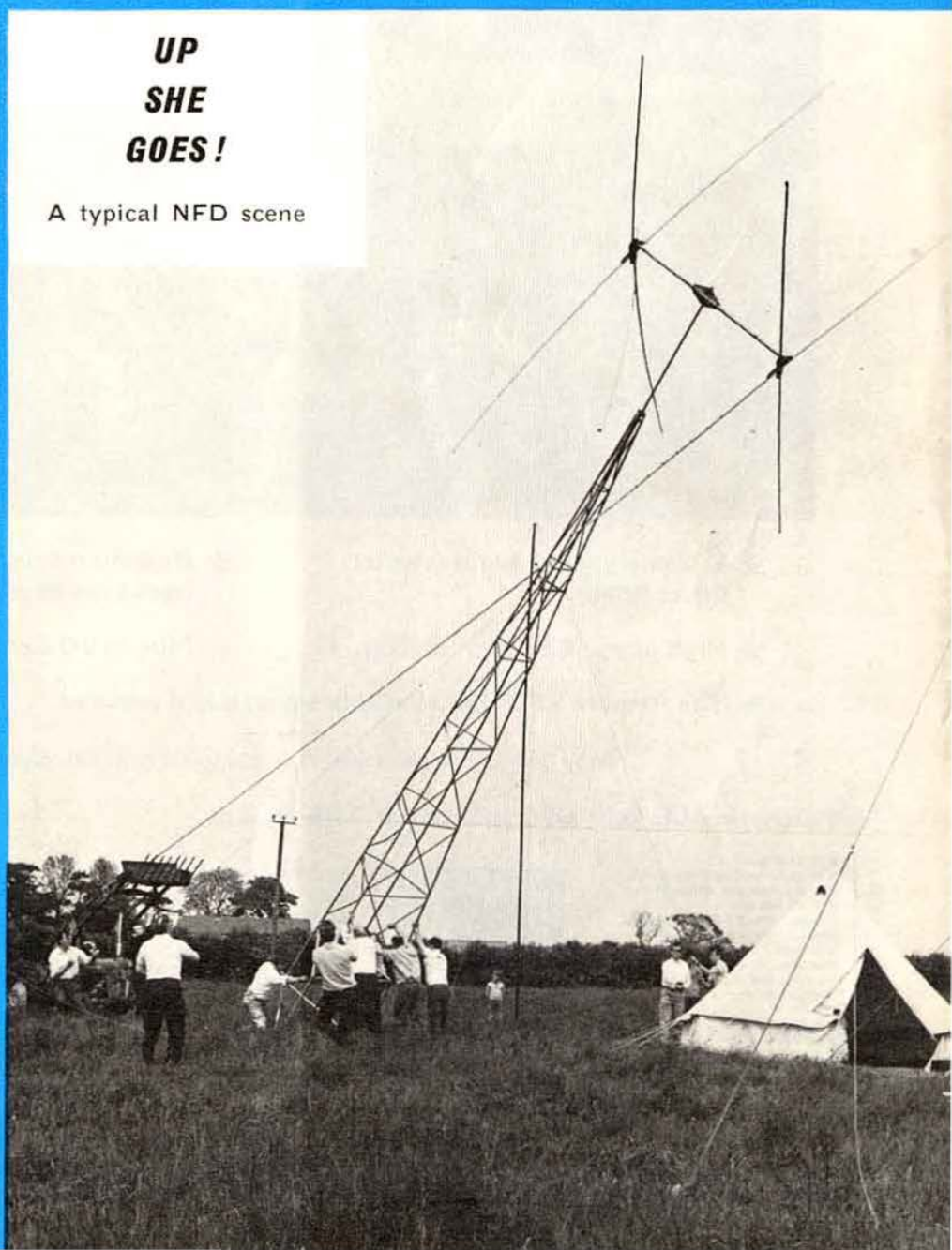
radio communication

August 1970

Journal of the Radio Society of Great Britain

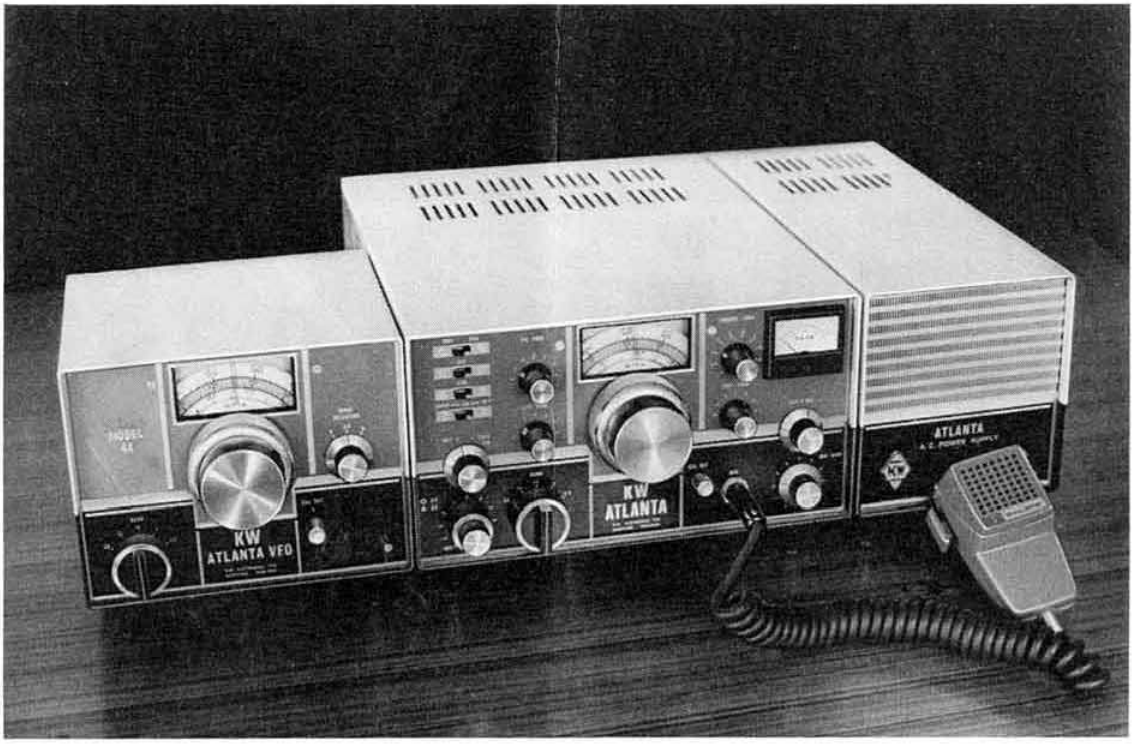
UP SHE GOES!

A typical NFD scene



THE KW ATLANTA

NOW AVAILABLE WITH REMOTE VFO UNIT



★ **Extremely good audio (crystal filters fitted).**

★ **Operation on all amateur bands from 10 to 80 metres.**

★ **High power SSB Transceiver.**

★ **Plug-in VOX unit available separately.**

★ **The Remote VFO Unit available separately if required.**

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KW Low-Pass Filters
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August 1970

radio communication

Volume 46 No 8 Price 4s

CONTENTS

FRONT COVER

The 14MHz cubical quad of Bangor & District ARS station GI3XRQ/P being erected on the farm of Hugh Irvine, GI3TLT, on National Field Day

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.
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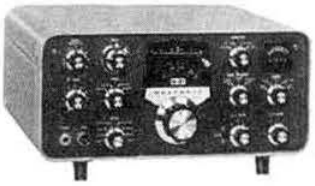
HEATH KNOW WHAT YOU WANT AND ARE ALL OUT TO GIVE IT

THAT'S WHY HEATH PRODUCE NEW MODELS



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We shall be pleased to see old and new friends on this occasion.

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Full 2 metre coverage —140 watts PEP SSB input—RX sens 0·2μV for 10dB S+N-N—120/240 VAC—Use with your existing HF gear.

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Shows quantity of signals transmitted and received—160-10 metres—15 watts to 1kw—Operates with receiver IF's through 6MHz—120/240 operation.

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Variable sweep width up to 500kHz—Lin or Log scales—Variety of input frequencies (455-6000kHz)—10μV input sensitivity—120/240 VAC.

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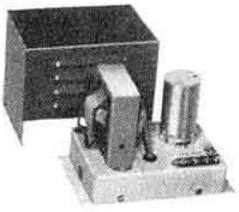
HW-30 2M TRANSCEIVER

Suitable for local or R.A.E.N. purposes—Transmitter input approximately 5 watts—super-regenerative receiver + RF stage—Built-in AC power supply or use with GP-11.

NEW Price £24-18 (Original £31-10) Carr. 8/-.

GP-11 VIBRATOR PSU



Designed for use with HW-30—6 or 12 Volt operation—250 VDC 100 Ma nominal rating.

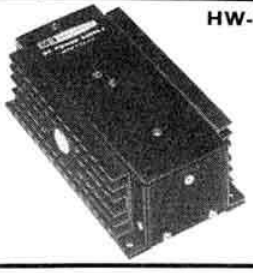
NEW Price £10 (Original £12-6) Carr. 6/-.

HW-17 2M TRANSCEIVER

Frequency range 143·2-148·2MHz—extal controlled TX or use with external VFO-RF output 8-10 watts—Transistorised, Double conversion RX 110/240 VAC.

NEW Price £59-10 (Original £80-4) Carr. 10/-.

HW-17 ACCESSORIES



HWA-17-1 (Illustrated)—Transistorised DC PSU for mobile or portable operations.

HWA-17-2—Easily fitted to HW-17—provides AM or FM facility at throw of a switch.

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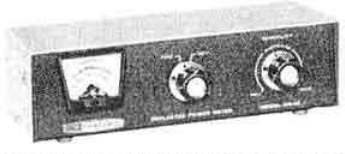

HM-15 REFLECTED POWER METER

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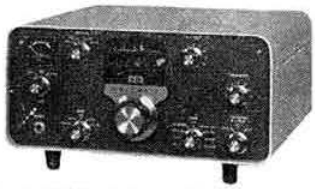
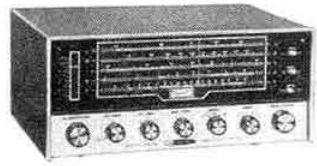


NEW Price £145 (Original £156-14) Carr. 10/–.

GR-54 DE LUXE SW RECEIVER

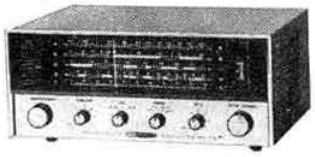
5 bands—3 SW bands cover 2MHz—30MHz—Tuned RF stage—Crystal filter—USB-LSB switch—Electrical band spread—115/240 VAC.



NEW Price £49 (Original £48-16) Carr. 12/–.

GR-64 LOW-COST SW RECEIVER

550kHz in four bands—Bandspread tuning—BFO control—Noise limiter—Built-in tuning meter—115/240 VAC operation.



NEW Price £25 (Original £24-16) Carr. 10/–.

GR-78 GEN-COV RECEIVER

190kHz–30MHz in six switched bands—Double conversion on 18–30MHz band—AM-CW/SSB switch—All solid state (including 5 F.E.T.'s)—Internal rechargeable battery.

NEW Price £65 (Original £68-18) Carr. 8/–.

DX-60BE 80-10M TRANSMITTER

80–10 metres phone/CW—90 watts input—Crystal or VFO controlled using HG-10B VFO — Built-in low pass filter to eliminate T.V.I.—120/240 VAC.

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HR-10B 'AMATEUR' RECEIVER

80–10 metres—internal crystal filter for optimum selectivity—Sensitivity—1μV for 10dB S + N-N—Image rejection—40dB or better—120/240 VAC.

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HD-10 ELECTRONIC KEYER	£21. Carr. 6/–.
GD-125 "Q" MULTIPLIER	£9. Carr. 6/–.
HD-20 XTAL CALIBRATOR	£8. Carr. 4/–.
PM-2 POWER METER	£7-12. Carr. 4/–.
GD-396 HEADSET	£3. Carr. 4/–.

HRA-10-1 100kHz CRYSTAL CALIBRATOR	£6. Carr. 4/–.
GRA-72 SWL ANTENNA	£2. Carr. 4/–.
HDP-21 COMM-MIKE	£18–8. Carr. 6/–.
HG-10B 80–2M "VFO"	£30. Carr. 8/–.

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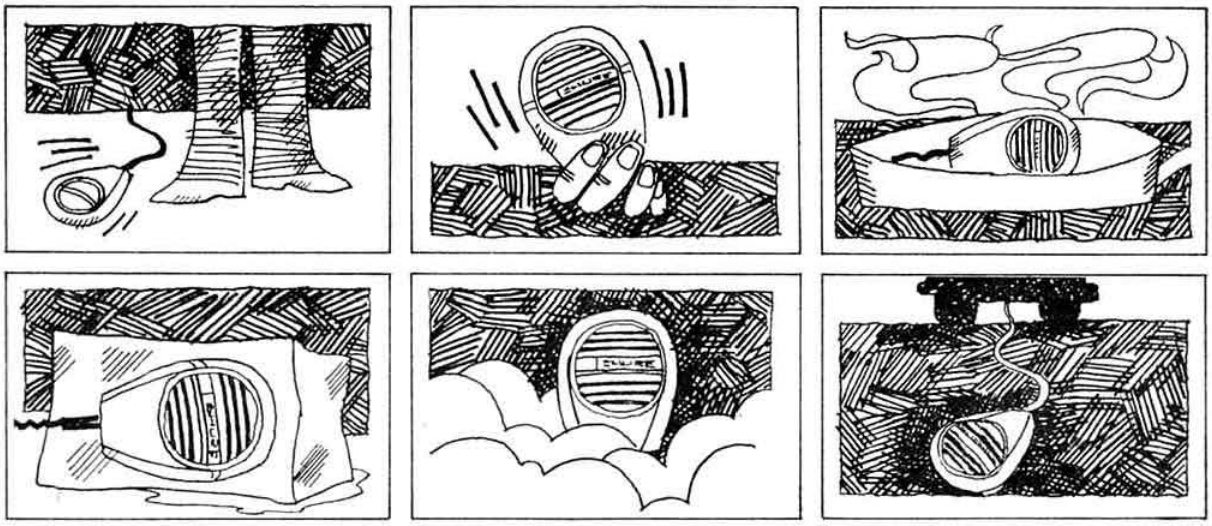

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* FREQUENCY RANGE:
  3.5-29.7MHz (7 Bands)
* SENSITIVITY: 1μV (at 10dB S/N)
* IMAGE RATIO: More than 50dB
* FREQUENCY STABILITY:
  ± 2KHz in 1—60 min.
  after switching on; subsequently
  within 100Hz per 30 min.
* DIMENSIONS:
  13"(W), 7-3/32"(H), 12-3/16"(D)

SSB COMMUNICATION RECEIVER JR-310

Model 9R-59DE

BUILT IN MECHANICAL FILTER 8 TUBES COMMUNICATION RECEIVER

* 4 Bands Covering 540KHz. to 30MHz. * Two Mechanical Filters Ensure Maximum Selectivity. * Product Detector for S.S.B. Reception. * Automatic Noice Limiter. * Large Tuning and Bandspread Dials for Accurate Tuning. * Calibrated Electrical Bandspread. * "S" Meter and B.F.O. * 2 Microvolts Sensitivity for 10dB S/N Ratio.

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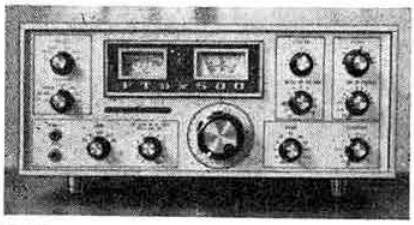
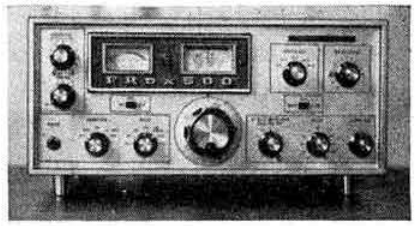
FT 500



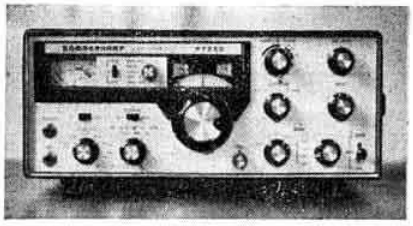
500W PEP
VOX, PTT, MOX. 100 and 25kHz marker RIT, Metered ALC. All the usual optional extras fitted as standard, £250. With extra 6 xtal CW filter £270.

FR 500



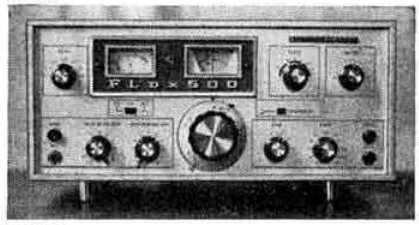
Top band to 2m.
The no compromise AM, FM, SSB and CW receiver for the man who wants the best. £160.

FT 250



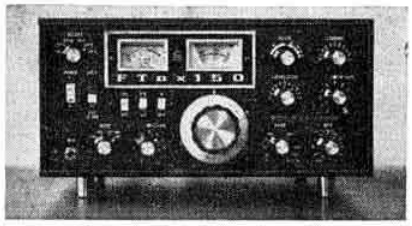
240W PEP
VOX, PTT, MOX. 100kHz marker. RIT Metered ALC. Again, usual extras are standard. £160. psu £45.

FL 500



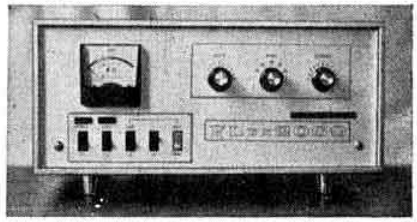
240W PEP
Companion to the FR-500 for transceive or split frequency. Matching it in quality and performance. £145.

FT 150



120W PEP
All transistor except driver and PA. Both AC and DC power supplies built-in. Specially designed for mobile. VOX, PTT, MOX, 100kHz marker, RIT. £215.

FL 2000



To complete the station, there is the FL-2000 linear. 1200W PEP. input. Comfortable legal limit output. Built-in SWR meter, etc. £110.

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RADIOCOM 70—The RSGB Show

Wednesday 19 August to Saturday 22 August

Royal Horticultural Society's New Hall, Greycoat Street, Westminster, London SW1

Radiocom 70 will be opened formally at midday on 19 August by Major-General J. E. Anderson, CBE, Assistant Chief of Defence Staff (Signals). He will be accompanied by the President of RSGB, Dr J. A. Saxton, DSc, PhD, C.Eng, FIEE, FInstP, and together they will later tour the exhibition.

The largest display will be by the Royal Signals Regiment, which is this year celebrating its golden jubilee. The Royal Navy and Royal Air Force will also be mounting displays.

The Radio and Space Research Establishment, of which Dr J. A. Saxton is Director, will occupy the whole of the stage area for space research displays.

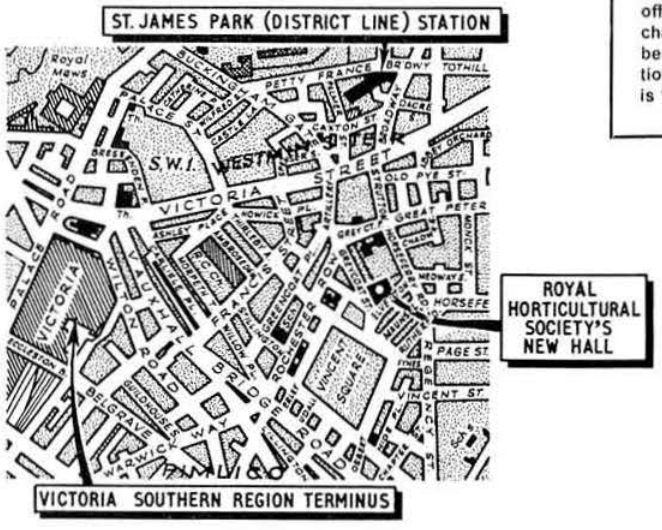
The **RSGB stand** area will include the **Enquiry and Reception Area** which will be in the charge of M. J. Wallace, G8AXA, and Mrs Eileen Vaughan, BRS26612, who will be assisted by Council members and members of the various RSGB committees. Orders will be taken for USA magazines, and callsign and car badges. In addition, subscriptions may be renewed and full information on the Society's activities will be available to prospective members.

Overseas visitors are particularly asked to call at the reception area so that arrangements may be made for them to attend the reception for overseas amateurs to be held on Friday 21 August.

The **RSGB Bookshop** will be in the charge of Stand Manager Ron Broadbent, G3AAJ. A full range of RSGB publications will be on sale. (See separate box).

The **Display of Home Constructed Equipment** is being organized by M. R. Elliott, G3VWS, of 23 Filbert Crescent, Gossops Green, Crawley, Sussex, to whom all enquiries should be directed. See page 439 of the July issue of *Radio Communication* for full information.

It is anticipated that **GB3RS** and **GB2VHF** will be operational from the exhibition hall on 80m and 2m, respectively.



The **British Amateur Radio Teleprinter Group** will be giving demonstrations on its stand of the operation of various types of teleprinter units using local loops. Stand manager will be Jim Heck. Various BARTG publications and operating aids will be on sale at the stand.

Reception for overseas amateurs. The Society is organizing an informal reception for overseas amateurs on Friday 21 August at 7.30 pm. Between 7.30 and 8.30pm entry will be restricted to overseas visitors and invited guests, but Society members may obtain tickets for this period at a cost of 7s 6d.

Among the many major exhibitors at the show will be Western Electronics, EMSAC, Garex, Gale, Baginton Electronics, Amateur Radio Shop, Microwave Modules, Lowe, Adcola, KW, Nombrex, Weller, Radio Shack, Minpostel and WAMRAC.

