Road, Beds, Tel Flitwick 2913.

HRO with psu, ldspkr, 9 gc coils, £17. Harwood, 21 Butts Hill Road, Woodley, Berks. Tel Sonning 2378.

Hy-gain 18Jr-197 Hy-tower, 10–80m vertical, 39ft, £20. New hammer gray cabinet, panel and chassis, £5. G3NUG, 27 London Road, Shenley, St Albans, Herts. Tel Radlett 4435.

Trio 9R59DE, new in makers carton, £29. Ferguson 3226 4 track 2 speed recorder, new Jan 1970, hardly used, cost £46, accept £32. Unica 4 band comm rx, £8. Andrews, 34 Rawcliffe Lane, York. Tel York 59035.

NCX5 Mk2 and ac psu, little used, £185. Delivered free within approx 200 miles London. Am available weekends only. G3OND, QTHR. Tel 01-71 34104.

Brand new BC221, serial number 12685. Comp with instruction manual, charts and psu. G6TA, QTHR. Tel 01-769 1038.

KW/Geloso amateur band convtr, faulty band switch, £8. p&p extra. G3YWX, 41 Linton Rise, Leeds LS17 8QW.

Xtal: 8008·24kHz, ¾in pin spacing, 12s 6d. 4M convtr (TW), 2–2·7MHz i.f., mounted aluminium box with switch etc, £5. 0-1000mA meter, 4½ os dia, 25s. G2WS, QTHR.

12–14W pa amp, £10. Avometer, heavy duty, £11 10s. Thornton, 26 Stagbury Ave, Coulsdon, Surrey. Tel Downland 54130.

HRO and psu comp with 6 gen cover/bndspread coils and manual, very gd cond, £25. PR30X, mint cond, £5. Buyer coll or carr extra. Platts, 3 Birchwood Ave, Rawmarsh, Near Rotherham, Yorks.

/M psus: 19 Set 12V, new, 30s; SCR522 12V 220V 100mA, 400V 180mA, new, £4; HRO 6V, 30s; Carter 6V gen, 500V 200mA, 30s. 36ft sectional steel mast, 1¼in dia, £5. Sae. G3IUD, QTHR.

BC342N rx, 1·5–18MHz, comp with 240/110V trnsfmr, vgc, £14 ono. Buyer coll or carr extra. New valves: RG1/240A, GU50, 27s each; KT66, 18s each. All plus p&p. UM1 mod trnsfmr, 40s plus p&p. Randall, 3 Boston Grove, Ruislip, Middx. Tel Ruislip 35594.

TA33Jr in first class cond. Coils Araldited, excellent f/b etc, £17 plus 10s carr. GW3DZJ, QTHR. Tel St Asaph 3333.

Vfo drivers for TX53, vfo 24in scale. Sig gen type 6. 25W modulator, 4x 807s. Modulator pp 807s. 5 lf HRO coils. Test set 102. *Bulletins* and *SWM* 1951–69. Offers. G3HBM, QTHR.

Factory built Heathkit 10–12U cro, perfect, £30 ono. Heathkit RF-1U, perfect, £10. Wanted: KW match,; Mosley V-4-6 or RV-4; TF144G manual; 150W coax relay; cw monitor. G8SP, QTHR. Tel Silchester 513.

70MHz xtals; 3645, 7090, and 30 other xtal freqs. Wearite coils 6V vib psu. TU5B. Sae for list. G3NNO, QTHR.

G2DAF Mk2 tx and psu, 160–10m, cabinet, ex wkg cond. Trio JR-500SE rx with 160m, Q mult outlet, works extremely well. Tx and rx, £45 each, psu £10. Willcox Gay vfo, £5. G3XHC, QTHR. Tel HW 26200 ext 275 (wkg hours).

2m convtr xtal control, £6. 2m nuvistor TW pre amp, £5. 2m all 6V6 convtr, vy gd, £3. HRO senior, £12 10s. 2m trnscvr, 4W, £15. G3JGJ, QTHR. Tel Moreton Hampstead 578.