RSGB PUBLICATIONS

Amateur Radio Techniques by Pat Hawker, G3VA
The new (third) edition will make its debut at the exhibition. Enlarged and revised, it now contains 208 pages and nearly 500 diagrams. Price 20s. (postpaid 22s).

Log Books
New editions of the standard and de-luxe log books will be on sale at the exhibition. The standard log book now has a durable gloss cover and costs 9s (by post 10s). The de-luxe log book has board covers with a gloss finish. The large pages are printed on one side only and the new binding will allow pages to lie flat on the operating table. The price of the de-luxe log book is 21s (by post 25s).

Call Book—*obtain it post free !*
The 1971 edition of the *RSGB Amateur Radio Call Book* will not be available until 1 October, but as a special exhibition offer orders may be placed at the cover price of 9s. Purchasers will complete a self-addressed envelope which will be used to despatch the Call Book immediately on publication. The normal price of the Call Book, including postage, is 10s.

EGM, 19 AUGUST

The attention of corporate members is drawn to the *Current Comment* on page 437 of the July issue of *Radio Communication*.

The proposed amendment to the Articles of Association of the Society seeks to set new MAXIMUM subscriptions, but as explained in the *Current Comment* it is not anticipated that these maxima will be introduced in the foreseeable future and that LESSER SUMS (eg £4 for corporate members and £2 for associates) may be adequate to maintain financial viability for many years.

Certificates and Awards

THE Society has reviewed its awards programme, and as a result both the actual certificates and the conditions of issue have undergone changes. Enclosed with this issue of *Radio Communication* is a copy of the new awards leaflet which sets out the revised conditions.

It will be noted that the Society has introduced a new award, the **IARU Region 1 Award.** This follows a recommendation made at the Opatija Region 1 Conference. Although not specifically mentioned in the rules, this award may be claimed by short wave listeners on a "heard" basis.

In accordance with the announcement made last month, claims for awards under existing conditions must be postmarked not later than 31 December 1970. Awards may be claimed under the new rules with effect from 1 August 1970. All RSGB award claims should continue to be sent to the Society's awards manager, C. R. Emary, G5GH, Westbury End, Finmere, Buckingham. Mr Emary is organizing a display of certificates at the RSGB Exhibition and this will include the new RSGB designs.

Awards information

The Society frequently receives enquiries concerning certificates issued by other organizations. As there are more than 800 operating awards now available, the collation and revision of the conditions of issue of these many awards presents problems. The RSGB does not produce any publication giving details of awards, other than its own, and the difficulties of keeping the information up to date have caused the Council to decide not to attempt to publish an awards directory.

There are several sources of information concerning awards, and the basic details of these are given for the guidance of members.

A paperback with the title of *DX Awards Log* is published by R. J. McMahon, W6IZE, 1055 So. Oak Knoll, Pasadena, Calif 91106, USA, at a cost of $4.95. In addition to providing details of various awards this book gives space for the entering of the relevant calls as worked.

The **Award Hunters' Club** issues a *AHC Bulletin* which consists of loose-leaf pages giving full details of the various awards. Further information and subscription rates (at present £1 for 10 issues) may be obtained from J. Velamo, OH2YV, Isokaari 4-B-30, Helsinki-20, Finland.

The **Certificate Hunters' Club** (which includes organizations such as **FHC** and **SWL-CHC**) is managed by Clif Evans, K6BX, 3212 Mesa Verde Road, Bonita, Calif 92002, USA. The **CHC** publishes a quarterly *Directory of Certificates and Awards* providing details of the majority of the awards now available. The USA cost of this loose-leaf type publication is $3 but it is available to amateurs outside the USA for $2.50 per issue. Stocks of the directory are not held in the UK but it may be ordered for delivery from K6BX to the subscriber. Orders, which are handled on a non-profit basis purely as a RSGB membership service, may be sent to G2BVN accompanied by a remittance of 21s 3d.

Claiming awards

In many cases it is not now necessary to send QSL cards when claiming awards. Almost all member societies of the International Amateur Radio Union will now accept, in place of QSL cards, a statement by the certificates manager of the applicant's own society that the cards have been seen and checked. In the case of RSGB members, cards for checking should be sent to G5GH accompanied by a stamped envelope for their return.

The **Worked All Continents** award is issued by the headquarters of the IARU and claims should be sent to the certificates manager of the applicant's own society and not to the USA. This is the only award where this procedure is followed. It may be noted that claims for **WBC** only need an additional QSL to complete a **WAC** claim.

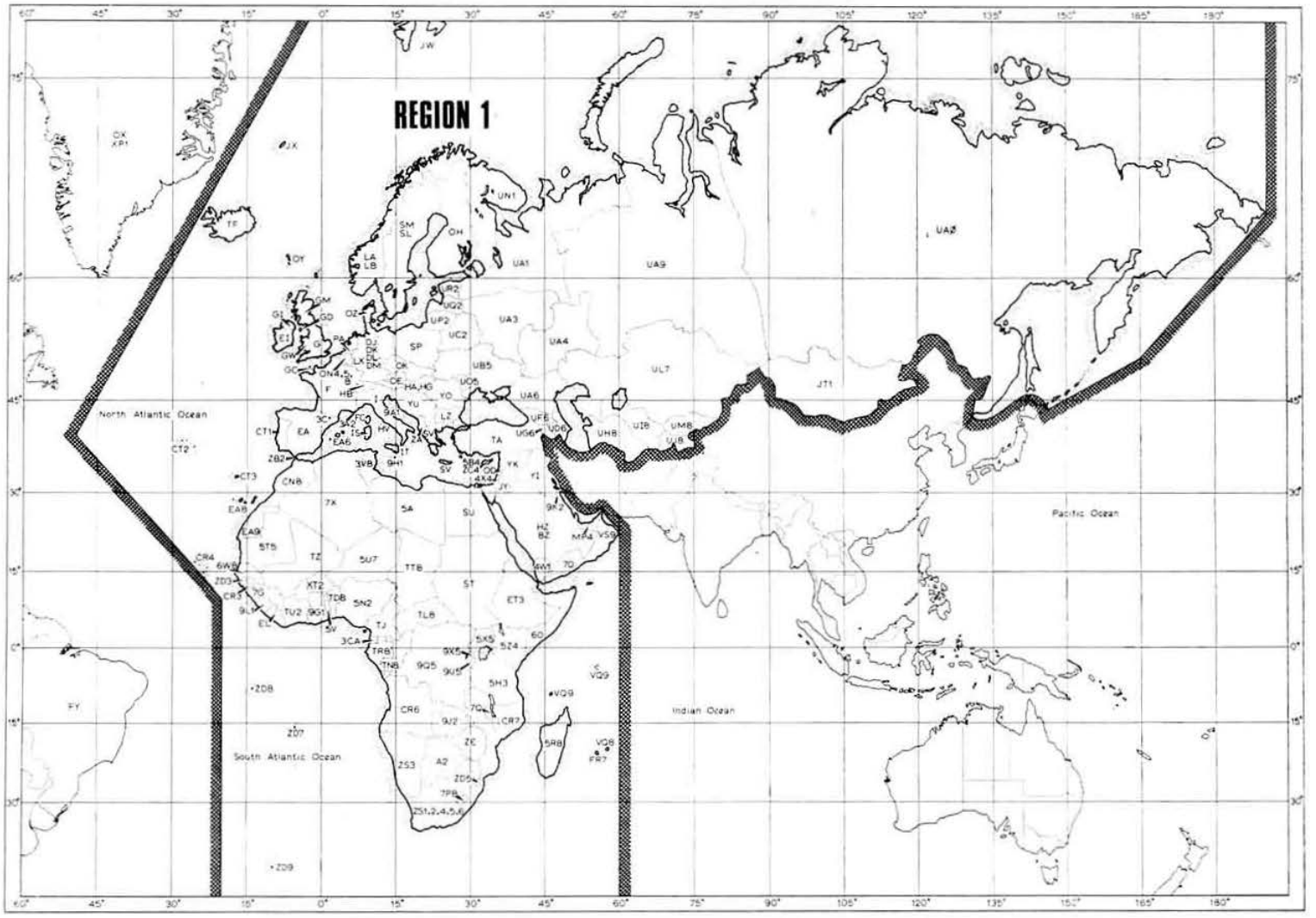
It should be noted that the ARRL will not accept certified lists for their **DX Century Club** and **Worked All States** awards. It is essential that claims for these awards should be made on the proper forms which are available for return postage from ARRL, Communications Dept, 225 Main Street, Newington, Conn 06111, USA.

The **Worked All Zones** and **WPX** awards are sponsored by *CQ Magazine*. Claims for **WAZ** should be sent to K4IIF, PO Box 205, Winter Haven, Fla 33880, USA. However, the QSL cards of UK stations can be checked by John Allaway, G3FKM, thus obviating sending the cards overseas. **WPX** claims are dealt with by WA6GLD, 5031 Arroway Ave, Covina, Calif 91723, USA.

The **Worked All Europe** and **EU-DX-D** awards issued by the German society, DARC, are issued free to RSGB members. Details obtainable from G5GH who checks the QSLs for these two certificates.

When sending awards claims, either to the RSGB certificates manager or to the issuing organization, applicants should check that the correct postage has been prepaid and also that return postage, or reply coupons, is enclosed. Write legibly and arrange cards so that they may be readily checked, remembering that the certificates manager is a volunteer performing a membership service for his society and his time is valuable.

G2BVN



IARU REGION 1

QTC AMATEUR RADIO NEWS

July "Radio Communication"
As a result of an error by the printers, approximately 3,000 copies of this issue were not posted until 15 July although postmarked 7 July, the date on which all other copies were posted. Garden City Press apologise to all members who were inconvenienced by the late arrival of their copies.

Area representative, Jersey
Mr A. G. Cole, GC3GS, is now the area representative for Jersey and is compiling a register of all Jersey members who are requested to send their names and addresses to him at 6 Greve D'Azette Gardens, St Clement, or telephone Jersey Central 24800.

Falkirk area RSGB group
An initial meeting of the proposed RSGB group in the Falkirk area was held in the Royal Hotel, Bonnybridge, on 12 June. The meeting was well attended and a formation committee was elected, with Mr B. Mulleady as chairman.

Any member not able to attend, and any others interested in joining the proposed group, should communicate directly with Mr B. Mulleady, 1 Elizabeth Crescent, Camelon, Falkirk, who will notify them of the future meeting to discuss the formation.

RSGB Dinner Club
The next meeting of the RSGB Dinner Club will be at the Kingsley Hotel, Bloomsbury Way, London WC1, on Friday 4 September at 7.30 for 8pm. The Kingsley Hotel is a few minutes' walk from Holborn tube station and there is ample car parking space available in the vicinity. The cost of the dinner is 26s, and bookings accompanied by a remittance may be sent to Miss Sheila Sims at RSGB headquarters. Please note that bookings must close 24 hours before the dinner.

All RSGB members are welcome and a particular invitation is extended to overseas amateurs who may be visiting London.

RAE instructor required
A licensed instructor is required for the RAE class in Beckenham, Kent, commencing in September. The ability to communicate simply and enthusiastically to a friendly audience is more important than deep theoretical knowledge.

This class serves a large area of South London and adjoining counties and has already contributed some three dozen callsigns to the QRM! The present instructor is retiring due to pressure of other work and a change of QTH.

Further details from G3OJE, QTHR.

Volunteers wanted
Ron Broadbent will again require a number of volunteers to help man the RSGB stands at the RSGB Show from 21-22 August. QTHR or 01-989 6741 ASAP.

RSGB Region 10 ORM

University College, Park Place, Cardiff
Saturday 26 September 1970

1pm	Meeting opens
3pm	Business meeting
5pm	Buffet
6.15pm	Regional lecture

Council will be represented by the Vice-President, Mr Brian Armstrong, G3EDD; Mr Roy Stevens, G2BVN; and the Zonal Representative, Mr Cyril Parsons, GW8NP. The chairman will be Mr David Thomas, GW3RWX, Regional Representative.

There will be an exhibition of commercial equipment; competitions for home-constructed equipment, best mobile installation; time of arrival prize for mobile visitors; a raffle. Talk-in stations will be in operation on top-band and two metres. Adequate car parking facilities exist on the site.

The regional lecture will be given by Mr Keith Winter, MSc, BMus (Wales), Leverhulme Lecturer in Music and Physics in the Department of Physics, University College, Cardiff. It will be entitled: "New sounds for music".

Tickets: 15s, obtainable from Mr Roy Morris, GW3HJR, 22 Millfield, Pontyclun, Glam.

Closing date for ticket applications: Tuesday 22 September.

Region 1 ORM
Preliminary Notice
Sunday 27 September at the Floral Hall, Southport.
Tickets, to include tea, 15s from either G2AMV or G2CUZ. Further details will be given in the September issue of *Radio Communication*.

Licence figures
The Ministry of Posts and Telecommunications advises that the following numbers of amateur licences were in force at the end of May 1970:

Class A	13,516
Class B	2,143
Class A/M	2,575
Class B/M	284
Television	183
Model Control	18,199

RSGB QSL Bureau
The RSGB QSL Bureau will be closed from 12 October to 4 November, inclusive.

Please do not send any cards or correspondence to G2MI which would arrive between these two dates.

Calling GB3KL
G3VZF requests anyone connected with the operation of GB3KL to send a large sae for a quantity of QSL cards received and awaiting despatch.

RSGB National Mobile Rally

WOBURN ABBEY, BEDFORDSHIRE

Sunday 9 August 1970

The park opens at 11am. Among attractions will be visits to the state apartments, more than 3,000 acres and 2,000 animals, trade exhibition, surplus sale, grand raffle, children's playground, pets corner, boating lake, children's sports and lucky dip, amusement park and funfair, the Woburn Wild Animal Kingdom, restaurants and snack bars. There will also be a bring-and-buy sale. Please price any surplus equipment for sale before putting it on display and remember that a deduction of 10 per cent will go towards rally funds.

Car parking in a specially reserved car park.

Talk-in stations GB2VHF, G3VHF and GB3RS on 2m, 4m and 160m.

Organized by the Radio Society of Great Britain. Use of Woburn Abbey by kind permission of His Grace the Duke of Bedford.

RAE Courses, 1970-1

Aldridge, Staffs. Tynings Lane County Secondary School. Fridays 7–9.30pm commencing 18 September. Enrolment 9–9.30pm 11 September. Enquiries to G. Coffin, 45 Egerton Road, Streetly, Sutton Coldfield, Staffs.

Bath, Somerset. City of Bath Technical College. Commences September. Instructor: P. A. Bubb, G3UWJ, who will supply further details.

Birmingham. Lea-Mason Technical College, Bell Barn Road. Enrolment week commencing 14 September. Commences 7pm 21 September. Morse class commences 7pm 24 September.

Boreham Wood, Herts. Boreham Wood College of Further Education; Elstree Way, Boreham Wood. Wednesdays 7-9.15pm commencing 30 September. Enrolment 10am-8pm 14-15 September.

Brighton, Sussex. Brighton Technical College, Richmond Terrace. Enrolment 1730–2000 14–16 September. Details from F. R. Canning, CEng, MIEE, Engineering Faculty.

Canterbury, Kent. Canterbury Technical College, New Dover Road. Enrolment 8–10 September. Commencing 21 September. Details from The Principal.

Chingford, London E4. Friday Hill House, Simmons Lane. Enrolment 8pm week commencing 21 September. Commencing 28 September 7.30–9.30pm. Preliminary elementary mathematics course four weeks commencing 24 August; enrolment 8pm 17 August. Details from G2HR, 35A Woodland Road, Chingford. Tel: 529 2932.

Glasgow. Glasgow College of Nautical Studies, 21 Thistle Street, Glasgow C5. Tuesdays and Thursdays 7–9.30pm commencing 15 September (enrolment evening). Fee £3, students under 18 on 1 August free.

Ilford, Essex. County High School for Girls, Cranbrook Road, Ilford. Enrolment 7–8.30pm 7–10 September. Commencing 23 September, 7.15–9.15pm. Apply to W. G. Hall, G8JM, 48 Hawkdene, N Chingford, London E4 (sae please).

Leicester. City of Leicester Polytechnic. Commencing 23 September, 6.30–9.15pm. Enrolment morning and evening 16–17 September. Instructor, G3ORY. Fee £2 8s.

London Borough of Ealing. Acton Technical College, High Street, Acton. Wednesdays 6.30-9pm commencing 23 September. Enrolment 6.15-8.15pm 9, 10 and 16 September. Fee £3 3s.

London Borough of Hounslow. School for Girls, Clifden Road, Brentford. Mondays 7.15–9.15pm, commencing 21 September. Enrolment 6.30–8.30pm 10, 11, 14 and 15 September. A non-RAE amateur radio course will also be held at Cranford School, Woodfield Road, Cranford, on the same days.

London Borough of Sutton. Carshalton College of Further Education, Nightingale Road. Thursdays 7–9.30pm commencing 17 September. Enrolment 6.30–8.30pm 7–9 September.

Portsmouth & District. Further Education Centre, Drayton Road, North End, Portsmouth. Tuesdays and Thursdays 6.30pm. Enrolment 9 September onwards. Enquiries to G6NZ.

Sheffield, Yorks. Western Road School. Wednesdays 7pm commencing 30 September. Details from J. Bell, G3JON, 30 Alms Hill Road, Sheffield S11 9RS. Tel: 367774.

Slough, Bucks. Slough College of Technology, William Street, Slough. Basic course, 6.30–9.30pm Thursdays; advanced course, 7–9.15pm Mondays. Enrolment 2–8pm 9 and 11 September; late enrolment 14 September. Details from E. C. Palmer, BA, G3FVC, Dept of General Studies.

Taunton, Somerset. Taunton Technical College. Thursdays 7–8pm, commencing 17 September. Details from A. T. Stiby, senior lecturer, Dept of Engineering.

Welwyn Garden City, Herts. Mid-Herts College of Further Education, The Campus, Welwyn Garden City. Enrolment 2–9pm 7 and 8 September. Details from R. Stringer, Electrical Dept.

Wombourne, Staffs. Wombourne Evening Institute, Ounsdale School, Wombourne, near Wolverhampton. Enrolment 7 and 8 September. Details from D. E. Battison, head teacher of the institute.

A new approach to vhf/uhf receiver design

PART I

by C. L. DESBOROUGH, G3NNG*

THIS article describes a new approach to a good performance specification vhf/uhf receiver design. An attempt has been made to utilise modern readily available devices and components and at the same time maintain costs at a minimum. To off-set the normal difficulty for home constructors of vhf/uhf equipment, that of variations in layout producing variations in performance, the entire receiver is produced in printed board form.

Simple add-on units to produce ssb transceiver operation and a 4m converter have also been built and may be the subject of a future article.

Design philosophy

It is becoming steadily more difficult to find a suitable modern receiver with a 2MHz tuning range at a reasonable performance/price ratio for use with vhf converters. Hf operators are left with only 28 – 30MHz for their tunable i.f. range, and even this is sub-divided on most receivers. Purchasing a receiver solely for a tunable i.f. is expensive when added to the cost of converters for 2m, 70cm and 23cm.

The alternative approach, as given here, is a design which gives a multiband vhf receiver on conventional superhet lines; ie a tunable local oscillator beating directly with the incoming signal and using fixed narrow-band IFs from there on. Because of the harmonic relationship of the three bands used, the design given only requires a single crystal oscillator chain to cover all three bands and hence gives a common dial calibration for the three bands.

Two added advantages of this system are worth listing:

(*a*) high Q narrow-band circuits are used immediately following mixing from signal frequency to minimize cross modulation and spurious effects (conventional converters require a 2MHz bandwidth);

(*b*) large ganged variable capacitors with their attendant tracking and alignment problems are eliminated.

Another problem, that of sheer overload or blocking from local stations, is rapidly becoming more acute with the large increase in vhf activity (especially 144MHz) and the use of much higher gain aerial systems.

This effect will nearly always occur after the first converter mixer because, if the blocking station is not the one actually tuned to, no agc will be produced to reduce the receiver gain. Overload may even occur at the first mixer if too much gain is built up in the rf amplifiers. Also the selectivity at the front ends of most receivers is usually inadequate—bearing in mind that a converter may have already produced some 34dB (50 times voltage) gain which the tunable i.f. was not designed to accept.

This problem (and it could be a problem chez G3NNG with a fellow 144MHz operator barely 400 yards away) was tackled by always throwing away unwanted gain in tuned circuits and just maintaining sufficient to overcome the noise figure of the next stage.

The overall noise figure NF_0 of two cascaded stages is given by $NF_0 = NF_1 + \frac{NF_2 - 1}{G_1}$ where NF_1, G_1 are noise figure and gain of first stage in dB. (G_1 includes losses in couplings).

Therefore the front-end noise figure is degraded by the factor $\frac{NF_2 - 1}{G_1}$. In hard facts then, using the *worst case* figures at 144MHz for the devices used (16dB gain for TIS88, 4·5dB noise figure for 40600) the noise figure is degraded by 0·21dB or 1·05 times in noise power. More typically this figure will be 0·14dB or 1·03 times the noise power. The advantage gained by changing to a TA7153 mixer is minimal, ie typically the noise figure increase is 0·08dB but the choice is left to the constructor.

On 432MHz the *worst case* conditions of 10dB gain and 4dB noise figure of the TIS88 means that the overall noise figure of the first rf amplifier may be degraded by 0·3dB (or 1·07 times in noise power) by the second TIS88. Again more typically the figure is increased 0·16dB.