Bendix precision floating type magnetic compass, new, £5 ono. Cambridge unipivot, 100μA, 30s ono. 70cm oscillator unit type G44, 25s. 1000V psu comps, various meters and trnsfmrs, cheap. G3QC, QTHR. Tel Nottingham 283901.

Many bargains in chokes, trnsfmrs, meters, Lektrokit, valves. Example: 20H 110mA. 10s; 5H 420mA 10s. 12·6V at 2·7A × 3 0-4-6·3V at 3A, C core, 25s. 375-0-375V 120mA, 5V at 2A, 6·3V at 1·1A, 6·5V at 2·6A, 6·3V at 0·3A, C core, 30s. Sae for lists. Kilner-Smith, 101 Oxford Road, Marlow, Bucks.

AR22 rotor, few weeks use only, £14. J36 bug key, £1. G3FXB, QTHR Tel Southwick 3382.

19 Set rx, tx stripped, gd cond, 1·75-8MHz, int mains psu, bfo, S meter, £5 10s plus 10s carr. Smiths micro relays, ex equipment, £1. G3WXS, QTHR. Tel Andoversford 439.

Five Eddystone 6 pin rx coils, 3 sockets, £1. Three ceramic tx coils and socket base plus hv variables, 350 and 400mFd, £3. HC6/U xtals: 7007, 7012, 7060kHz, £1 the lot. GM2HFV.

Eddystone 740, £20. CR100, £12 10s. QQVO6-40 valves in sealed cartons, £2. Pye 25W base station, high band, £25. Xtals, 5s, state requirements. Exchange FT243 7050, 7075, for area 2. G3IDW, 6 Church Way, Lower Stratton, Swindon.

DX100U, vgc, £45. SB-10U, perfect, £25. KW500 lin amp, perfect, £45. HQ180, beautiful, £100. AR88, new i.f. trnsfmrs, £35. All manuals. G3WVI, Crowthorne Farm, Crowthorne, Berks.

Eddystone 940, one owner, manual, gd cond, £90. Nesbit, 30 Thorold Road, Chatham, Kent.

Thunder Bird TH6 six ele ant with Ham M rotator and roof mounting, comp with cables, coax and control box indicator. Cost £175, accept £75. G3NVA, QTHR. Tel 030-53712.

KW Vanguard, 10–80m, lpf, unmarked appearance, £20. GM3NEC QTHR. Tel 041-644 2179.

Comp rx station: HRO and spares covering 10–160m, atu, xtal calib, ant, £17. Send for details. Lamb, 70 Dudsbury Road, Ferndown, Dorset.

New TA32Jr beam, £19 ono. G3YQU, 89 Roundmoor Drive, Chesthunt, Herts.

Codar CR70A rx comp with PR30 preselector, matching spkr. As new, purchased November, £18. Horder, 152 Maidstone Road, London N11. Tel 01-368 0218.

PE transistor millivoltmeter, as new, £2 10s. *PE* white noise generator, 10s. Benkson 690 tape recorder, £3. Pope, 234 Derby Road, Chesterfield, Derbyshire.

KW Valient tx, 10–80m, 50W am/cw, plus mains and /M psus, £27. HRO rx with 5 bs coils, £20. Tx and rx together, £42. R209 rx, 12V model, 1–20MHz, £9. Wilkinson, 35 Street Lane, Leeds 8.

Trio trnscvr TS500/PS500, mint cond, £160 ono. G3WTN, 5 Argyle Road, Whitby, Yorks.

BC221 and charts, less psu, gd cond, £10 plus p and p. G3LEJ, 17 Dendys, Hemingford Grey, Hunts. Tel Slepe 579.

3 comm 100kHz xtal filts, 3kHz bndwdth, £4 each. Xtal oven, £2. PL259 plugs, brand new, comp, 5s each. Sockets for same (6 only), 3s each. Marconi valve voltmeter TF1300, as new, no hndbk, £6 10s + post. G3KBQ, QTHR.