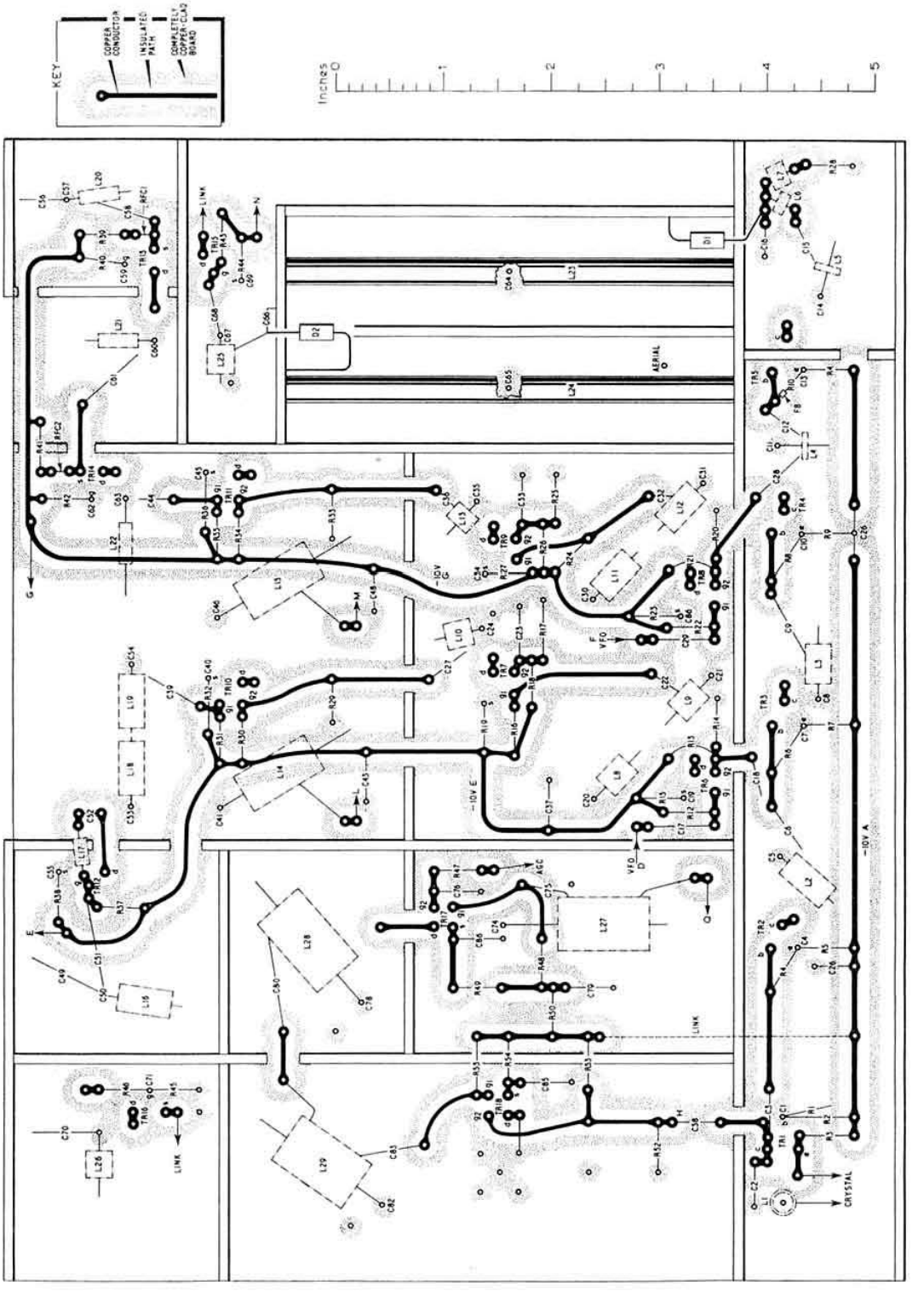
Subsequent noise additions by later stages may now be ignored on both bands.

The object of the above figures is to demonstrate that vast quantities of front-end gain (where selectivity is at a minimum) are unnecessary, and coupling at the mixer outputs for highest Q factor at the expense of gain may now be used, as well over 26dB of gain have been built up on 144MHz and 432MHz and even a 0·5μV input signal has now been raised to at least at the 16μV level.

Ideally the i.f. now produced should go directly into a crystal filter, but readers are advised to take a good rest with a suitable sedative after enquiring about prices; and so one is left with tuned circuits to achieve filtering at the first intermediate frequency of 29·6MHz.

In order to achieve the points listed, JFETs are used as rf amplifiers because of their currently superior noise performance at low cost, and dual-gate MOSFETs for mixers

* 22 Westland Road, Faringdon, Berks.



Lower board (Figs 1-7)

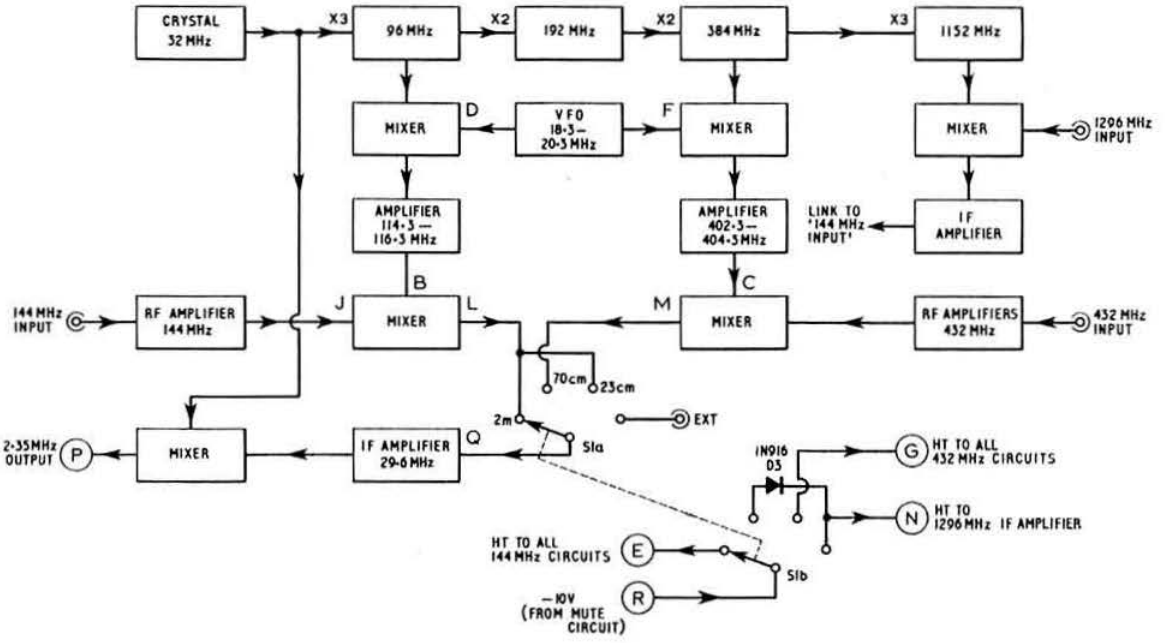


Fig 1. Front end schematic diagram

because of the isolation achieved between injection and signal frequencies which are only 29·6MHz apart.

1,296MHz reception is achieved by using the 144MHz band as the first i.f. This is a reasonable choice as 1,296MHz goes naturally with 432MHz, but an external link switch only need be used if 1,296MHz/144MHz operation is desired.

Other points included in the overall design are a tone oscillator for cw monitoring and an external mute facility, both requiring an earth for operation. The receiver was designed for a positive earth to fit in with existing club equipment for field days.

Principle of operation

The receiver front-end is shown as a block diagram in Fig 1 and when considered band by band is fairly straightforward. Basically the system consists of: (*a*) a conventional 32MHz crystal oscillator followed by frequency multipliers, and (*b*) a variable frequency oscillator tuning 18·3 to 20·3MHz. Individual band operation on 144MHz and 432MHz is achieved by adding the vfo to the appropriate multiplier of 32MHz to give an output tunable over a 2MHz range. This new variable frequency is then mixed with the signal frequencies to give a fixed i.f. of 29·65MHz which may then be selected by the band switch SW1(a).

The selected 29·65MHz signal is then amplified by an agc controlled stage and mixed with the original 32MHz fundamental to give a final i.f. of 2·35MHz. Thus then, for the 144MHz band the vfo is mixed with 96MHz to give a local oscillator injection frequency of 114·35 – 116·35MHz, and for the 432MHz band 384MHz is used to give a 402·35 – 404·35MHz LO.

At 1,296MHz the procedure is more conventional in that the 1,152MHz harmonic is mixed directly with 1,296 MHz to give a broad-band i.f. of 144 – 146MHz. By manually connecting an external link to the 144MHz aerial socket rather than a switch there is little chance of receiving 2m signals by pickup from an adjacent 2m aerial lead.

The diode D3 associated with the band switch is to allow the 144MHz section to operate while set to 1,296MHz but not vice-versa.

With the exception of the vfo, which is in a separately screened box, Fig 1 represents the entire circuitry contained on the lower printed circuit board.

Circuit description

Oscillator sections

The complete receiver oscillator system is designed around a 32MHz crystal and harmonic multipliers which are selected to mix with a stable vfo.

The circuit is given in Fig 2 and comprises basically a 2N2369 32MHz crystal oscillator TR1. A series resonant crystal is used, and at 32MHz the series resistance will be well under 100Ω and hence it is essential, for 100 per cent certainty of the crystal controlling correctly, that it is driven between low impedance sources. The obvious points, therefore, are the emitter, and an in-phase feedback point which is tapped only one-and-a-half turns down on L1 from the earthy end. It must be stressed, however, that a series resonant crystal is required. Instances have been reported of spurious operation of these high frequency overtone crystal oscillators but the author has never experienced this

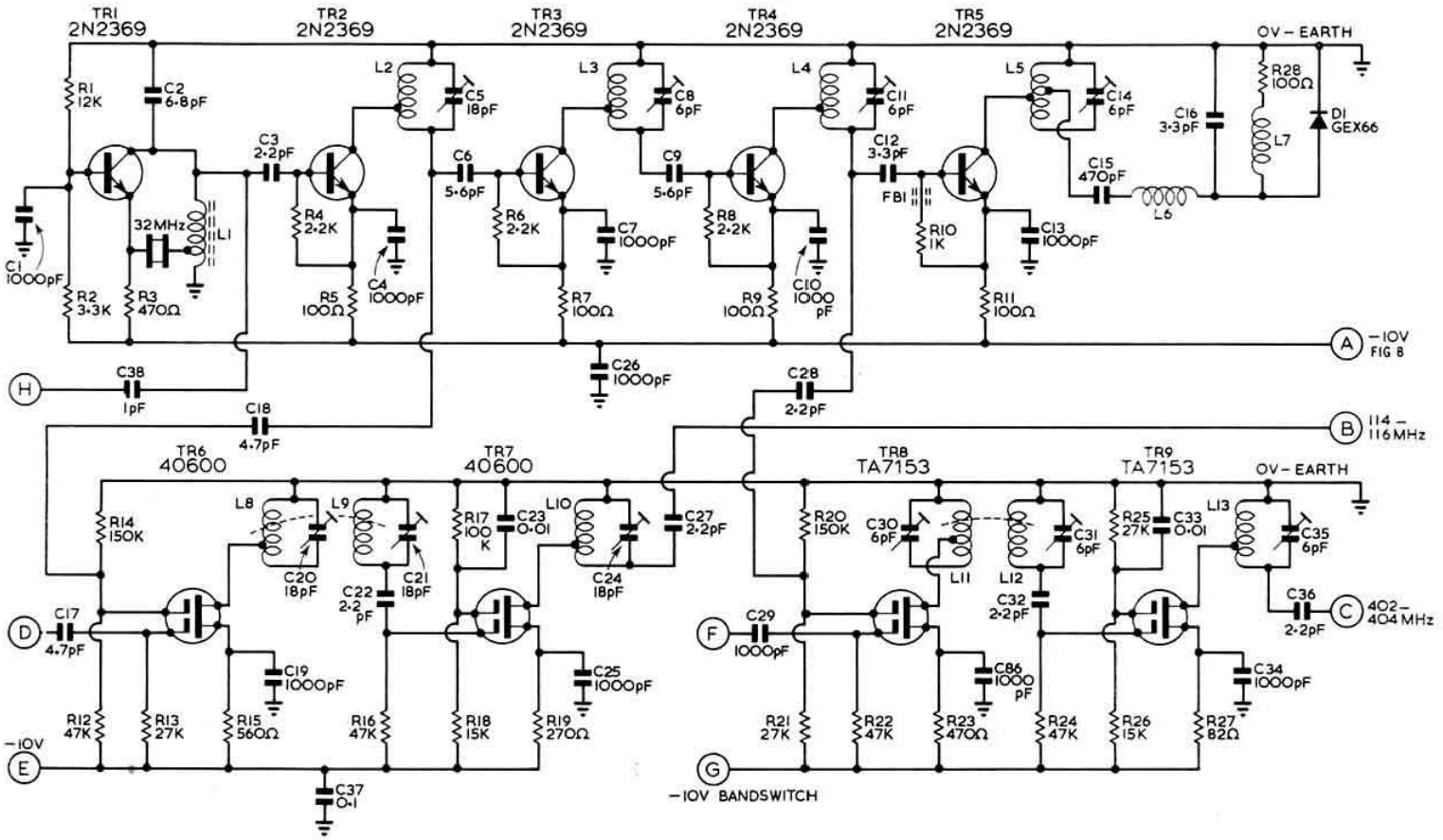


Fig 2. Oscillator sections

with the circuit in Fig 2. However, should such a case arise, the circuit may easily be neutralized by the addition of a further one turn from the earthy end of L1 returned via a 6·8pF capacitor to the emitter of TR1 to give an out-of-phase signal at low impedance to neutralize the crystal capacitance.

The crystal oscillator TR1 is followed by three 2N2369 Class C frequency multipliers TR2, TR3 and TR4 giving x3, x2, x2, respectively, to 384MHz. Drive is applied to each stage via a low value of coupling capacitor which transforms from the high impedance of the tank circuits to the relatively low-input impedance of the base without undue damping of the tank Q value. The LC values given will allow only the correct frequency to be selected. The emitter resistors R5, R7, R9 and R11 are purely to enable the level of drive to be conveniently measured and, if excessive drive in any stage is found, then the appropriate coupling capacitor may be tapped down on the preceding tank coil. The important point, as with any high frequency transistor design, is good decoupling of the emitters, with as short a lead length as is practical to reduce emitter inductance.

The transistor TR5 is a conventional Class C amplifier at 384MHz which drives the diode x3 multiplier, D1, via a series resonant circuit L6 to ensure a clean 384MHz waveform and readily match the impedance of D1 to L5 C14. R28 provides the load and a monitor point for tuning up. If we now consider that the 144MHz band has been selected by the band switch (SW1 in Fig 1), then ht is applied also to the 40600 dual gate MOSFETS TR6 and TR7. TR6 is a conventional mixer with the larger amplitude signal (96MHz) applied to gate 2 at approximately ±2V peak amplitude, via C18, and the vfo signal (18·3–20·3MHz) at approximately ±300mV peak, to gate 1. The sum frequency, 114·3–166·3MHz, is selected by L8 C20 and loosely coupled to L9, C21, inductively, to achieve sufficient overall Q to reject the 96MHz component. The mosfet TR7 is a Class A amplifier chosen to minimize the introduction of spurious frequencies associated with Class C operation, and the dual gate device is used because of its inherent stability and high gain in this mode. The three tuned circuits are stagger tuned to give an overall bandwidth of 2MHz and to maintain a fairly constant output level of oscillator signal. It is all too easy to produce excessive injection levels with semiconductors and this in turn is liable to produce harmonics and spurious mixings, so always the rule is never to produce excessive powers—in this case only a few 100s of microwatts are required for TR6 and TR8.

Similarly if 432MHz is selected, ht negative is applied to TR8, TR9 (TA7153s) and their functions are exactly the same as TR7, TR6—but using the 384MHz component via C28 to give a local oscillator output of 402·3–404·3MHz.

RF amplifiers (Figs 3 and 4)

The object of any rf amplifier is firstly to overcome mixer and i.f. noise, as explained earlier, and secondly to provide some front-end selectivity. The first objective is achieved adequately by a single stage of amplification on 144MHz, and two stages on 432MHz giving about 16dB in both cases after circuit losses. Reasonable selectivity consistent with a 2MHz bandwidth is achieved by using three stagger-tuned circuits of fairly high loaded Q in each case. It must be remembered, however, that too high a loaded Q indicates a very low coupling and hence higher insertion loss and a vicious circle of gain versus noise figure is guaranteed, so a compromise has been made.

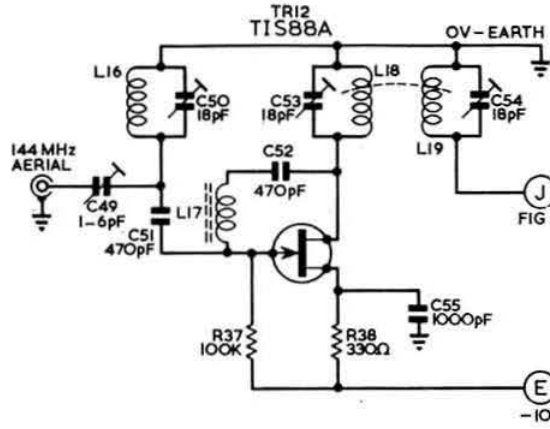


Fig 3. 144MHz rf amplifier

The 144MHz amplifier TR12 is in grounded source and the reverse transfer susceptance (−0·8m mho) is neutralized by L17 (+0·8m mho or 1·2μH). The input-tuned circuit L16 C50 is matched to the 75Ω aerial feeder by C49 (approx 2pF) and hence to the gate of TR12 (approx 1k for optimum signal/noise) via C51; increasing the value of C49 will degrade performance. The output tank, L18 C53, is loosely coupled to L19 C54, and the mixer load on L19 is roughly the same as the drain load on L18 thereby maintaining similar Q values for band-pass symmetry. C52 is for dc blocking and is chosen for its low self inductance.

At 432MHz the TIS88 is stable in grounded gate and neutralization is unnecessary. C56 (about 1pF) matches the aerial to L20 C57, which in turn is matched to TR13 source by tapping down on L20. C61 (about 1pF) matches TR13 tank circuit to TR14 source and, as with 144MHz, increasing the value of C56, C61, will degrade the circuit Qs. ¼-wave

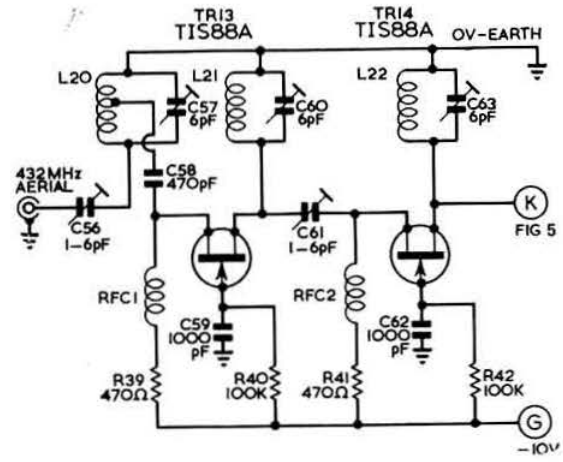


Fig 4. 432MHz rf amplifier

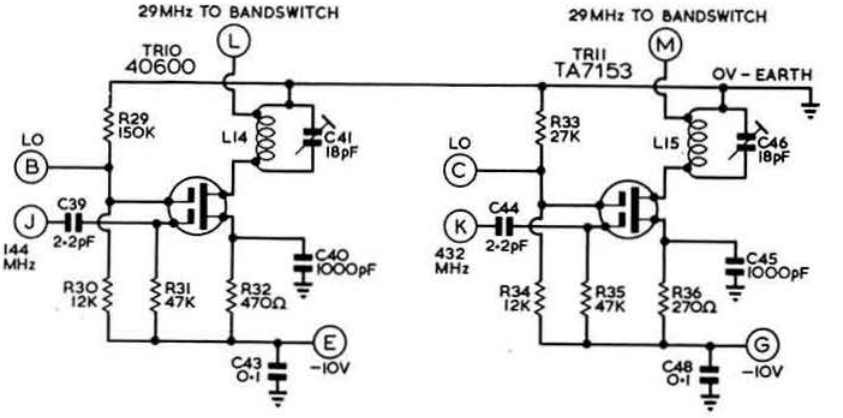


Fig 5. 144MHz mixer (TRI0)
432MHz mixer (TR11)

rf chokes are used in the sources of TR13, TR14 to avoid shunting the signal into the source resistors which are of similar value to the input impedance.

No rf amplification is provided at 1,296MHz, firstly due to the cost factor, and secondly that the best place for an amplifier at this frequency is right on the aerial.

Signal mixers (Fig 5)

The cross-modulation, blocking and spurious response performance of the receiver is determined mainly by these mixers, as the bandwidth, and hence selectivity, of earlier stages is at its worst. Cross modulation is produced in devices having a transfer characteristic with powers higher than two, hence the fet with its square law (power of two) transfer is ideal. Blocking is usually caused by the unwanted signal moving the bias point of the mixer and is reduced by keeping rf gain prior to mixing low. Spurious responses are often caused by the local oscillator voltage reaching the last rf amplifier and varying the depletion capacitance of the collector junction, thus producing mixing with unwanted signals. This effect is eliminated by using dual gate mixers which have a very high isolation between gates. Thus the dual gate mosfet is the solution to signal mixers on 144MHz and 432MHz, but at 1,296MHz these problems are very small and the conventional diode mixer is still used.

The 144MHz and 432MHz mixers TR10 and TR11 have the signal applied to g1 and the LO at about ±0·6V peak to g2 which is biased to 0·6V with reference to source. The mixer drain is tapped down on the 29·6MHz i.f. coils to give a very high loaded Q for optimum selectivity at the expense of gain. The i.f. coils L14 and L15 are air-cored and wide spaced to achieve as high a Q as possible. It is well to remember that a Q of 150 at 29MHz is only 3dB down (power) at a band width of 190kHz! The working overall circuit Q achieved at 29·6MHz is about 300.

On 1,296MHz (Fig 6) a conventional diode, D2, is used for window mixing the 32MHz multiplier chain harmonic at 1,152MHz (L23) with the signal frequency (L24) to give an i.f. of 144–146MHz. L23 and L24 are ½-wave lines resonated at their centre by a 2BA brass bolt passing through 2BA nuts soldered on the earth plane side of the chassis thus forming C64 and C65. The 300Ω i.f. impedance of D2 is matched on L25 which is coupled to the cascade arrangement of TR15 TR16 by C68. This arrangement is used to

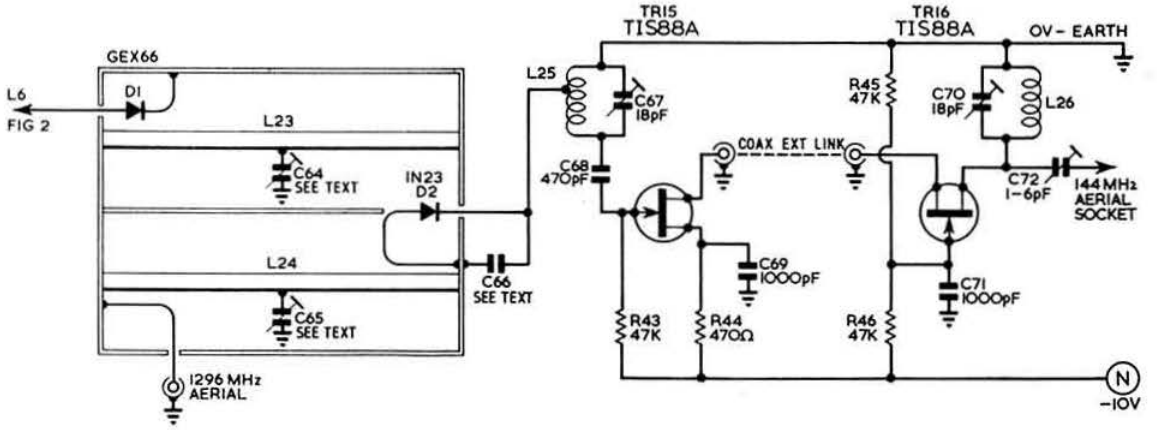


Fig 6. 1,296MHz mixer and i.f. amplifier

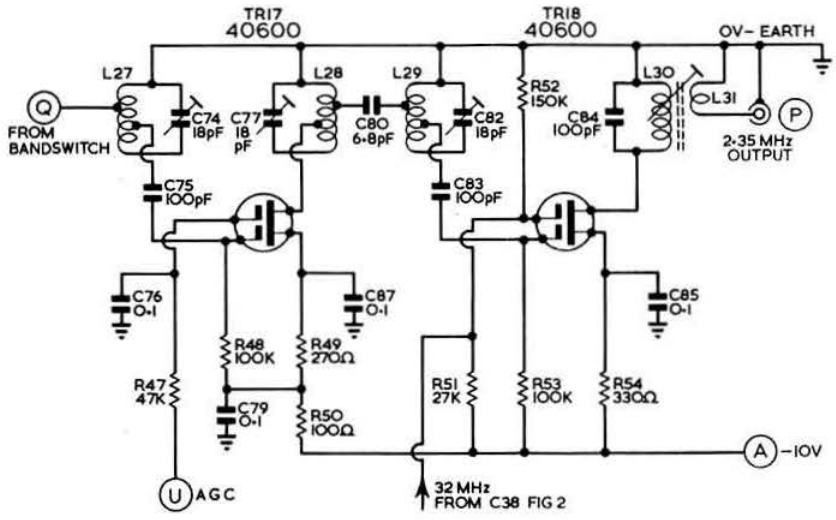


Fig 7. 29·6MHz amplifier and mixer to 2·35MHz

enable a coaxial link at low impedance to be wired across the printed board to a more convenient position for TR16. C72 (2pF) matches the output circuit L26 C70 to 75Ω for direct connection to the 144MHz aerial socket. Ht for TR15 TR16 is applied via the bandswitch SW1 (*a*) on Fig 1 which also gives ht to the 144MHz circuits via D3.

1st i.f. amplifier and 2nd mixer (Fig 7)

It is very desirable to have as high a Q a possible, which means very low coupling of tuned circuits and hence loss of gain. To replace some of this gain an amplifier TR17 is used, and to eliminate the need to neutralize while achieving a good agc characteristic for the stage, a dual-gate 40600 is used, with agc applied to g2. The gain from aerial to bandswitch SW1 on both 432MHz and 144MHz is some 26dB (22 times voltage) at point Q, hence a low degree of coupling is quite sufficient to ensure noise pickup on SW1 is negligible. R50 C70 provide decoupling from the supply line and also some dc bias to give a greater agc control range. The output tuned circuit, L28 C77, is very lightly coupled to the mixer input L29, C82 via taps and C80. Again L27, L28 and L29 are air-cored coils for maximum Q and, as stated, an overall working Q at 29·6MHz of 300 is achieved.

TR18 is a dual-gate mixer with the 32MHz oscillator injection of ±1V peak applied to g2 which is biased to +1V with reference to source. The i.f. output of 2·35MHz is selected by L30 C84 and coupled by the low impedance winding L31 to the crystal filter on the upper printed board.

The upper printed board contains the vfo, and main i.f. amplifier chain with crystal filters, detectors, audio amplifier and all the extra circuitry. The schematic of this board is shown in Fig 8. Ready access to the lower board is given by allowing this board to hinge upwards on a hinge on the rear panel, after disconnecting the vfo drive shaft.

To be concluded

TABLE 1

Lower board components

R1, 30, 34	12kΩ	All resistors ¼W 10 per cent
R2	3·3kΩ	eg Erie type 15
R3, 23, 39, 41, 44	470Ω	
R4, 6, 8	2·2kΩ	
R5, 7, 9, 11, 28, 50	100Ω	
R10	1kΩ	
R12, 16 22, 24, 31, 35, 43, 45, 46, 47	47kΩ	
R13, 21, 25, 33, 51	27kΩ	
R14, 20, 29, 52	150kΩ	
R15	560Ω	
R17, 37, 40, 42, 48, 53	100kΩ	
R18, 26	15kΩ	
R19, 32, 36, 49	270Ω	
R27	82Ω	
R38, 54	330Ω	
C1, 4, 7, 10, 13, 19, 25, 26, 34, 40, 45, 55, 59, 62, 69, 71, 86	1000p F/T	Erie CFT 3000 (or CDFT1000 Discoid)
C2, 80	6·8pF	
C3, 22, 27, 28, 32, 36, 39, 44	2·2pF	
C5, 20, 21, 24, 41, 46, 50, 53, 54, 67, 70 74, 77, 82	18pF max	C004EA/18 E
C6, 9	5·6pF	
C8, 11, 14, 30, 31, 35, 57, 60, 63	6pF max	C004EA/6 E
C12, 16	3·3pF	
C15, 51, 52, 58, 68	470pF	Hi K type AD 10 per cent
C17, 18	4·7pF	
C23, 33	0·01F	Hi K type PAZ
C37, 43, 48, 76, 79, 85, 87	0·1pF	STC polycarbonate PMA 0·1/100
C29	1000pF	Suflex 63V 10 per cent
C38	1pF	
C49, 56, 61, 72	1–6pF	air spaced
C64, 65, 66	see text	
C75, 83, 84	100pF	Suflex 63V 10 per cent
values below 10pF are Erie	P100/AD ± 0·25pF or NPO/A ± ½pF	
TR1, 2, 3, 4, 5	2N2369	
TR6, 7, 10, 17, 18	40600	
TR8, 9, 11	TA7153	
TR12, 13, 14, 15, 16	TIS88A	
D1	GEX66	
D2	IN23 or equivalent	
D3	IN916	

A noise limiter for transistor receivers

by W. H. BOND, FRCS, G3XGP

When the G3XGP transistor tx/rx mobile was constructed, one unit designed and innocently incorporated was a noise limiter; this was thought to be rather good for it enabled low-level QSOs to be heard in the 1·95MHz pulse transmission where the KW201 station receiver was useless. However, when the mobile was installed the noise limiter was found to be so effective that apart from the built-in 12 turns on a computer toroid choke in the positive battery lead, no further electrical suppression was required: plug, starter and trafficator noise, let alone the dynamo, could not be heard even on a dead band. The car is a big Mini converted to negative earth, and the aerial is a commercial top-loaded whip mounted on the strengthened front off-side corner of the roof.

The noise limiter is extremely simple, small, can be constructed from the junk box, and can be incorporated into any transistor receiver with a 5k volume control below the detector diode. The unit simply replaces the volume control (Fig 1) as the diode load, the top lead to the volume control being broken and attached to the input point, the volume control re-attached to the output, and the chassis being taken to deck.

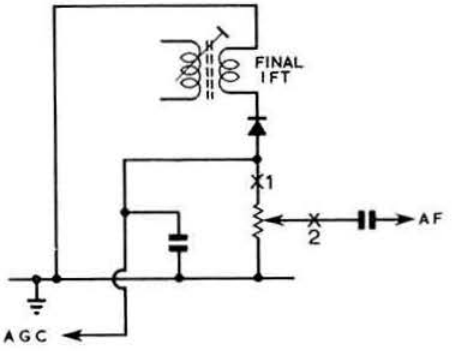


Fig 1. Simplified transistor detector circuit. The circuit is inserted at X1 and X2

The circuit operates by integrating the af output from the detector and using this voltage to forward bias D1 (Fig 2), the current path being R1, R2, D2, R4. The detector output can also pass down R3 and R4 either to deck or in the reverse direction through D1, thence to the coupling capacitor and volume control. Under normal listening conditions, apart from the insertion loss of about 4dB, reception is normal, but should a sharp noise spike appear this will be seen by the diode as a negative reverse biasing voltage because of the sluggish response of the timing circuit formed by R1, R2 and C1. The af current is immediately cut off during the spike, but is as immediately resumed when it ceases for there is no time for C1 to change potential

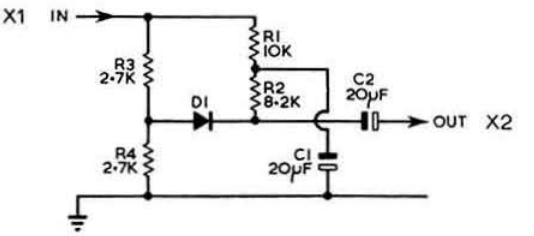


Fig 2. Circuit diagram. Component values are: R1, 10k; R2, 8·2k; R3, 2·7k; R4, 2·7k; C1, 20μF; C2, 20μF; D1, Ge point contact. Note the polarity of the capacitors and the diode at first sight are incorrect, these should be reversed for positive earth systems

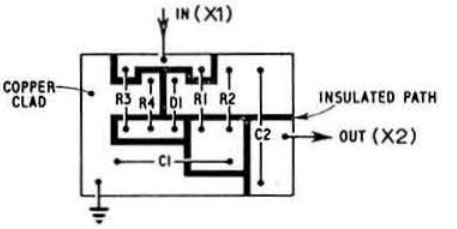


Fig 3. Etched circuit board plan. Using miniature components 1in² is generous

markedly. The system is self levelling and requires no adjustment. An etched circuit board suitable for short-ended ex-computer panel components is shown in Fig 3. Finally, to a first approximation, a similar circuit with all resistors multiplied by 100 and all capacitors divided by the same term should be suitable for valve receivers.

REGION 4 ORM REPORT

The attendance at this meeting was most disappointing. Only 28 RSGB members put in an appearance. The Council was well represented; Dr Saxton, the President, was accompanied by Roy Stevens, G2BVN, and Fred C. Ward, G2CVV. Tom Darn, G3FGY, Region 4 regional representative, acting as the chairman. Also in attendance were Ron Vaughan, G3FRV, (general manager); Jack Petty, G4JW, of Sheffield; and Ted Ingram, GM6IZ.

Dr Saxton gave a short address emphasizing the coming conference on frequency allocations which was of great interest to members present. Many questions were forthcoming on the administration of the Society and on the Society's journal. These were ably answered by Roy Stevens.

The proposed increase in the cost of Society membership was also discussed and a vote was taken to get an idea of what members thought was a reasonable sub. The majority indicated that £4 per annum was a very reasonable figure.

Due to the lack of attendance we must presume that the members in Region 4 are well satisfied with the way that the Society is being run at present, otherwise they would have come along and made their contribution to this meeting.

G3FGY

A wide-range crystal calibrator using integrated circuits

by D. A. HOLLINGSBEE, G3TDT*

THERE cannot be many amateur stations that do not possess a 100kHz crystal marker either built into their receiver or free standing. Similarly, there cannot be many stations who have not wished it covered 1MHz and 10kHz at some time or another. Of course, many do, but they invariably depend for division on locked multi-vibrators that tend to drift and seldom produce a "square" enough output to give useful harmonics at the top of the hf band.

The circuit to be described does not require adjustment and develops a square wave with rise and fall times measured in nano-seconds (thousandths of a micro-second) and even the 10kHz signal is clear on 10m. As described, the output is on 1MHz, 100kHz, 10kHz and 1,000Hz as this was considered the most useful range. However, there is no reason why any crystal up to 10MHz should not be used, and as the ic can be wired to divide by five or two, then an output on 5MHz, 1MHz, 100kHz etc could be of value. The bottom limit is set only by the number of stages used, 1,000Hz being selected as it provides a form of pulse modulator for the high ranges and, on its own, makes an excellent signal tracer for fault finding on a receiver. Of course, some receivers can be calibrated on 1kHz marks!

What is the integrated circuit that makes all this possible? Known as a decade counter, the commercial application is to convert a decimal signal into a binary form, but that need not concern us. Internally, the device consists of four bistable, or JK, circuits. When a pulse is applied to the input of a bistable the output changes polarity on *one* edge of the pulse (usually the negative-going edge) which means that if a square wave is fed into it, then the output will be at half the frequency of the incoming signal. By the ingenious use of multiple input gates on the bistables the manufacturers have contrived to give outputs on divide by five and divide by two as well as the other binary codes that do not interest us. The full internal circuit of the ic shows some 50 transistors plus resistors and diodes. Not bad for a package less than ¾ by ⅜ by ¼in, including leads!

The other ic package used contains four independent two-input gates or switches, each made up as four transistors, four resistors and a diode. Known as NAND gates, the output will go high (1) if *either* input is low (0 or ground potential). With the exception of the modulator gate and switch they are only used as buffers, so the unused input is strapped to the positive rail. A word of warning at this stage. These ICs are transistor/transistor logic and the output is taken from the junction of two transistors in push-pull. Shorting the output to *either* supply rail will prove expensive.

Now to the circuit proper, starting at the crystal oscillator. This is a straightforward circuit and has not failed to start with a wide range of crystals. It may prove a little short of output with some FETs such as a 2N3819.

The feed-back capacitor (VC2) may not be required, depending, it seems, on the amount of parallel capacity required to bring the crystal on to frequency. If the output is low or uncertain, then it is worth reducing the source resistor (R2) but it is not recommended that it is removed altogether or the circuit would become a simple Pierce oscillator. It will work all right—but not for long unless a *very* inactive crystal is employed.

Of course, any of a dozen circuits will work as well, the only requirement is a couple of volts (peak to peak) output and some means of adjusting frequency. Link coupling is not essential, the capacitor C5 going direct to TR1 drain.

The buffer (TR2) needs a little explaining. Firstly, the ic gates are intolerant of signals above about 6V and the CO output can easily exceed this with some crystals and LC arrangements. Secondly, the gates like a really low signal so this arrangement has been used.

As explained earlier, most of the gates are used as buffers and to sharpen up the pulses. The output from the transistor is fed to two gate/buffers, one of which is the 1MHz to the range selector switch and the other to the "clock" input of the first divider. The dividers are cascaded and the junction point taken out to the range switch via a buffer. These buffers are essential as they present the correct output load to the dividers.

The final divider gives an output of 1kHz and, it must be admitted, is of limited value. On the average ssb receiver there will be at least two signals in the passband at all times. As the

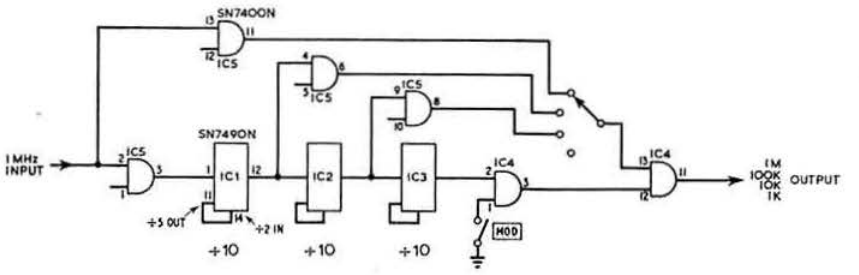
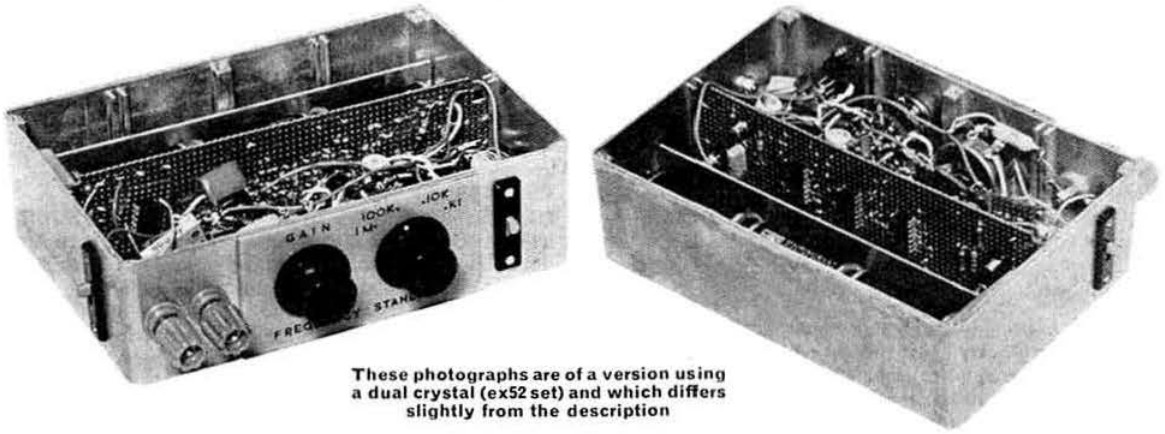


Fig 1. Block diagram

*1 Mead Avenue, Salfords, Redhill, Surrey



These photographs are of a version using a dual crystal (ex52 set) and which differs slightly from the description

devices are quite expensive, the stage can be omitted altogether, which will show a double saving. Only one ic of four gates will be required, as the gate following the selector switch is not needed unless the 1kHz modulator is incorporated.

The action of the modulator is as follows: The output from the 1kHz stage is fed to a gate, the second input of the gate being switched to the 1 or 0 rail. In the "0" position the gate output is clamped high (1) and there is no signal on the output. When the switch is to "1" the output is switched at 1kHz by the divider and this is fed past the range switch to a second two-input gate, the other input of which is fed from the range switch. Now remembering the gate rule that any low input gives a high output, it can be shown that, due to the 1kHz, the output will be high for 0·5ms and influenced by the signal from the range switch for a further 0·5ms.

In other words, the higher frequency signal is turned on and off 1,000 times a second. Fig 3 shows this quite clearly. On the higher bands of a receiver this is useful, as the oscillator signals are not always easy to distinguish, but up to several megs the 1kHz component is audible across the band. If the 1kHz signal is required on its own, the modulator switch must be on (1). As the ICs are not designed to provide power, the last gate is followed by an amplifier. The base resistors R6 and R7 are known as a "Pull up" for the last gate and have been selected to prevent damage. The values must not be changed.

A protective buffer for the final ic is provided by a pnp transistor that has been chosen in order to bring the signal "low" back to dc earth.* The output is about 2V peak and the shape is determined by the load presented. The choice of output capacitor is a compromise and could be reduced to a few picofarads for most applications. An idea would be to use a second bank on the range switch to bring in a different value for each range. The undivided (1MHz) output will not be symmetric, unlike all other outputs.

Construction

The complete instrument can be built into a 6 by 4 by 2in die-cast box (STC), and 0·1 pitch Vero-board is recommended for wiring up. Unless experienced, the use of

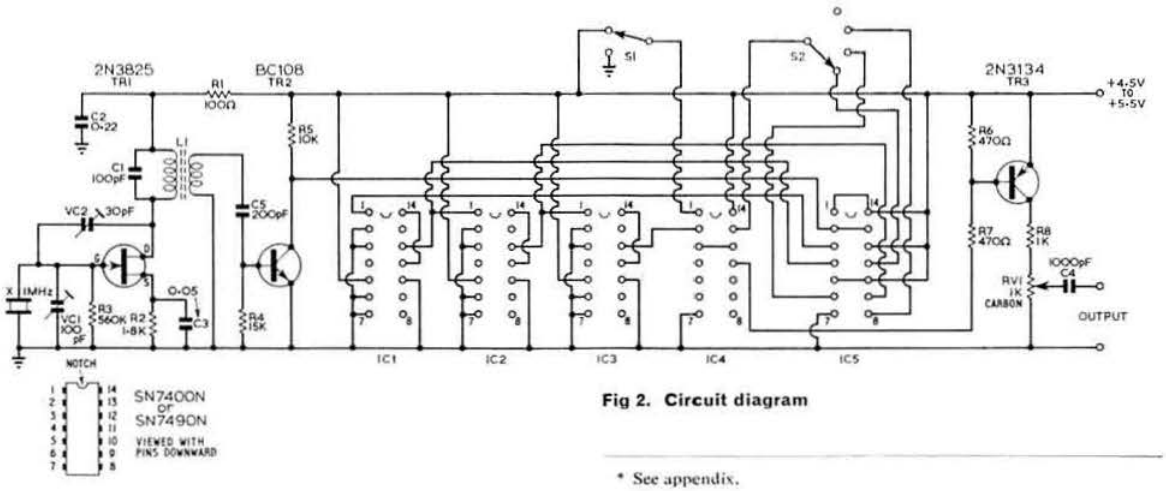


Fig 2. Circuit diagram

* See appendix.