One Mullard magnetron JP9/7P. Mullard klystron KS9/20/D. Ferranti QF41/TTR31MR. All believed 3cm, brand new. Offers or exchange 2m/70cm tv equip. G8BGU, 27 Dene Garth, Ovingham-on-Tyne, Northumberland. Tel Prudhoe 2020.

AR88LF comp with S meter, £30. HRO comp with bs coils 1·7–30MHz £10. Both rxs in gd wkg order, £35 the two. Buyers coll. Tel Taunton 2409.

T1131L tx, comp in rack, £10 ono. HF multibnd tx, QQVO320 pa, wide bnd coupler system, Woden mod trnsfmr, £10 ono. Trnsport by arrangement. G3GHN, QTHR. Tel 01-684 9771 day only.

Trio 9R-59 rx, new cond, with manual, £17 buyer coll. G3THV, QTHR

2m Hallicrafter SR42 trnscvr with HA26 remote vfo, built in 12V dc and 115V ac psus, manual. Mint cond, £105. Agfa Supersilette CRFVXM, erc, hood, filters, flashgun and projector, mint cond, £24. G3VKC, 178 Park Street Lane, Bricket Wood, St Albans, Herts. Tel Park Street 3638.

EC10 Mk1, new batts, ant coax and jack remote control sockets, hndbk, £40 ono. G3XFW, 124 Chelston Ave, Yeovil, Somerset.

100kHz B7G xtal. Hustler /M mount, £2 10s. 12in fibreglass ant insulaters, 10s ea. 230V ac blower, 10s. Jap stereo phones, £2 10s. Relay pressure gauge set, £1 ea. Acos xtal mic, £1 5s. Wanted: 9MHz filt; 5MHz HC6/U xtals; 38.666 xtals. G3AAJ, QTHR. Tel 01-989 6741.

Three new 813s, 35s ea. New 811, 17s 6d. 4X150s, 17s 6d ea. G3KCF, 4 St Johns Ave, Cherry Willingham, Lincoln.

KW 2000 dc psu, comp with cable minus one plug, £18. G3JNX, QTHR. Tel Brixham 3142.

WANTED

Hndbk or circ diagram for Solartron scope CD1014·3. Buy or loan G3UGM, QTHR. Tel Leicester 856588.

Loan of recent *Radio and Electronic Engineer* inc May, June and October 1969. G3KTH, QTHR. Tel Bromsgrove 5554.

BC221, perf cond, comp with charts. G3KI, The Horns, Crondall, Farnham, Surrey.

Rambler or Bantam pack set; Cambridge high-band 12V /M; Hallicrafter SX24. G3HKV, 16 Abbey St, Crewkerne, Soms. Tel Crewkerne 2662.

Driver trnsfmr for class B TZ40s from pp triodes. Also TZ40 or DA41 valve. G5BM, 60 Maidenhall, Highnam, nr Gloucester. Tel Gloucester 25415.

Sockets and chimneys for 4X150A; 23cm convtr. G. Fuller, ZL3TFF, 95 Pages Road, Christchurch 6, New Zealand.

Parmeko trnsfmr for Mullard 3W P2361. Sutcliffe, 24 Medfield St, Roehampton, SW15. Tel 01-789 4979.

Xtals: 7·150, 7·215, 7·100MHz; channels 327, 328, 46. Quote price. all replies answered. G3SVP, 38 Hailstone Close, Rowley Regis, Warley, Worcs.

SW and brdcst bnds rx for 12V operation; 1132 aircraft rx. Pyatt, 23 Arundel Drive, Orpington, Kent. Tel Orpington 20281.

Radio and Television Servicing vols 1962–1963, 1963–1964, 1964–1965. State price and cond. Kensdale, Lukifynd, 19 Vine Road, Tiptree, Essex. Tel Tiptree 6278.

Pye Ranger PTC 2007, or any recent model in wkg order, with mic and 12V dc psu. Will pay up to £15. Ceyzeriat, 19 rue du Cdt Faurax, 69 Lyon, France.