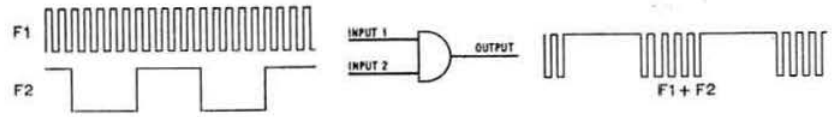


Fig 3. Modulation diagram

double-sided board is not recommended. The photographs, although a little different from the circuit given, show how it can be done.

Components

At the risk of being told to practise what is preached, the use of a new crystal cannot be too strongly advocated. When ordering, it is essential to include a sketch of the proposed circuit and a note on the application.

As stated earlier, almost any "N" channel fet will work, the MPF103 has been known to work well and is reasonably priced.

The SN7490N (Texas) and the FJJ141 (Mullard) are identical (rumour has it that they are the *same*). Similarly the SN7400N and FJH131, as well as the Signetics N8889A, are alike, and there are dozens of others which will do in both TTL and DTL (Diode/Transistor Logic). Some would be directly interchangeable, others not, as permutations of connections, shape and temperature range are almost infinite.

Most junk boxes should be able to supply the npn transistors, as almost any fast silicon transistor will do. 2N706, 2N2926, BC107/8/9 and the ZTX300 series are examples. For the pnp transistors the position is not so easy, as many of them are not satisfactory as switching transistors. A device that will operate in the megahertz range as a linear amplifier may well take micro-seconds to release from a saturated (hard on) condition. In the Mullard range the BCY72, BSY40 and BFX88 will do as well as the 2N3134 used, but the OC200/207 range is unlikely to prove satisfactory.

Do not be tempted to use any old switch for range selection. It will be handling about 1mA at 4V and 4mW will not push very far through dirty or un-plated switch contacts.

Components list

C1	100pF
C2	0·22 polyester.
C3	0·05 disc ceramic
C4	1000pF.
C5	100pF.
VC1	100pF pre-set
VC2	30pF pre-set
R1	100 Ω
R2	1·8k Ω
R3	560k Ω
R4	15k Ω
R5	10k Ω
R6	470 Ω
R7	470 Ω
R8	1k Ω
RV1	1k carbon
TR1	2N3825 (fet)
TR3	2N3134
TR2	BC108
IC1, 2, 3,	SN7490 N/FJJ 141
IC4, 5,	SN7400 N/FJH 131
L1	Medium wave aerial coil (Valve type)
X	1MHz crystal
S1	Single-pole c/o switch
S2	Single-pole, 4-way switch

Power supply

UNDER NO CIRCUMSTANCES MUST THE SUPPLY RISE ABOVE 7V. Unless a well-regulated supply is available, use batteries. The correct working voltage is 4·75 to 5·25V, but this is not available in conventional batteries.

Mallory manganese alkaline batteries have a very good store life and about eight times the life of conventional zinc-carbon types. Furthermore the output is a little less than 1·5V, so four in series can be used in safety. The penlight size (ref Mn 1500) should give at least 10 hours use, and that would be a year or two in most shacks. The prototype uses three cells and has run several hours, but it may well start giving trouble when the supply drops below about 4V. If conventional batteries are used, then three U2s or U11s are suggested. Current drain is about 45mA.

Alignment

After wiring, check and double check the ICs. Run the edge of a screwdriver between the stripes on the Vero-board to clear any "gremlins". Using either an oscilloscope or a meter in the fet supply, adjust the tuned circuit to resonance. The correct position for the core is slightly lf (further in) than the peak. Adjust the crystal frequency to zero beat with MSF or BBC Radio 2 (200kHz) in the usual way. If using a receiver capable of pulling in MSF on 10MHz, or better still WWV, then by zero beating the 10kHz signal a very high degree of accuracy can be obtained—but start with the highest range first. The author must admit that he took the easy way out and borrowed a frequency counter.

Other frequencies

Not only can the SN7490N divide by two, five or ten but it could be connected to divide by other whole numbers. Unfortunately an explanation of the method would need a series of articles of little interest to many readers, but most manufacturers publish booklets on the subject. Of course, the public library will be able to help and some general coverage publications print introductory articles from time to time.

However, what we can do is quite extensive. With the circuit as it stands we could tap off (through a buffer) from the junction of pins 11 and 14 to give additional marks 200kHz, 20kHz and 2kHz, the latter perhaps being more useful than the 1kHz marker.

If a 500kHz or 5MHz crystal is available then the oscillator can be fed into pin 14 when the output will be on 100kHz or 1MHz. Although dividing by two can be accomplished, it is not economic unless the divide by five is also required. To do this the signal is fed to pin 14 and the division taken from 12. Obviously this signal could be fed to pin 1 and out of 11 to give a total of 10 divisions. If the whole circuit was wired up this way and fed from 2MHz, then outputs would be available on 2 and 1MHz, and 200, 100, 20, 10 and 5kHz —quite a useful lot.

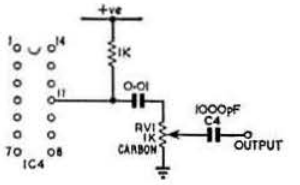
While this sort of information might inspire the would-be synthesizer, it is felt that most will be quite happy to just have a reliable 100 and 10kHz marker that does not drift.

And a final word of warning. It is all too easy to destroy an integrated circuit. Check and double check before connecting the power, and if anything is wrong then be very careful with meter test probes. Remember also that, with the meter on "OHMS", the negative terminal is at *positive* potential and that on the high resistance range it can be as high as 22V.

Appendix

It has been suggested that the final buffer transistor will degrade the harmonic content of the signal as the ic can turn on and off in (typically) 8 and 18ns compared to at least three times as long for the transistor.

As a result, the output circuit of Fig 4 was tried. This proved very satisfactory and quite safe as long as the input was coupled to an aerial or other isolated input but it must not be directly coupled to a live circuit or the final ic could well be destroyed.



Alternative output arrangement if IC5 and TR3 are omitted

Modifications to the self-contained linear amplifier for 144MHz

by G. R. JESSOP, G6JP*

SINCE the publication of the original article in the February 1970 issue of *Radio Communication*, further work has been done on a similar amplifier. Also by the provision of adequate bias voltage the amplifier may be alternatively operated in Class C for cw or nbfm, thereby making it a general purpose amplifier.

The changes required are:

1. Increase the screen voltage to 300V. This can be done by using OA2/CV1832/QS1207 stabilizers in place of those specified. Note that the value of the series resistors from the transformer centre tap will need to be suitably reduced.
2. Increase the available grid bias voltage by adding a further stage to the voltage doubler so that it becomes a tripler. However, so as to include sufficient bias for Class C operation this circuit should preferably be changed to a voltage quadrupler, and this will provide a voltage of approximately 70V. With this bias the anode current is not quite cut down to zero, but the drive requirements are lower than would be the case if a higher voltage is used to fully cut off the anode current.

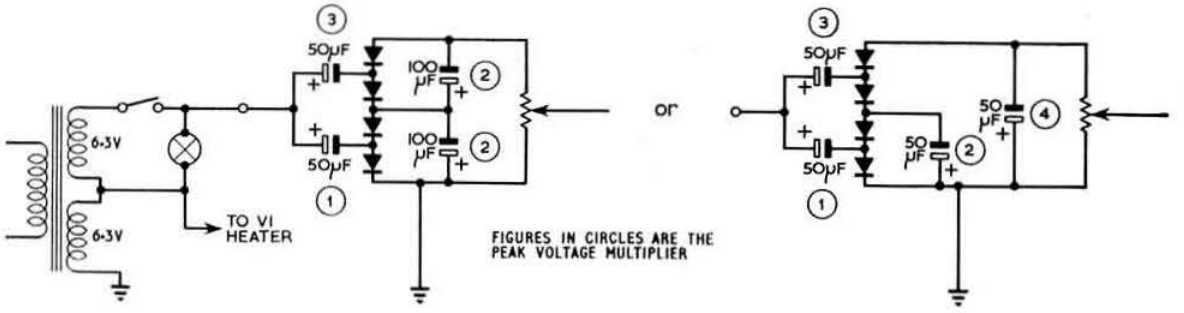
A conventional half-or bi-phase rectifier bias supply may be used if preferred.

Results of tests made using a similar amplifier with an ht transformer of 450+450V (the original article specified 350+350V):

Mode	Anode V	Anode current	Screen current	Bias V	Power output (Load)	Power drive	IM
Class AB1	1020	50		−58	100		
	900	190	28	−58	p.e.p.	4·5	−24dB
Class AB1	1010	100		−46	110		
	860	245	30	−46	p.e.p.	3·5	−34dB
Class AB	970	150		−39	110		
	830	270	28	−39	p.e.p.	2·8	−37dB
Class C	1020	20		−68			
	910	190	35	−68	110	6	—

NOTES (*a*) Upper line of figures in each case are "no signal" condition. Lower line, peak signal.
(*b*) In Class AB1, grid current max = 0·5mA.
(*c*) In Class C, grid current allowed to increase as normal.
(*d*) The drive is mainly determined by the shunt resistor used for passive grid operation.
(*e*) The IM performance was measured at 7MHz and these figures will apply for 144MHz, except for any feedback effects.

* 32 North View, Eastcote, Pinner, Middlesex.



A 10MHz VFO

by G. E. GOODWIN, G3MNQ*

Initial tests

To assess the virtues of various types of oscillators, tests were conducted on three different free-running oscillators using both bipolar transistors (BJTs) and FETs, and on crystal oscillators using fundamental and overtone circuits in order to obtain some comparative data.

As a result of these tests a design was evolved which has reasonably low drift and has been used on 2m ssb for more than a year without complaint of drift or other unwanted products attributable to the vfo.

The three types of free-running oscillator tested were the familiar Colpitts and the not so well known Vackar and Seiler. The fundamental crystal oscillator used an FT243 crystal in a Colpitts circuit for both BJTs and FETs, and the overtone used an HC6U crystal in a Hartley type of circuit. Only the bjt version of this is possible.

Components

Only generally available parts were used and relatively expensive items such as temperature compensating trimmers avoided.

Coils were hand wound using Radiospares formers and cores, the same type being used for all the oscillators except the overtone which is on a much higher frequency. The turns were held in place using polystyrene cement and the core locked by a thin strip of polythene sheet some $\frac{1}{8}$in wide and 1in long.

Capacitors used were silver mica and polystyrene types and results are given for the different combinations possible in the circuits. Silver mica capacitors are approximately +30ppm/°C temperature coefficient while polystyrene are −150ppm/°C. That is, the capacitance decreases for an increase in temperature resulting in an increase in oscillator frequency.

The oscillators were built on glass-fibre printed circuit boards with pins positioned so that the capacitors and transistors could be changed easily without interfering with the circuit or its other components. The boards were then bolted in a die-cast box for mechanical stability and the whole unit was heated for the temperature tests.

Power was supplied by a variable but highly stabilized unit so that measurements of supply voltage against frequency could be made.

Output frequencies were measured on a digital frequency meter which had a resolution of one part in ten million.

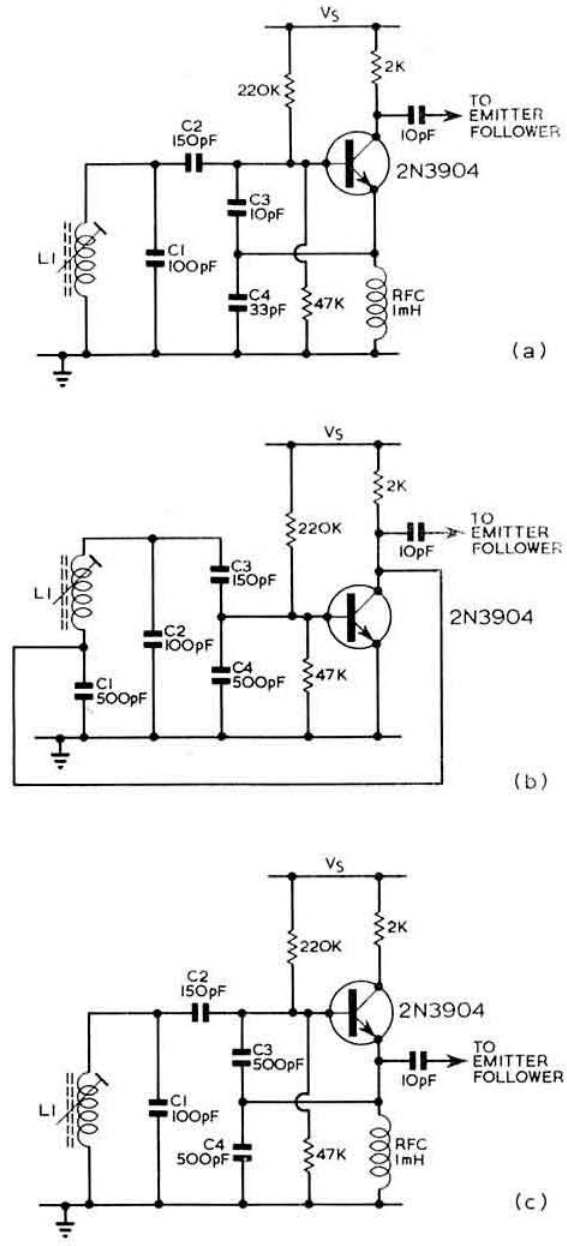


Fig 1.(a). Colpitts oscillator used in these tests. See text for modifications for FETs. L1 is 11½ turns 28 swg on Radiospares former. Capacitors are silver mica or polystyrene according to Table 2. (b). Vackar oscillator. Details as for (a). (c). Seiler oscillator. Details as (a)

Circuits

The circuit used for the bjt Colpitts is given in Fig 1(a) with the associated parts list. The same circuit was used for the fet version, base being changed to the gate, collector to drain and emitter to source and the 220k resistor being omitted.

Fig 1(b) is the bjt Vackar and Fig 1(c) the bjt Seiler, the same modifications being carried out when changing to FETs.

* 4 Elfin Grove, Dunton Bassett, Rugby, Warks.

Table 1. Frequency v Supply voltage (Vs)

Change in frequency (Hz/V) reference to 12V

Vs	VFO	Colpitts	Vackar		Seiler		Xtal Colpitts		Overtone
	bjt	fet	bjt	fet	bjt	fet	bjt	fet	
9	+7,230	−6,970	−2,670	−1,330	+1,840	−270	+2	+7	−50
10	+4,230	−5,840	−1,870	−1,140	+1,110	−190	+2	+2	30
11	+1,900	−2,490	−930	−480	+510	−120	+1	0	−20
12	0	0	0	0	0	0	0	0	0
13	−1,560	+2,620	+980	+350	520	+110	−1	0	+10
14	−2,420	+4,880	+1,700	+540	850	+180	−1	0	0
15	−3,090	+7,030	+2,380	+450	−1,170	+220	−1	0	0
16	−3,420	+9,030	+3,120	−20	−1,420	+260	−1	−1	−10

This lists the change in frequency obtained with each type of oscillator when the supply voltage Vs is varied each side of 12V. From this it can be seen that of the VFOs the fet Seiler is by far the best, since the changes in frequency are the smallest.

The crystal oscillator results are included as a comparison, the fundamental type being some 100 times better than the best vfo, and the overtone at five and a half times the frequency has a change of approximately double that of the fundamentals—megahertz for megahertz, that is.

It is also interesting to note the direction of the change for each variety as this is different for bjt and fet versions of the same type of oscillator. Of the VFOs only the Vackar shows the drift to be in the same direction.

Table 2. Frequency v Temperature (20 C–40 C)

Change in Hz/°C for Vs −12V

Component type	Colpitts		Vackar		Seiler	
	bjt	fet	bjt	fet	bjt	fet
C1, 2, 3, 4, (poly)			+510	+790	−170	+250
C1, 3, 4 (poly)			+146	+400	−300	+57
C2 (sm)						
C1, 4 (poly)			226	+75		
C2, 3 (sm)						
C1 (sm)					−410	−60
C2, 3, 4 (poly)						
C1, 2 (sm)						
C3, 4 (poly)						−280
C1, 3, 4 (sm)	−1,300	−1,000				
C2 (poly)						
C1, 2, 3, 4 (sm)	−1,600	−1,170	−560	−280		−390

poly = polystyrene sm = silver mica

This shows the change in frequency against temperature for combinations of frequency determining capacitors.

The Colpitts showed up very badly in that the best figure obtainable was −1kHz/°C for the fet version, and further tests on this type of oscillator were not carried out as there was nothing that could be done to it to get it nearer to zero temperature coefficient.

The bjt Seiler also showed that it was not possible to pass through zero, while the other three showed that it was possible with some combination of capacitors. The fet Seiler again showed up the best as it was least susceptible to changes in components.

For comparison, the crystal oscillators had the following drifts:

Bjt Colpitts	−4Hz/°C
Fet Colpitts	−2·4Hz/°C
Overtone	−21Hz/°C

Frequencies used

These were the natural frequency of oscillation with the dust core about half way in for the VFOs and the core adjusted for maximum output on the crystal oscillators. The resultant frequencies were:

Colpitts and Vackar, approximately 11MHz;
Seiler, approximately 8·3MHz;
Crystal Colpitts, 8·037MHz;
Overtone, 45MHz.

Loading tests

All the oscillators were buffered by an emitter follower stage (Fig 2) since in practice they will have to drive a load which will require some power from the oscillator. Also there may be some capacitive loading due to connecting cables etc, and this may be partially variable due to feedback.

In the emitter follower circuit the base potentials are set by the 6·8k resistors plus the two diodes in series across the supply lines. The diodes ensure that there is always 1·4V between the bases, and this biases the transistors so that there is about 2mA collector current.

In these tests a 500pF capacitor was connected between the output of the emitter follower and earth and the change in frequency observed; Table 3 giving the results.

The fet Seiler was found to be the least changed with this loading and it would in practice be least liable to frequency pulling by the following circuits.

Table 3

Change in Hz for 500pF load

Vackar		Seiler	
bjt	fet	bjt	fet
−14,700	−8,500	−2,500	−680

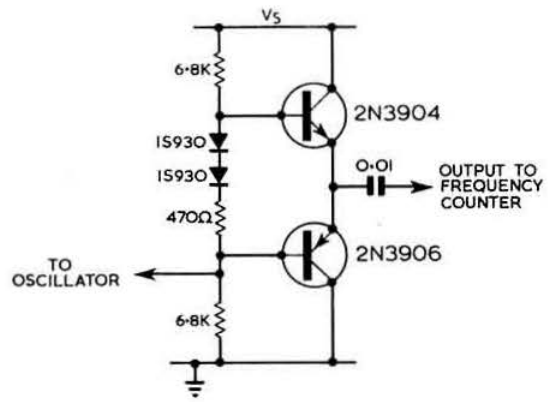


Fig 2. Emitter followers used to buffer the oscillators during the tests to reduce loading by the frequency meter and its cables

Addition of variable capacitor

A 30pF double bearing capacitor (Jackson type C808) was added across the tuning coil and C1 to determine the effects, since this will be included in a vfo. It appeared to

have a slight positive temperature coefficient and Table 4 shows the new change in frequency when it is added.

Table 4

	Change in Hz/°C			
	Vackar		Seiler	
	bjt	fet	bjt	fet
Without	+146	+400	−170	+250
With 30pF	+120	−26	−250	+63

For once, the Seiler did not show up the best. It should be noted that the 30pF was fully meshed and that intermediate positions will give a variable amount of frequency change. It will not therefore be possible to construct a vfo with zero frequency drift at all frequencies as this will change with the amount of capacitance added by the tuning capacitor.

Variation of temperature change v Supply voltage

It was found that small variations in change of frequency against temperature could be obtained by varying the supply voltage, and the effect of this is shown in Table 5 for the fet Seiler. This shows that the oscillator has zero drift at 12V supply, but at reduced voltage the drift becomes negative and at increased voltage it becomes positive. This property can be used for trimming out small amounts of drift where component changes would produce too large a change.

Table 5

Vs	Change—Hz/°C
4	−35
8	−14
12	0
16	+10

The output voltage does not vary with this type of oscillator as long as Vs exceeds 6V, and is then constant at about 0·5Vrms.

10MHz VFO

The work on the various types of oscillator led to the fet Seiler being chosen for a vfo for 2m ssb. It is used as the excitation frequency of a transistorized phasing exciter. The output from this is mixed with 135MHz from a crystal oscillator to produce 145·41±50kHz.

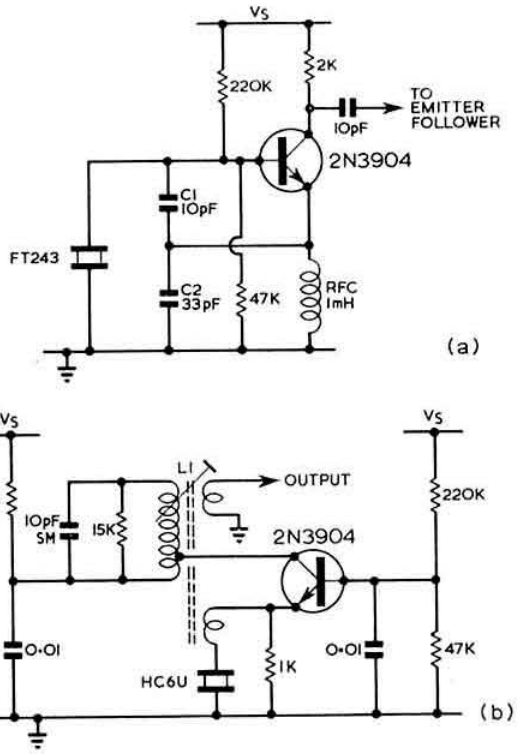


Fig 3.(a). Crystal oscillator of the Colpitts type used in the tests. Modifications for fet operation are shown in Fig 1(a), as are details for L1. (b). Overtone oscillator using 45MHz crystal. L1 is 7½ turns 28 swg tapped at 1 turn, emitter winding 1 turn, output winding 2 turns

The circuit is shown in Fig 4 and the pcb layout in Fig 5(a), while 5(b) shows the arrangement of the pcb and tuning capacitor in the die-cast box. The pcb is bolted to the bottom of the box while the tuning capacitor is bolted to one end. Electrical connections between the capacitor body and pcb earth must be made by short copper wires, as must the earth between the pcb and the output socket. Copper track (on the underside of the pcb) is shown unshaded in Fig 5(a).