Schoolboy swl urgently required HRO with psu and coils. Price around £7. Can collect up to 50 miles. Robertson, 31 Greenways, Bow Brickhill, Bletchley, Bucks. Tel Bletchley 2463.

Old cw/am tx urgently wanted for club station. Appearance not important providing comps gd and wkg. Limited funds available. Write or phone G3SVH, QTHR. Tel Cheslyn Hay 708.

Electroniques front end QP166 and bfo coil HSO85. Pointon, 26 Parkwood Ave, Trentham, Stoke-on-Trent, ST4 8PD.

Pre-war Raymart *Shortwave Manual*; BTS *Short Wave Constructor*; Eddystone *Shortwave Manuals* 2 & 3 and *Ultra-shortwave guide*. Ham catalogues especially Eves, Hamrad, Premier, QCC Read & Webbs. G3IDG, QTHR.

Loan or purchase 2m gear for Achill Island, Western Ireland dxpedition late May. LA19 large por core given free for winding details of same for /P psu. G8CEF, Birkenshaw, The Ridge, Little Baddow, Essex. Tel Danbury 3314.

DX100U with or without SB10U. Cond must be gd. G2ACK, 19 The Headway, Ewell, Epsom, Sy. Tel 01-393 7804.

Valves: 876, 874. Info on rectifier unit type CRV-20131 (RCA). Neill, 10 Main St, Newcastle, Co Down, N. Ireland.

Rx to cover 60MHz to 250MHz. Austin, 46 Lakewalk, Clacton-on-Sea, Tel Clacton 21121.

Recent model DX100U unmodified and in top cond. G8FR, QTHR.

898 dial, must be cheap. Lord, 18 Westfield Road, Woking, Surrey. Tel Woking 62575.

A bandspread translucent dial for Hallicrafters SX24 comm rx. Hersom, 57 South Street, Durham City, Co Durham.

250 + 250 or 300 + 300, and 500pF variable capacitors suitable for Z match. G2UZ, QTHR.

Details/circuits for 160m transistor a.m. tx with modulator. G3XZU, QTHR. Tel 061-773 6069.

3·5MHz ssb trnscvr, as previously requested, still required. Comp details please. G3TUO, 6 St Mary's Close, Letchworth. Tel Letchworth 71020.

Genuine Vibroplex bug key. Will pay up to £10. G3OIT, 7 Wiggins Lane, Billericay, Essex.

Sommerkamp FT150 Trnscvr and 14AVQ ant. G3UAA, 28 Loxley Road, Glenfield, Leicester. LE3 8PB.

Heathkit Mohican rx and hndbk. State cond and price. 2m convtr, 4–6MHz i.f. 2m six ele beam. 30ft tubular mast. R1147B, going for p&p and why. Swift, 34 Walsall Road, West Bromwich, Staffs.

Circuit or service manual for Pye Ranger hi band. Also mods required for 2m /M operation. Will pay costs. G8DKJ, 6 Baldry Gardens, Streatham, SW16. Tel 01-679 1378.

Swop CDR AR22 rotator with desk controller/indicator (perfect, 3 months use only), for Heathkit scope OS2 or similar. Must be perfect with manual. G2BTY, 2 Agar Meadows, Carnon Downs, near Truro, Cornwall. Tel Perran-Ar-Worthal 198.

Amateur gear; valves, variable capacitors etc, in exchange for interesting rock or geological specimens (Quartz, agate, serpentine etc). Sae with details G2XG, QTHR. Tel 01-529 4938.

RDO rx with tuning units, or any rx tuning 100MHz upwards. G3LLW QTHR. Tel New Milton 1156.

Student swl requires the loan of equipment which can be moved frequently between London and Southampton. (Rx and/or ant needed). Green, c/o 139 Avenue Road, Portswood, Southampton, Hants.

S meter circ diag for R107. Griffin, 97 Woodlands Road, Allestree, Derby, DE3 2HH.

Driver trnsfmr out of SCR522 tx, transfmr No A103016. G2AQN, 24 Trafalgar Square, Scarborough. Tel 4775.