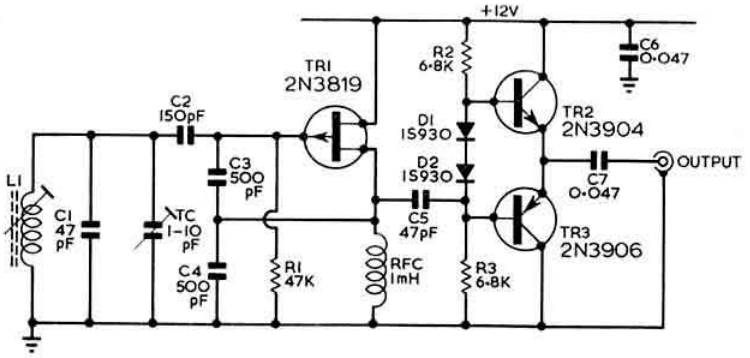
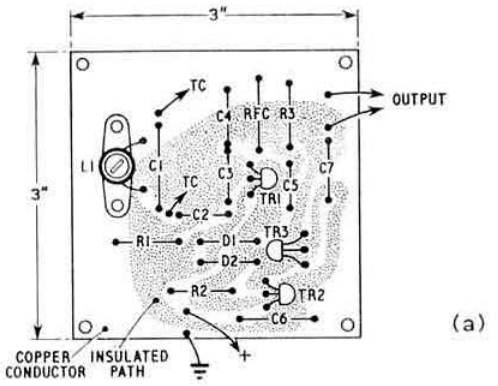


Fig 4. Complete circuit for 10MHz vfo using the fet Seiler oscillator and emitter followers. L1 as before, C1, sm; C2, 3, 4, polystyrene
(Direction of arrow on TR1 symbol should be in opposite direction)

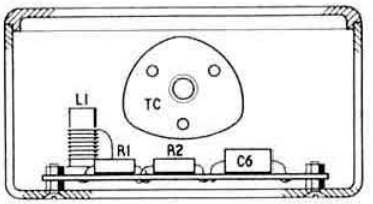
When setting up, the tuning capacitor is half meshed and the core adjusted to the centre of the desired frequency band.

Drift with temperature was measured at about 10Hz/°C and as the room temperature is fairly constant this was considered good enough. If, however, large temperature excursions are expected it is possible to improve the short term stability by lagging the box with thick polystyrene foam and using a nylon drive spindle to the tuning capacitor.

The results obtained were a considerable improvement on the valve Vackar originally employed which took 30min after switch on to stabilize and required stabilized heater and ht supplies to keep it within the limits desirable for ssb operation.



(a)



(b)

Fig 5(a). Pcb for the VFO showing layout of components and the copper circuit. TC (tuning capacitor) and output are connected by thick copper wires. (b). Pcb bolted into the die-cast box viewed from the capacitor drive spindle end. The tuning capacitor is bolted to the rear wall of the box on short spacers and the drive spindle extended via a slow motion drive out through the front wall. The die-cast box was STC 46R series 4·75in by 3·75in by 2·0in, and TC is Jackson C808 or ex-government 10C/4870 with vanes removed to produce the required frequency range

New Products

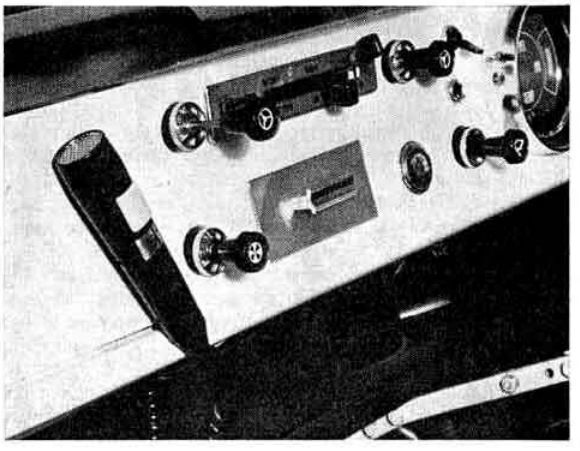
G Whips

A recent addition to the mobile range is a two-band aerial designated the 160/80. This is introduced primarily for Codar AT5 owners and is styled in the slimline black, white and chrome manner of the range utilizing the partial helical and centre loaded principle. The luxury Multimobile, a five-band self-selecting vehicle aerial is now being produced with reduced length loading coils. Production of the 15m G-Beam has now been discontinued.

UK dealers holding stocks of G-Whip aerials include Derwent Radio, Stephens-James, Amateur Electronics (G3FIK), Chas. H. Young, KW Electronics and G-Whip Products (GW3DZJ).

Mobile aerial fittings

The M161 antenna mount from Antenna Specialists UK Ltd permits any ⅜in-mount mobile aerial from this manufacturer to be fitted to a vehicle without drilling a mounting hole. Also available from the same source is a series of mobile aerials intended for application where the standard Antenna Specialists snap-in mount will not hold well, eg car wings or other radically curved surfaces and soft metal roofed cars. These aerials can be supplied for ⅜in-hole mounting if access to only one side of the mounting area can be obtained. A hole size of ⅜in is required if access to both sides is available.



Magnetically mounted microphone

A new hand microphone has been introduced by S. G. Brown Ltd of King George's Avenue, Watford, a Hawker Siddeley Dynamics subsidiary. Known as the **Classic,** this instrument has a powerful magnet fitted in a grip which enables it to adhere to any ferrous surface. A steel plate, fixed by screws or double-sided tape, is available for attaching the microphone to plastic, aluminium or other non-ferrous surfaces. It can be converted to a desk unit by a specially designed stand. The microphone has a coiled lead extending to 5ft, is 5in long and weighs 5oz. The nominal impedance is 300Ω and the output for normal speech is approximately 1mV true rms.

Apollo communications

by NORMAN MOORCROFT, FRAS, FRMetS*

The short paragraph on Apollo communication frequencies in a recent issue of *Radio Communication* (page 252, April 1970) prompts the author to put pen to paper to try and clarify a situation which appears to cause more than a little confusion, especially as reference is only made in the paragraph mentioned above to vhf working.

It must be realized from the start that vhf is only used for communication with the ground in the early earth orbit stages and again towards the end of the mission during the recovery phase. The vhf equipment is only intended to have a range of about 550 miles and would obviously be a little pushed, to say the least, at lunar distances (ie of the order of 250,000 miles). Apart from the initial and final stages of the mission, all communications between the spacecraft and earth are carried out using unified S-band equipment.

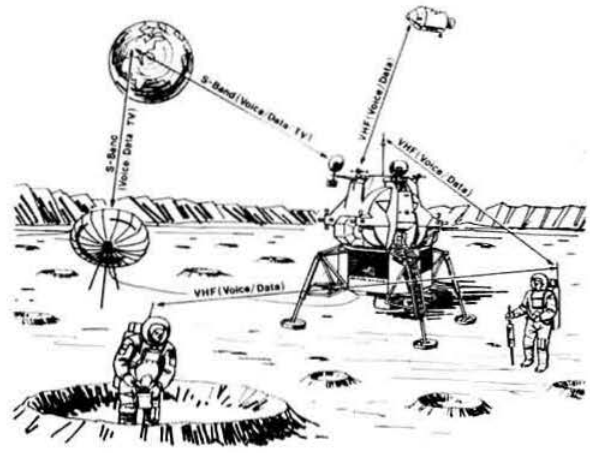
Communications between the command module and the lunar module, and also between the extra-vehicular astronauts (ie when they are on the moon's surface) and the lunar module is carried out at vhf. Transmissions to earth from e-v astronauts are converted from vhf to S-band in the lunar module equipment and transmitted to earth at S-band (above 2,000MH$_2$) frequencies.

The very complexity of the communications system often gives rise to misunderstanding—mainly through pieces of information being taken out of context.

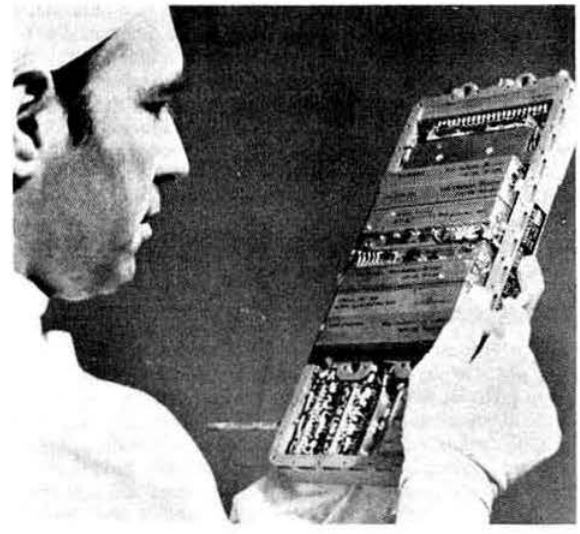
Ignoring telemetry, biomedical data, ranging and what have you constantly passing to and fro between the spacecraft and ground, the voice communication side involves a considerable number of transmitters and receivers. For instance the command module carries duplex vhf a.m. transceivers, as well as S-band equipment consisting of two phase-locked transponders and one fm transmitter. The transponders receive from the unified S-band ground stations (at lunar distance these are the three 85ft aerial stations at Goldstone, Madrid and Canberra) a carrier at 2,106·4MHz phase-modulated by a pseudo-random ranging code, a 70kHz up-data sub-carrier, and a 30kHz up-voice sub-carrier. The command module unified S-band transponder employs phase-locked loop techniques to transmit a 2,287·5MHz carrier which is phase coherent with the received carrier. This carrier is phase modulated by the received ranging code to permit accurate measurement of distance by the ground stations. The doppler shift of carrier frequency is used to provide measurement of spacecraft radial velocity. The down-link coherent carrier is also phase modulated by a 1·024MHz telemetry sub-carrier and a 1·250MHz voice sub-carrier. The voice sub-carrier (which is frequency modulated) is demodulated in the case of the up-link, or modulated in the case of the down-link, in a unit known as the pre-modulation processor, which is essentially a switching centre and multiplexer for the audio and data signals in the system. A separate non-coherent down-link carrier is also generated at 2272·5MHz for fm transmission of tv, additional real-time data, and recorded voice and data signals.

The S-band power amplifier uses TWTs to provide a minimum output of 11W.

Communication between the command module and the lunar module (and e-v astronauts) uses the vhf equipment on frequencies of 296·8MHz and 259·7MHz.



Artist's impression of the flow of communications between astronauts on the moon's surface and earth
RCA photo



The back-pack transceiver used by the astronauts on the moon's surface
RCA photo

* 57 Hampton Road, Gt Baddow, Chelmsford, Essex.

The lunar module also carries vhf and S-band equipment. The vhf equipment being used for communication with the command module during the lunar descent phase, the lunar stay period, and during the ascent and subsequent rendezvous with the command module. All these transmissions can be relayed to earth via the command module S-band system.

The vhf transceiver contains duplicated equipment and is capable of duplex operation, transmitting on 259·7MHz and receiving on 296·8MHz (or vice versa). The S-band transceiver receives voice and range interrogation from ground stations on 2101·8MHz and transmits voice, pcm telemetry, biomedical data and wideband tv to ground on 2282·5MHz. The S-band power amplifier in this case has an output of 20W minimum.

During extra-vehicular activity the astronauts carry a backpack equipment made by RCA weighing only 6½lb and measuring 14in by 6in by 1¼in. Each set contains five transmitters and receivers plus telemetry and voice processing circuitry.

In operation, one set acts as a relay for the other, eg when Aldrin spoke to mission control from the moon's surface during the Apollo 11 mission, his voice was transmitted on 279MHz fm to Armstrong's set, which in turn relayed the transmission to the lunar module on 259·7MHz a.m. The lunar module equipment then transmitted the signal to ground on S-band. As Aldrin's set could also receive on 259·7MHz a.m. he could receive the signal transmitted by Armstrong's set (and also hear his own transmission) thus providing a duplex link.

Signals received from earth on S-band are re-transmitted to the astronauts from the lunar module on 296·8MHz a.m.—providing duplex operation between the astronauts and ground.

It is hoped this short article will clarify the position a little, as the author hates to think of listeners feverishly twisting their receiver dials in the hope of receiving vhf signals from the moon. Of course, one can never say anything is impossible, but I am certain it is very unlikely.

During the launch phase the sub-satellite point of the spacecraft track only just passes the 30° latitude (north and south) in its journey round the earth and at its earth orbital height of about 120 miles or so, so it is doubtful if signals would be received in this country. On re-entry vhf would probably only be used after separation of the service module (which carries the main S-band aerial) and it would seem even more unlikely that signals would be received in this country. If, however, you live between latitudes of 30°N and 30°S there is always a chance you might hear something.

QSL CORNER

by A. O. Milne, G2MI*

We are still concerned for the large number of members who heavily over-stamp their packets to the QSL Bureau. As many as a dozen packets every day prove to be over-stamped up to as much as 10d. It is a waste of money to send packets by first-class service. QSL-ing by a bureau is the cheapest, not the quickest method. The 2nd-class postage rates are 4oz for 4d, which represents about 20 cards, plus 2d for each succeeding 2oz.

We have been returning envelopes to some members, indicating the unnecessary excess but, after all, it surely behoves us all to familiarize ourselves with the postage rates. If, of course, your policy is to subsidize the Post Office, they will no doubt be deeply grateful.

It seems that some folk misinterpreted the third paragraph of the previous *QSL Corner* in April. To make it clear, please do not separate sorted cards with bits of paper. If you must put each country into a separate envelope, then please write the prefix in small letters in the middle of the envelope which, by use of a label, can be used again!

Sealed envelopes, containing reports for overseas stations, cannot be accepted. They then rate as correspondence and cannot be included in packets sent by Printed Paper Rate, a concession which dates back more than 40 years and which we cannot afford to lose.

When sending cards to the bureau, please do not put two packets of cards side by side in a large envelope. The weight in the two halves tends to split the envelope open and your cards turn up, many weeks later, via the dead letter office.

Stations working MP4MBC should note that his QSL manager is no longer G3HSR, who is now in Malaysia as 9V1PR. MP4MBC's address is RAFARS, MASIRAH, BFPO 65. Please note that G2MI is not CR6GO's QSL manager. Cards for the following may be sent via G2MI: CR6BX, CA, DA, DX, DB, FY, IK and GO. Please do *not* send QSL cards to 35 Doughty Street.

The QSL Bureau sub-manager for the G4AAA series of calls which, we understand, is likely to start in the autumn, will be Mr R. I. Buckby, G3VWK, 3 Great Eastern Road, Caldecott, Market Harborough LE16 8RP.

Once again, two reminders. G3WAA-ZZZ QSL sub-manager is Mr F. G. Rylands, G2VF, 39 Parkside Avenue, Millbrook, Southampton SO1 9AF; G3YAA-ZZZ QSL sub-manager is Mr P. R. Cheeseman, G3KDE, 10 Nursery Road, Hook End, Brentwood, Essex.

If you work a station whose QSL manager is DL7FT, please note that he is not a member of the German society, DARC, and cards must be accompanied by return postage. His address is: Franz Turek, Petunienweg, 99, 1 Berlin 47, Federal Republic of Germany.

8X8AA has fooled quite a lot of people by saying "QSL via RSGB". This prefix does not exist, neither does Cray Island. He has recently said "QSL via G4TQ." This callsign has never been issued.

PX1UT, we understand, was operated by a Swiss amateur, so our collection of cards has been sent to USKA. We still need a home for a large bundle of cards for VP8JF.

Finally, please note that the RSGB Bureau will be closed from 12 October to 4 November, inclusive, so please do not send any mail to G2MI which would arrive between these two dates.

G2MI/VP9 will be on the look-out for contacts with the UK—and QSLs 100 per cent.

* 29 Keehill Gardens, Bromley, Kent.

TECHNICAL TOPICS

A monthly feature by PAT HAWKER, G3VA

THE recent task of revising and expanding the collected edition of 12 years of *Technical Topics* (the new 208-page third edition of *Amateur Radio Techniques* with over 470 diagrams, 130,000-plus words of text, and 385 indexed topics is just off the press, if you will excuse the commercial break) served to remind us of the many questions which increasingly face writers for, and editors and publishers of, technical and amateur journals. Should explanations be intelligible to newcomers while attempting to retain the interest of the long-time amateur? How much does a reader remember from past issues, and therefore will not require a full introduction each time a subject is raised? To what extent is he confused by all the new abbreviations? (Can *you* immediately define and distinguish between sic, mosic, mosfet, jfet, igfet, most, unipolar, bipolar or unijunction transistors, scr and thyristor, cm, im and ip and the like?)

If one were to include in a monthly column, each time a term or abbreviation is used, a full explanation of what it meant, it would take up vastly too much space and would certainly become turgidly unreadable. Yet there is a good deal of evidence that many readers consider modern technical jargon extremely frustrating and off-putting. Certainly, those of us who are not in the data processing business find computer terminology an almost impenetrable barrier to casual reading. The specialist writes and talks to a narrower and narrower field, the complete opposite to what we believe to be the requirements of amateur enthusiasts.

Pick up an average copy of, say, the *IEEE Transactions on Antennas and Propagation* or the more local IEE's *Electronic Letters* and note how little, unless you are a specialist in the particular subject concerned, you can gain from most of the pages. And yet it is in such journals that much of the most important original work in radio communications is initially presented. The professional specialist seems quite happy to write for his own narrow circle, without attempting to reach a wider audience. Too much dependence on mathematics, and an unbending attitude towards terminology make many of these subjects a closed shop to the rest of the world—yet often the rest of the world needs to know what the specialists are up to and the direction in which research is heading.

One of the reviewers of an earlier edition of *Amateur Radio Techniques* said, with a touch of reproof, that it was written in "semi-technical language". Far from resenting this, I can think of no better definition of what *TT* and *ART* have always tried to do—to discuss technical matters (and often highly technical matters) in "semi-technical" language. This is a column dedicated to the idea that the purpose of writing is to communicate—and blow the dignity.

As we say in the preface to the new edition: "this is not a book which aims at competing with or displacing the standard handbooks—but rather at extending the readers' awareness of new techniques and providing a source-book for many useful circuits and aerials; an *ideas book* rather than a constructional manual or conventional text book."

Audio amplifier interference (HiFil)

About 15 years or so ago we received one of those dreaded messages which indicated that our signals were causing interference. This was at a time when we were operating from a flat in Bloomsbury, and tvi was by no means an unknown occurrence. But this time the problem turned out to be not tvi but "wipe-out" interference to an elaborate hi-fi installation in a neighbouring flat. It proved a thoroughly intractable problem, and we never did finally close up all the ways in which the rf was getting into that well-known audio amplifier noted for its less than 0·1 per cent distortion. In the end we simply came to an arrangement whereby the hi-fi owner could indicate that he was using his equipment (fortunately increasingly rarely since it turned out that the hi-hi-fi usually gave him a headache!). But, before then, we had discovered that far from our rf getting into the front-end of his equipment, as is usually suggested in the literature, most of it was being picked up on the loudspeaker leads and passing into a relatively late stage in the main amplifier. Even with the pre-amplifier section disconnected, pressing the key resulted in a mighty thump in his massive speaker system. In modern integrated amplifiers this situation would be denoted by the volume control having little or no effect on the interference.

More recently, in our "non-amateur" role, we quite often come into contact with members of the public who find they cannot keep powerful local tv signals out of tape recorders, public-address systems and the like—*tvi in reverse!*

So it was with some interest that we read a most useful round-up on this subject by L. G. McCoy, W1ICP of ARRL, (*QST*, June 1970)—"How to handle hi-fi interference". He notes that "it is very apparent from our mail that while tvi has become less and less of a problem (*lucky Americans!*), amateur interference to hi-fi, tape recorders, electronic organs and such types of entertainment equipment has been getting worse." He suggests that this form of interference is getting worse mainly because of the gradual changeover to semiconductors in all of these types of equipment. It is not only in television tuners that the susceptibility of transistors to overloads from strong local rf fields is becoming apparent. Quite small rf voltages may drive a device into non-linearity and cause rectification.

W1ICP rightly stresses that there is nothing that an amateur can do at his own station (except switch off or vastly reduce power) to eliminate the majority of instances of this type of interference. In other words, the amateur is not to blame. Unfortunately some dealers and service engineers, when consulted by a sufferer, are quite likely (often in ignorance) blithely to suggest that the trouble is in

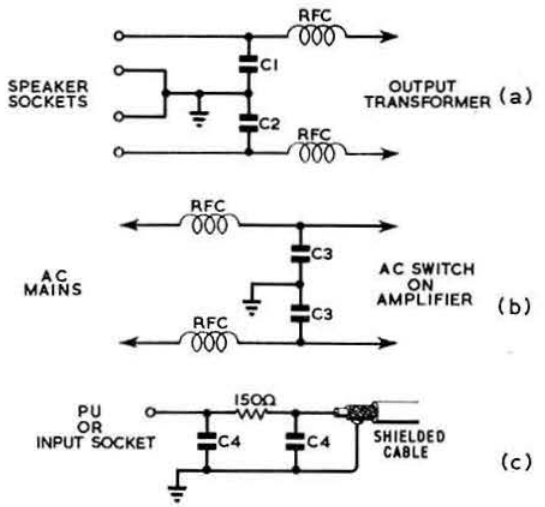


Fig 1. Filters for curing audio amplifier interference. (a) Filter for loudspeaker sockets (in simplest form the rf chokes may be omitted). C1 and C2 0·01 to 0·03μF disc ceramic. (b) Mains filter, C3 0·01μF disc ceramic (must be rated for 250V ac). (c) Filter for pick-up socket (filter should be mounted directly inside the chassis at the terminals using short leads). In all cases RFC may be about 24 turns No 18 enamel wire close wound on ¼in former (eg pencil)

some way the fault of the amateur transmitter. As far as I am aware there is no legal obligation on the part of an amateur, in the UK or elsewhere, to do anything about audio amplifier interference. But, as W1ICP points out, we have to live alongside our neighbours and it does nothing for our public relations merely to shrug off such complaints.

The main thing, he considers, is to "keep your cool" and offer to talk to the complainant's dealer or service engineer, or to suggest that he (or you on his behalf) writes directly to the manufacturer of the equipment. He believes that the amateur should know how to treat and cure such interference, but generally should not himself undertake any changes to the equipment concerned, since the owner is likely to ascribe any future faults to these modifications. Instead, offer to pass on your information on the subject to the dealer, using diplomacy and tact. Sometimes, of course, the problem may well arise within the amateur's own home, and this is rather a different matter.

Basically, the vast majority of the trouble arises from appreciable amounts of rf being picked up and fed into the audio amplifier, where it is rectified and appears as audio: cw may cause the output level to change, hum to appear or thumps (in the case already referred to, pressing the key was sufficient to produce a loud thump, with the amplifier then going completely dead!); a.m. usually appears as normal speech; ssb as gibberish.

The rf may be reaching the amplifier at its front-end (for example, picked-up or carried in via the pick-up leads) or via the mains lead, or—and this seems quite common—via the loudspeaker leads (unlike pick-up leads these are seldom shielded and may even form a resonant aerial). On hearing-aids, the earphone lead is the usual "aerial". Where fm tuners form part of the hi-fi installation, the rf may be coming in via the vhf aerial (we are not concerned here with the more normal bci affecting vhf/fm reception).

Sometimes a simple cure will come from just providing a good earth for the amplifier, making sure that all separate metal work in an elaborate hi-fi installation is bonded together. The simplest form of filter is to bypass each loudspeaker output socket point to chassis via an 0·01 to 0·03μF disc ceramic capacitor with the shortest possible leads: since these points will normally be low-impedance sockets the loss of higher audio frequencies should be negligible.

For more difficult cases, W1ICP suggests a number of simple filters: Fig 1. These will cope with interference coming in via loudspeaker leads, mains leads and input leads. A more elaborate mains filter was given in *TT*, March 1969. In stubborn cases it may be necessary to provide shielded loudspeaker leads. For rf coming in via an fm aerial, a tvi-type high-pass filter or any of the other tvi techniques could be used.

Where a simple cure cannot be effected, write to the manufacturer of the equipment and ask for recommendations. Indeed, my own view is that always, where an item of entertainment or domestic equipment seems unusually susceptible to local rf fields, the matter should be brought to the attention of the firm making, or—in the case of imported equipment—distributing the equipment. For all the hard words often written about domestic equipment, the more reputable manufacturers take such matters very seriously.

Versatile microphone amplifier/matching unit

There is still a common belief that it is difficult to use crystal microphone and other capacitive transducers with bipolar transistor amplifiers. Barry Priestley, G3JGO, draws attention to a technique which, although not new, deserves to be more widely known. This is a technique for matching a capacitive transducer into a transistor amplifier, originally

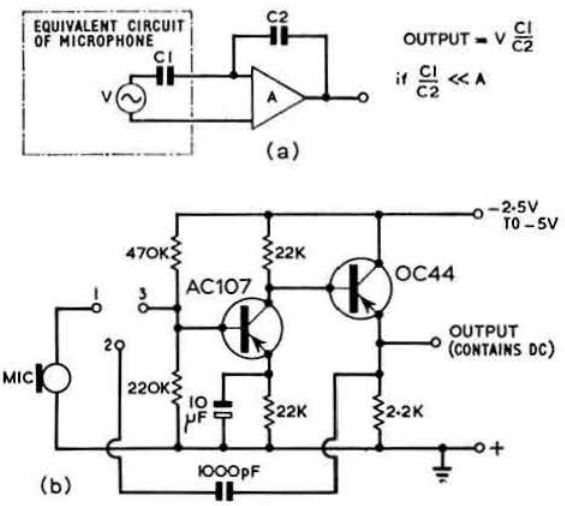


Fig 2. Versatile microphone pre-amplifier for crystal and ceramic microphones, and alternatively for moving-coil (dynamic) microphones. With "2" disconnected for moving-coil units the gain is about 100× and input impedance about 50k

described (primarily for use with crystal pick-ups) in an article "Capacitive transducers with transistor amplifiers" by A. R. Bailey, *Wireless World*, October 1963. The ideas was later used by G3JJG in his ssb exciter described in the *RSGB Bulletin*, July 1966, although its more general application was not then highlighted. The principle is outlined in Fig 2(a) and a practical realization in Fig 2(b). G3JGO indicates how, by a simple technique of plug wiring, the unit can be used for both crystal and moving coil microphones. For crystal units wire the plug so that points 1, 2 and 3 are linked; for moving coil microphones, ignore point 2, thus disconnecting the 1,000pF capacitor line.

Factory-built synchrodyne transceiver

To the best of my knowledge the "first-ever" suggestion that the synchrodyne receiver principle might have particular appeal to amateurs in opening the way to compact transceivers appeared in *TT*, July 1967, stemming from a note from Charles Bryant, GW3SB. He highlighted the fact that since the stable oscillator needed for synchrodyne reception is tuned to the frequency of the incoming signal, it would be ideal, without any additional heterodyning, for use as the vfo of an associated transmitter.

This suggestion has since been followed up by quite a number of amateurs, and the first factory-built unit of this type, "The Ten Tec Power-Mite PM2", has recently been favourably reviewed in *CQ* (April) and *QST* (June). The reviewers suggest that this two-band (3·5 and 7MHz), 2W battery-operated cw rig is an excellent companion for camping, vacations etc, capable of providing numerous contacts on both bands. The absence of chirp and transistor pa harmonics is noted by *QST*. The unit operates directly off a 12V battery with no zener voltage regulation, taking up to about 300mA. Basically the transceiver (a block outline is given in Fig 3) comprises a 40604 dual-gate mosfet heterodyne or "direct conversion" detector; CA3035 integrated circuit high-gain audio amplifier; two-stage vfo buffer using MPS6514 bipolar transistors; and 2N4427 (SE8010) transistor pa. The suggestion is made that the receiver should always be tuned to the high side of the signal to facilitate working to conventional transceivers. The basic price of these little rigs is about $54 (approximately £23) which must be one of the cheapest ways of getting on the air with a new factory-built rig for some time—even if it is strictly QRP.

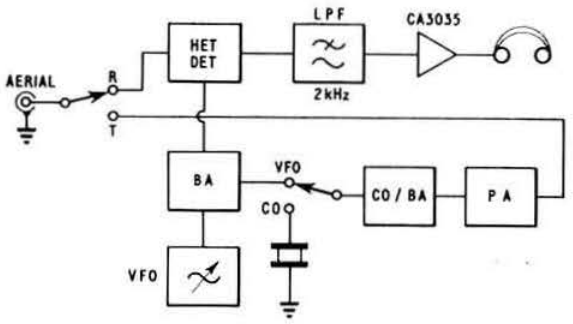


Fig 3. Block diagram of the Ten Tec PM2 transceiver

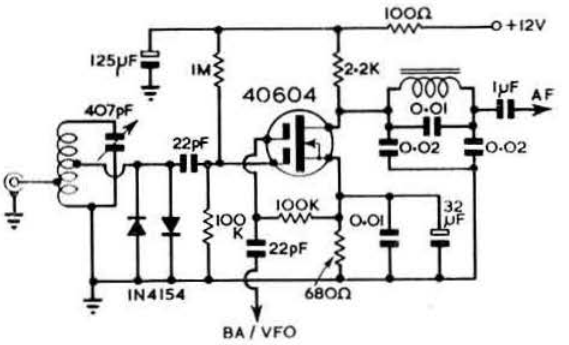


Fig 4. Heterodyne (direct conversion) detector used on PM2

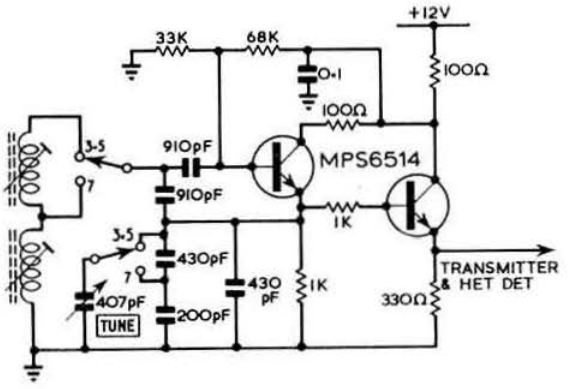


Fig 5. Two-band switched vfo used on PM2

Adjustable "zener"

In *TT*, May 1969 we included a useful adjustable voltage stabilizer arrangement based on two transistors, suggested by G3OSU. A related, but slightly different version of this technique, turns up in *Radio-REF* (June 1970) in turn based on a circuit published earlier in *Revue EEE*: see Fig 6. This is stated to operate over the range 0·8 to 5V, being particularly effective between about 1 and 3V.

Vertical radiation angles

From time to time everyone interested in long-distance hf operation pays lip-service to the benefits of good low-angle radiation (and increasingly to the even more spectacular benefits of extremely low-angle radiation). Yet only rarely do most of us stop to think quantitively what this is all about. One result is that most amateur dx contacts are being made with an effective power of just a few watts. It is almost certainly true to say that in many cases the vast majority of the power actually radiated from our aerials plays little or no part in the signal received in the distant country.

One of the basic problems about lowering vertical radiation patterns is the extreme difficulty of measuring these patterns; another is that above typical earth (particular urban and suburban earth) the real vrp is often very different from the theoretical patterns shown in the text books.

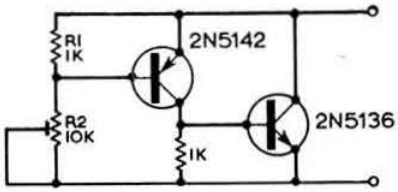


Fig 6. Adjustable voltage regulator providing equivalent of zener diode over range of about 1 to 3V

Just what angle should we aim to achieve? The answer, almost certainly, is the lower the better. Some figures derived from the commercial world of point-to-point are useful; though we should remember that the particularly interesting modes that exist primarily at twilight and dusk are of more interest to amateurs than to commercial traffic people. Vertical wave-arrival angles based on 30,000 measurements made in 1960–61 on signals arriving in the UK from Poona, Sydney and New York indicated that most of these signals arrived at angles less than 10°, often as low as 5° to 6° (and one doubts if the measuring techniques were capable of measuring much below 5°), with considerable variation at different seasons. In summary, between about 10 and 19MHz, the arrival angle of the main mode was below 15° for 90 per cent of the time, with a median of 8°.

More recent measurements (*Proc IEE*, February 1969) made only on *European* stations on frequencies from 5 to 12MHz, and including sporadic E, F1 and F2 modes, show a much greater spread; roughly from 7° to 43°, but even here with more than 50 per cent of the measurements indicating angles below 20°.

If we could concentrate our entire power below 20°, and with a reasonable proportion below 5°, we would achieve the equivalent of a power gain of many times over the existing situation. This is one of the prime advantages of beam aerials mounted at a good height above ground; but even so, many amateurs do not appreciate just how high an aerial needs to be to achieve a really low take-off angle. Fig 7 indicates that even with rhombic aerials (well liked for their low angle radiation), a mast height of about 1·5λ is needed to put the main lobe at 10°.

Les Moxon, G6XN, has pointed out (*Wireless World*, April 1970) that sloping ground can be effectively used to lower radiation angles. A similar point, but with artificial ground planes, is explored in an article "Enhancing hf received fields with large planar and cylindrical ground screens" (*IEEE Transactions on Antennas and Propagation*, November 1967) which shows that large ground planes can achieve substantial improvement of received signals, and that similar benefits can be achieved by much smaller ground screens if these are sloping. Unfortunately, even the smaller 10-λ sloping ground-planes suggested in this article are far too large for most amateurs, though not impossible at vhf. However, at vhf the problem of achieving very low radiation angles is by no means so acute.

Height of site

In previous notes on this problem of low-angle radiation, we have indicated that the sea can be effectively used as an almost ideal ground plane, and G6XN has shown the advantage of sloping sites. Back in November 1967 (and see also *ART*), when first raising this subject, we further hinted that some hf broadcasting stations were believed to be located at very high sites, which were thought to be favourable for low-angle radiation.

Recently we have been reading an article which shows convincingly that even a site height difference of say 700ft can have a significant effect. This paper—"A comparison of long-distance hf radio signal reception at high and low receiving sites" by Epstein *et al* (*Radio Science* 1, 1966 pp 751–760)—was based on extensive measurements made over paths from Okinawa to Malta and Puerto Rico to Hawaii, at frequencies between about 10 and 25MHz. A Stanford University team set out to discover whether there would be signal strength advantages with receiver aerials located at higher sites; to determine the advantages as a function of transmitter frequency and time of day; and find out whether circuits would stay open longer if received at and transmitted from higher sites. Some extremely interesting conclusions were reached. These indicate that sites at a height of about 1,000ft have substantial advantages over those at 200ft, but that these advantages steadily decrease with rising frequency. Whereas an average signal advantage of some 5 to 10dB was noted at 12MHz, this reduced to about 0 to 2·5dB at 23MHz. It was also found that the most marked advantage of the higher site occurred almost always immediately following the time of signal re-appearance in the early morning, in other words *just as the path is opening*. On these long paths it was found that the circuits could be kept open for an average of about 1½ hours longer on 14MHz from the higher sites, but only about 10 minutes longer on 23MHz. The higher sites were advantageous for both transmitting and receiving.

This seems to be yet one more confirmation of the practical importance to amateurs of the chordal hop and similar "non-textbook" modes of propagation, often involving extreme low-angles of wave arrival and departure. All the work over the past decade points clearly to the way in which dx results on 7 and 14MHz, in particular, can be significantly improved by the use of any of the various techniques which can help to lower the angle of radiation—and add further edge to G6XN's advice on choice of sites for portable or fixed operation. Now, if we could only find a sloping salt-water lake on the upper slopes of a mountain with the Fresnel zones broken up!

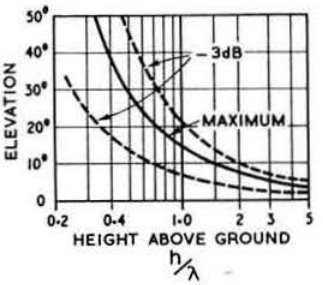


Fig 7. Vertical radiation along the beam of a rhombic aerial at various heights (*after D. E. Watt-Carter and S. G. Young*), **showing how angle decreases with greater height**

"Rating" silicon diodes

Bob Price, G3ECH, draws attention to a useful but little-known method of "rating" unknown and often extremely cheap unmarked silicon rectifiers; this idea appears in recent editions of the ARRL *Radio Amateur's Handbook*. Two basic important characteristics—peak inverse voltage (piv) and forward current ratings—can be derived using the test circuits of Fig 8.

To find the piv, a source of adjustable high voltage (maximum say about 2½ times the anticipated piv) is passed through a limiting resistor (R1) having a value of about 1,000Ω per inverse volt (eg 0·5M for 400 piv diodes): Fig 8(a). The applied voltage is gradually increased, and it will generally be noticed that the diode will initially pass very little inverse current until this reaches a figure of about 10μA, and then will start to rise rapidly. The procedure is simply to note the voltmeter reading at the onset of the rapid rise of inverse current and then to give the diode a piv rating of roughly 0·8 times (80 per cent) this voltage.

To derive a current rating, use the arrangement of Fig 8(b). This will measure the voltage drop across the diode under test. The *Handbook* gives the procedure as follows: the test consists of setting R2 to what the rating is anticipated to be. Then, if the voltage drop across the diode is greater than 3V, discard the diode. If the drop with a current of 0·75A through the diode is 1·4V, rate the diode at 400mA. A 3A diode would show a drop of less than 1·5V at 3A; a diode good for 2A would show 2·5V or less drop at 2A forward current. Should a 3A diode show a drop of 2V at 3A, it will be advisable to consider it as having a 2A rating.

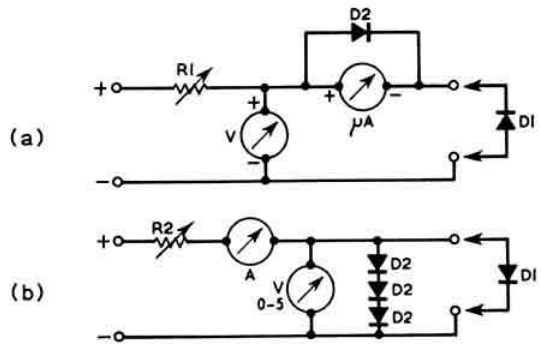


Fig 8. Diode testing. (a) Arrangement to determine piv. High variable voltage source (low current). R1 about 1,000Ω per inverse volt. (b) Arrangement to determine diode current rating. Ammeter two/three times anticipated current rating. Voltage source about 10-25V. R2 as required to limit current to anticipated diode rating. In each case D1 is diode under test, D2 are 400 piv diodes to protect meters

Dummy load for low-power transmitters

M. E. O'Donnell, G8CCV, writing from the Middle East, provides information on constructing a useful dummy load for low-power transmitters. By providing good thermal conductivity, a ¼/½W resistor can successfully dissipate, for example, the 2W or so output from a G8ARV Mullard-type vhf transistor transmitter. Main details are shown in Fig 9. The resistor is a ¼/½W Metox/carbon composition type. The interior of the finished BNC plug is filled with MS4 silicon grease. This conducts the heat generated in the resistor to the body of the plug, and is then conducted to the BNC socket and the chassis of the transmitter to form a large heat sink.

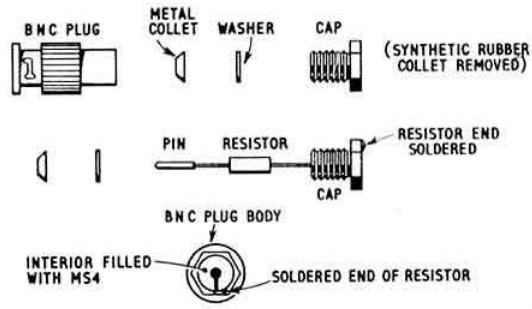


Fig 9. Details of the dummy load for low-power transmitters

G8CCV suggests that this type of construction could be scaled up for N-type sockets or for Belling and Lee television type sockets.

Here and there

Among the recent Application Notes issued by the Mullard Technical Information Service (Mullard Industrial Electronics Division, Mullard House, Torrington Place, London WC1) are several dealing with field effect devices. Two of these likely to be found of particular interest are: TP1175, "RF applications of FETs in communication receivers" (providing vhf and uhf amplifier and mixer circuits based on the BFW11 device); and TP1110, "The field effect transistor as a voltage variable resistor" which describes application of devices for agc amplifiers, stabilization of Wien bridge af oscillators, and voltage-controlled attenuators permitting remote control with variable dc voltage.

We indicated last month that our notes on the Aerialite "Supreme" uhf aerial and associated coaxial feeders (*TT*, April) needed some further amendment. Alec Hodgkinson, G3LLJ, points out that the impression was given that the planar dipoles are matched by type 385 coaxial cable, whereas in fact the planar dipole consists of one stamping of which the matching has been calculated and included in the "metal matching lines" which separate the two dipoles, as shown in the photograph. Also, unfortunately, the figure I gave of the loss at 850MHz of the type 500 coaxial cable (2·7dB/ 100ft) needs to be doubled, since it is the practice of the firm to quote attenuation per 50ft as this is regarded as a typical tv feeder length: actual attenuation is thus about 5·4dB/100ft.

Some interesting ideas on valve receiver front-ends and agc/noise limiting have been received from Philip Hay-Heddle, BRS31995, and we hope to refer to these in this column shortly.

TVI TIPS

by B. Priestley, G3JGO

Transistors and cross modulation

"My neighbour's old valve tv set never gave a bit of trouble, but now he's got a transistorized one and I've got tvi." The TVI Clinic has heard this countless times. The problem is the increased susceptibility of bipolar transistors to cross modulation, an effect which is often hidden behind a mathematical smoke screen. To clarify this, no excuse is offered for the following crude explanation.

Imagine an income tax scheme in which no tax is paid up to a gross income of £500, and then tax is deducted at 5s in the pound above this figure. This can be represented by a simple graph (Fig 1) where the gross income is called "input" and the net "output". A fluctuation in a man's income due to overtime, say, is reflected as a proportional fluctuation in the output, provided he stays below the £500 mark. However, if his wife also works and her income is added on to his and the total taxed, then the additional take home pay due to the wife's earnings will fluctuate in accordance with his overtime if their income exceeds £500. Thinking in general terms, because of the bend in the input/output graph, amplitude modulation (fluctuating overtime) of the one input crosses over to the other input (which could itself be modulated but it complicates the drawing).