4½in wide chart paper for Evershed Vignoles pen recorder (Type 747165). Kaye, 29 Bainbrigge Rd, Leeds 6. Tel 57692.

JXK 70cm convtr. 4MHz xtals to multiply to 2m. G3TTV, 12 Hazel Close, Mildenhall, Suffolk.

HRO psu. Panda Cub circuit. GM3MUQ, QTHR. Tel Portobello 3264.

/M vhf rx suitable for m/cycle. Waters, 15a Midmoor Road, London. SW12.

2m/M rig, 12V, commercial or homebuilt. Will consider separate mains tx and rx. Must be working or repairable. G8DOS, 57 Bacon Lane, Edgware, Middlesex. Tel 01-952 6570.

AM/CW tx, 100W on 160 and 80m. Marine band tx ideal, must be comp with mains psu. G3XOI, QTHR. Tel Southend 557468 or 01-236 9613 Ext 66 (wkg hours only).

R1155, HRO or similar rx, any cond, cheap. G3IPM, 2 Hobbes Walk, Dover House Road, Roehampton, London. SW15.

8MHz xtals in 2m zone A and C. 10XJ or FT243 48MHz xtals in zone A. Would exch for 8.100MHz FT243. Also good 2m beam. G8DAD, Easter Hill, Christchurch Lane, Lichfield, Staffs.

Sommerkamp FR100B. G6AS, QTHR.

HRO bndsprd coil for 10m. McNamara, 125 Cooley Road, Dublin 12, Eire.

Bantam or similar tx/rx. Need two but will buy singly, 2m or 4m (2m pref). Will consider hb if gd enough. GW3UUS, QTHR. Tel 0633 65572.

HRO coils, Eddystone 898 dial, Z match, sig gen TF144G (Advance). Sale: Racal If adaptor: G3OXS, QTHR.

American bug key. G2HAX, QTHR.

SB10 ssb adaptor. Will coll in July. 9J2GE, PO Box 1586, Lusaka, Zambia.

FTDX500 trnscvr, must be in mint cond. State age price, etc. Will coll within reasonable distance. GW3TMP, QTHR.

CQ—CQ—CQ de G3VQM/KW

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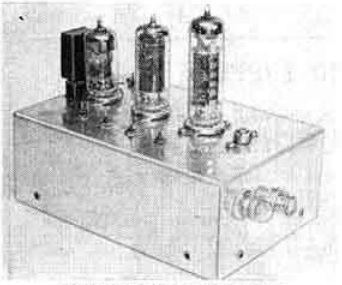

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QTHR

DATE ..... *SIGNED*..... *CALLSIGN, BRS or A No.*.....

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Radio Society of Great Britain

FOUNDED 1913
INCORPORATED 1926

PATRON H.R.H. THE PRINCE PHILIP
DUKE OF EDINBURGH, KG

APPLICATION FOR CORPORATE* OR ASSOCIATE* MEMBERSHIP

RADIO SOCIETY OF GREAT BRITAIN,
35 DOUGHTY STREET,
LONDON WC1N 2AE
01-837 8688

* I hereby apply for election as a Corporate Member of the Society and enclose a remittance for £2/10/- being the amount of my first annual subscription.

* Being under 21 years of age and not holding a current Amateur Radio Transmitting Licence I hereby apply for election as a Non-Corporate (Associate) Member of the Society and enclose herewith a remittance of £1/5/- being the amount of my first annual subscription.

I, the undersigned, agree that in the event of my election to Membership of the Radio Society of Great Britain, I will be governed by the Memorandum and Articles of Association of the Society and the rules and regulations thereof as they now are or as they may hereafter be altered; and that I will advance the objects of the Society as far as may be in my power; providing that whenever I shall signify in writing to the Society addressed to the Secretary that I am desirous of withdrawing from the Society I shall at the end of one year thereafter after the payment of any arrears which may be due by me at that period to be free from my undertaking to contribute to the assets of the Society in accordance with Clause 8 of the Memorandum of Association of the Society.

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