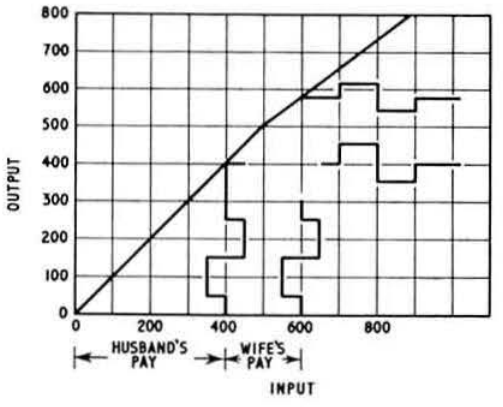


Fig 1. The input/output graph of the income tax system. Note that the husband's £400 ± 50 produces the same take home pay, but his wife's steady £200 produces a take home pay varying from £162 10s when he earns £450, to £187 10s when he earns £350, depending on how much his earnings pushes hers into the taxed region. In the same way two superimposed signals applied to a non-linear system can cross modulate

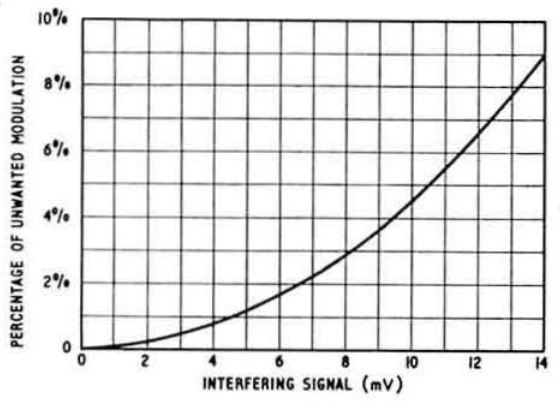


Fig 2. Percentage cross modulation caused by a 30 per cent modulated interfering signal vs amplitude of interfering signal. It is clear that a reduction from 10mV to 5mV, ie 6dB, will reduce the cross modulation from 4·5 per cent to 1·1 per cent, a reduction of 12dB. One per cent modulation may be taken as the threshold of visible interference. This curve is for an ideal transistor, but a practical device will show a similar trend

This is how a curved input/output graph will produce cross modulation. A transistor has a very marked curvature, and it is possible to show that an input of 4·7mV at the transistor base/emitter will produce 1 per cent modulation of any other carrier if 30 per cent modulated. The level of unwanted modulation goes up much faster than the unwanted signal, actually at 2dB/dB (Fig 2); conversely it goes down faster, so that a slight reduction in the unwanted signal can make a vast improvement in the level of unwanted modulation.

The interfering signal can be reduced in several ways:

(*a*) Straight attenuation with a resistive pad. This also reduces the wanted signal but only proportionally so there is a net gain in signal/interference ratio provided the signal is still above the noise.

(*b*) Filtered out. This is the obvious solution for an out of band interfering signal. A 405-line tv set receives a bandwidth of some 4MHz and to give a good picture must be flat across this band to within, say, ½dB. This means a tuned circuit with a Q of about 2·5 at 43MHz. The response will therefore be about 5dB down at 29 MHz, 10dB at 21MHz and 12dB at 14MHz. A good high-pass filter with notches at 29 and 21MHz will make a vast improvement.

(*c*) Confronted with a no entry sign on all other inputs to the receiver, in other words braid filters for the coaxial outers, mains filters and screening. The "best" type of braid filter depends very much on the local conditions, but the following is a suggested procedure:

(1) Try a pair of Faraday links. This is very cheap, and if the result is a clear picture without "snow", quite adequate.

(2) If snow results, try some form of ferrite core transformer which has less tv signal attenuation, but may not be quite so effective as a braid filter.

(3) In a fringe area, where no tv signal loss is acceptable, wrap the standard tv coaxial cable round a ferrite torroid as many times as possible. An old tv line output transformer ferrite core can also be used if available. Thin coaxial cable allows more turns, but may introduce excessive signal loss.

GAREX

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FOUR METRES AND DOWN

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

"Reap and keep"

Pat Hawker, G3VA, did well to draw attention in his amateur radio column in *Wireless World* to the propaganda lobbying being put on by commercial interests for extensions in frequency allocations for the mobile services. It seems that block demands for extra space blithely rope in our 70MHz and 432MHz allocations as if these were already available and not occupied by the amateur service.

Much has already been said in the British amateur radio press on this subject. To have it given wider currency in a mass-circulation journal like *Wireless World* can do nothing but good by drawing attention to the pressure being exerted on our frequency spaces by bodies which in fact have no just claim to them, and whose occupancy of them, if they succeeded in grabbing them, would in terms of rf watts output be considerably less than that generated by the amateur service.

"Use or lose": the phrase has done a good job over the last couple of years to bring home the need to promote full occupancy of our vhf/uhf allocations. Now is the time, your conductor thinks, to transmute it to "Reap and keep". Auto-suggestion, a powerful agent which could put a nation into an economic recession solely by talking about it, can act with equal force on "Use or lose". Say too often that there is inadequate occupancy of any of our bands and you are inviting somebody somewhere to sharpen the carving-up knives.

Ignoring "Two" in this discussion, because today it is on the go all the time thanks to Class B operators' enthusiasm and occupancy, we would say that in respect of "Four" and 70cm levels of activity are much higher than they appear to be to observers distant from pockets of local occupancy. They could be higher still if much of the short-haul working now done on "Two" was to be transferred to 70cm, and if more system gain was to be injected into equipments on "Four". Our 70MHz allocation has a potentially nation-wide range that is stultified by the use of inadequate aerials like dipoles in lofts, and clumsy ex-professional rigs ill-suited to amateur applications.

There is a big harvest to be reaped from sustained activity in the wide megacyclic fields of "Seventy Megs" and "Seventy Cems". Let us move on from "Use or lose" to the more positively orientated state of mind (and action) "Reap and keep".

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

Hot weather round up

As reported last month, the big tropo opening of mid-June began on the night of Friday 12th and declined slowly and excitingly over the next week. And much of the excitement was produced by the appearance of GM3TLA/P on 70cm. Grateful operators in Germany, France, Holland and Belgium welcomed the opportunity to make their first contact with Scotland on 433MHz. So did a score or two of G-men well down to the south. David Pearson sited his station at Cairn o' Mount in Kincardine, 1,480ft asl, and put 4W into a 6 over 6 slot at 70cm, and 10W into a 4-element Yagi on "Two". He comments on the stability of the Wrotham beacon's S9 signal, pounding in for hours on end from 360 miles away.

Near neighbour of 'TLA is GM8BRB of New Deer, Aberdeenshire. He has been dealing with a flood of mail from Continentals pouring QSLs on him as their first GM on "Two". What a flood means in practical terms is this: 14 countries worked from 11–14 June embracing 186 Continental 2m operators, plus another 14 Continentals on 18 June when the tropo, apparently in decline, suddenly reasserted itself. Two more statistics: the 11–14 June collection included 108 Dutch and 58 German operators, plus a respectable dozen of Danes.

Another "dx to most" man, Albert Latham of Dun Laoghaire, EI6AS, fresh from working ZB2BO RS59 both ways on "Four" on the Saturday morning (but that was Sporadic-E) turned his attention to "Two" on the Sunday, and found a queue of 15 PAZeros waiting to work him on the sideband channel.

A big lift on the bands brings a big lift in the hearts of the listening men (of whom there are rather more than the exclusive few appearing in the certificates award table might suggest). There are chances for them to add fresh countries to the logbooks and, more purposely, to feed the Scientific Studies Committee with observations on the more unusual propagation anomalies which are heard to occur—and let us be realistic here by saying that Aurora-induced anomalies tend to be more rewarding as a research project than June-type tropos, exciting as the latter are when they happen.

Listeners' reports confirm the predominant NW-SE direction of the June opening. The 2m log of A6812 (Nicholas Richardson, Wendover, Bucks), filled with details of GM to Continent contacts, gives an almost visual impression of swathes of activity along this NW-SE axis.

Nothing quite like the 12 June sequence emerged as week followed summer week, and one high pressure system after

Aurora at source. This spectacular display photographed over Reykjavik comes to us from TF3EA, who has opened up the 4m and 2m paths to the UK. It occurred last January and permitted Norwegian television signals to be identified in Iceland

another processing across or near the UK dredged up the predictable dx on "Two". Meanwhile, developments on "Four" were such as to persuade many a Class B man to have another go at the morse to allow him to use the next band up. The "E" manifestations in the opinion of many 70MHz operators almost equalled those of memorable 1968. The new Sussex beacon was heard in Malta (see below), and a new EI-TF record was established.

How midsummer "E" sounds on "Four" is vividly described by Ron Ham, BRS15744:

"Evening 6 July: BBC TV service carved up in Band 1, 40 to 66MHz. Continental fm stations mixing with BBC fm stations at 90MHz. Four metre band blown to bits by southern and eastern fm BC sigs. Usual crop of auto sigs and electronic bleeps 30 to 50MHz.

"However, around 2045 these signals died away and left 'Four' clear, and a change in direction of the Es reflection brought up the signal of TF3VHF, and TF3EA. From 2050UT to 2159 (1hr 9min) TF3VHF average 579 but mainly 599. The Iceland beacon signal faded out at 2159 but reappeared at 2213 for 6min at 539 and it was all over."

It was on that same night that the EI-TF "first on Four" was established. This deserves a section to itself.

EI-TF first on "Four"

Noting on the evening of 6 July that the TF3VHF beacon on 70·275MHz was hitting S8, Albert Latham turned the EI6AS beam NW, put out a "CQ DX TF" call on the key and was rewarded to hear TF3EA come back on 70·25. Reports both ways: 569. Later, the Icelander confirmed that this was his first contact with EI on "Four".

More about 6 July

All in all, Monday 6 July was a date to remember in 70MHz history. The TF-EI "first" is recorded above. The same evening TF3EA worked G3JVL, MHW, VNQ, TDH, G6HD, G3VSA, OHH, JVL, PLX, GVM, G2AXI, G3JVL and EI6AS in that order between 2058 and 2223gmt, after consistent reception of the Iceland beacon over many days before.

TF3EA uses a spot frequency of 70·25MHz, and TF3VHF 70·275. It is telegraphy only at TF3EA. Therefore, if heard he should be called on the key first, but will listen to other modes if asked.

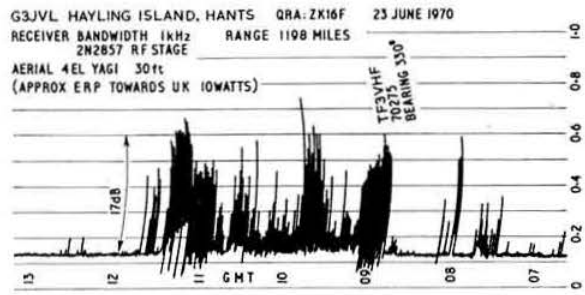
In a comprehensive review of this year's propagation manifestations at 70MHz—regrettably, there is space here for no more than a bare précis—Mike Walters, G3JVL, says: "It is interesting to note that practically all the Es openings of note this year (and most probably the last three years: not looking for the right thing then) have occurred at times near to the 27-day repeats of previous Ar events earlier in the year. Flares (not all have produced large openings or necessarily up to very high frequencies) have occurred before all the 4m openings.

"In particular the 27/28 May Es openings were preceded by a noise storm at 2300 on 25 May. While I was in QSO with TF3EA (20m) he reported at the time the noise was S9 on 4m and just audible on 20m. However, there was no sign of it with me on this occasion.

"Referring to the comment in June *Radio Communication* about events never occurring 27 days after previous ones, if the days are counted back it will be seen that there was indeed a 27-day multiple to a previous Ar event but not the 8 March in this case. I will agree that the same sunspot might well have disappeared, but if so it seems that new, equally active areas of the sun took its place. Through the first six months of this year all the dates of events have been predictable by observers both here and in North America. Add an uncertainty of say seven days to allow the sun to please itself! Most predictions have been much closer than this (corrections can be made as time passes to make predictions more accurate).

"For example, I had been warning TF3EA to expect an opening on 28 May and then 14 June. Both of these were quite close.

"Previous experience on straightforward, easily identifiable Ar has shown that people further north of myself always hear signals earlier and for longer than I. Even 30 miles makes a noticeable difference on marginal openings. However, Es just the opposite characteristic: people at extreme range, 1,200 to 1,400 miles, hear signals before closer-in stations, eg ZB2VHF to northern counties nil audible on south coast, or TF3VHF on south coast and nil or little in the northern counties. This is, of course, a well-known ionospheric propagation fact. The muf F1 is greatest



A chart recording taken at G3JVL, Hampshire, of reception of the Iceland beacon on 4m. Read right to left

at a given time at maximum single hop range, the range closing in at this same F1 frequency as the muf F2 rises further.

"The opening on 13 June displayed this latter characteristic Es. It occurred within an hour of a very big noise outburst, so confirming this one as Es 'pure'. But the opening on election night 18 June began up in the northern counties with S9 plus signals and occasional weaker bursts audible down here. So I suggest this one was forward Ar—supported I believe by others' observations."

Report from The Rock

Reviewing the Es season so far as it has gone, ZB2BO notes more morning openings than evening ones, comparing previous years (have tvi absences anything to do with this?). He gives 5 July as a very good day on "Four", wide open for UK at lunch time, with SE England, the Midlands plus GI and EI early evening (note earlier comments about the events of next day). Monitoring the BBC sound channels, 'BO waits with bated breath for the muf to creep high enough to take in 70MHz.

On this point these comments of his are worth pondering:

"A look at the last two seasons suggests there may be some rough correlation with the sun's rotational period, both for good spells and possibly rather more closely for bad spells. Some good Es on 48MHz in mid-May was followed by a good period in mid-June. The end of May and the end of June were poor and the 5 July opening appeared to tie up with one on 8 June that just touched 70MHz but gave about seven hours of BBC TV sound. Maybe someone with a bit more knowledge of the sunspots can tie it up, although the connection does not seem to be as firm as with Es to Iceland."

"Another part of the forest"

While 4m was showing what it was capable of, on and around 6 July, what of "Two"? The Sporadic-E concentration gave many newer licensees their first taste of dx by this mode. To do justice to what happened on "Two" makes one all too conscious of space limitations. A few highlights then:

For GI5ALP the openings have provided a marvellous final fling to his activities in the UK. Regrettably, he is on his way to a new posting, and his callsign, dx to so many, will be sorely missed. Hearing Germans in local QSOs on 6 July, netted and called, to raise eight of them, including two DMs. Which goes to show that you cannot tell who may be listening to your cosy 2m crosstown chat if the reflective patch is critically positioned: it might be someone 600 miles away.

An even more dramatic demonstration of this particular Sporadic-E formation: OY2BS in the Faeroes worked DL6BU—and we have it that this was genuinely via "E" and not by M-S, where OY2BS has much expertise.

Five up (to date)

When all the tropo tumult and Sporadic—E shouting have died, the meteor-scatter experts proceed steadily on their way working dx that is still there notwithstanding other come-and-go modes of anomalous propagation.

Flashback to the Birr VHF Convention. At right, Bob Williams, EI7AF, who organized the event, with EI5BY next to him. Centre: GI5ALP, the 2m dx man from Londonderry. At left, RSGB past-President Barney Patterson, GI3KYP, (he also holds EI4BC) and next to him in turn EI4AL

At the time this piece closed for press Johnny Stace, G3CCH, had achieved his fifth QSO with TF3EA on "Two" via M-S. This was on 9 July, and will doubtless have been capped again by now. The customary Thursday night schedule opened at 2100gmt. G3CCH heard TF3EA 115 times in the next 90 minutes. The highlight came at 2201gmt when he heard '3EA seven times, signal strengths being 9748522, and the QSO finished with 34 Rs being heard in 20 minutes. 'CCH is using a 40-element co-linear array (two 20-elements side-by-side) at about 25ft average height but clear to the NW. This appears to give a 6dB gain over a 10-el Yagi.

Mobile video: watch it!

The licensing authority expressed itself as being slightly unhappy about the recently intended mobile "Stroke T" exercise by the Dunstable Downs Radio Club. It will be remembered that the plan the DDC had in mind was to activate 435MHz from a video-equipped caravan up on the Dunstable Downs with the commendable objective of extending the range of amateur television coverage.

Graham Shirville, G3VZV—well, perhaps more appropriately G6AEV/T in this context—who is a power behind the DDC video operations, now passes on to *Four Metres and Down* a ruling the club asked and got from Minpostel on the point:

"Thank you for your letter of 27 May 1970 about mobile/portable operation of your amateur television station.

"We have carefully considered what you say and I am now able to tell you that we agree to portable operation, ie without the use of a domestic mains supply, at temporary locations. It will of course be necessary to give us at least seven days' notice as to precisely where and when you propose to establish the station.

"I must stress that the station will have to remain in one particular spot; we cannot allow mobile operation from various places in the locality."

The day before the Aurora

Was the great Aurora of 8 March induced in any way by the solar eclipse of 7 March? There is probably no easy and

immediate answer to this one. However, a great deal of observational work on the inter-relation of radio propagation (not necessarily vhf) and the total eclipse was done on a world-wide basis in March, and the magazine *Nature* for 20 June covers the subject comprehensively in a series of articles of considerable technical and mathematical interest.

Contest news

No need here to offer more than a passing reminder about the imminence of the year's severest test of metre-wave magic boxes, VHF National Field Day. By now sites will have been chosen, equipment tested and operators' rosters drawn up. But has a final look been taken at the new rules, published last March (page 180)? Do not take them for granted—re-read them.

* * *

The North-Western VHF Contest, organized by Ainsdale Radio Club for RSGB Region 1 and played off at the end of June, drew what sounded to us like the biggest support ever. Good conditions brought the southerners out in numbers, and towards the end the serials were approaching three figures. Nearly all this on 2m. Next year a multiplier to encourage a bandchange will probably be added to promote more activity on 4m and 70cm.

Self-help at Delta-Mike

We ran a piece here a few weeks back on self-help with beacons to show how the RSGB's metre-wavelength beacon chain is run at minimal cost to the Society for the very good reason that many contribute equipment and services voluntarily.

The new GB3DM beacon represents a copybook example of this self-help. The list of those who have brought this project to fruition reads like a conspectus of the contemporary vhf scene. Well-known names and callsigns abound.

For a start there is the site, which is Burnhope ITA station near Durham, 950ft asl. (Remember Howard Steele's friendly remarks about the amateur radio movement at the VHF Convention?). Then there are the aerials: J-Beam of course, 100ft up the tower, one 4-element Yagi beaming north, the other south, keyed simultaneously on 145·975MHz by a G3MNQ solid-state keyer.

The Pye transmitter (G3EDD) is also fully solid-state and delivers 32·5W into the Aerialite CAT500 coaxial sent along by G3UPB.

Add a few more well-known names: G8ANQ and G8BWH for general humping, getting together of everything needed, and general administration; G8BAG, who attended to some plating which had to be done when the special aerials were mated to the mast brackets; and man on the spot G3PTU, who works at Burnhope transmitting station and has agreed to be GB3DM beaconkeeper.

On-air tests began on 26 June. At once reports came in from Kent, Sussex and Aberdeen. Commissioning will be any moment now.

"SX" makes the dx

At last the asterisk may be removed from GB3SX in the beacon box. The new South Downs beacon is operational. Located on the G3DME site, it has a magnificent take-off. There are 50W in and a ground-plane radiator.

"Sierra Xray" made a sensational debut. It was heard in Malta by 9H1BL on 24 June during the massive Es opening, peaking 599 when only an 80M inverted-V could be used by way of aerial, and still audible when 24in of wire were pushed into the input socket of the JXK converter. The 9H1BL beam for "Four" was out of service at the time.

G3VPS of Hailsham tells us he has received from 9H1BL a tape recording of GB3SX as heard in Malta, and that he will be delighted to loan it to others interested. Apparently 'BL called the UK on 28,100kHz and on "Fifteen" to attempt to raise any G who could provide a crossband 4m signal but, not unexpectedly on a workaday Wednesday morning, without success. He will do this whenever a 4m opening seems imminent, as suggested by the presence of BBC TV sound signals on Channels 1-5.

Expeditions

A "highly radioactive" party from England is at present touring France and Switzerland. There are three "A"

After their wedding at York, Susan and Steve Webb, G3TPW, honeymooned on the island of Guernsey, complete with 2m rig. Because the people with whom they conversed over the air were, as Steve puts it, "amazed that Susan should allow it", they had a special QSL card prepared. This is it. Now G3TPW is on "Two" and "Seventy" from Cambridge, and Susan soon will be when she passes her morse test

members, one BRS and four callsign holders, all from the Ilford area. Many this side of the Channel may have already worked them under their callsign F0UV. They will be back in France 14–15 August, using a.m. on 144·24, 144·65 and 144·94: until then operation is from HB-land. Correspondence to G3WKV (QTHR).

* * *

During the first two weeks of August, Albert Latham will be airing his original UK call G3JLA around Herts and Essex on 70·26 and in Zone B on "Two". Look for it with either the /P or /M suffix, or even without them when he operates from his folks' home at Clacton, where G3JLA is now registered. Back to Dun Laoghaire and his EI6AS in the third week of this month.

* * *

Here are final details of the Verulam ARC visit north-about. Says Dick Wells, G8BNR: "We will be on the air from early in the afternoon on 9 August for testing purposes with some QSOs, but not on sked. The skeds will start that evening at 1930gmt (one every five minutes) until 2310gmt, or when we run out of contacts, whichever is the later. There will be no skeds for the last 15 minutes of each hour, when it will be a free-for-all, preference being to ssb, a.m. and cw, in that order. The same pattern of evening operation will occur on 11, 12 and 13 August, starting every night at 1930gmt. There will be no skeds on the night of 10 August because we will be entering the SSB Contest. However, we will be on for free-for-all QSOs.

"The frequencies of G3VER/P will be 145·420MHz for ssb and a.m. and 144·098MHz for cw. During the free-for-all periods we will not be listening on our own channel, and to get a QSO during these periods stations must call us plus or minus 10kHz of our frequency."

Four operators go on this safari. They will have an SB101 driving a transverter running 240W p.e.p. on ssb, 150W on cw, and 70W on a.m. (all are quoted as dc input to the linear).

* * *

Look, right now, for Norman Horrocks from Cardigan. GW2CUZ/P is on both "Two" and "Four" from that delectable county for about a couple of weeks from 6 August.

* * *

As holiday time takes the vhf fraternity to exotic places, expect well-known callsigns to pop up where they do not usually do so, eg GW2CUZ above. Here is a really tough one from a spot normally unworkable from most of the UK, namely, Wester Ross. From Greenstore Point about 20 miles south of Ullapool, GM8DAG/P will be offering a 2m signal during the first two weeks of August, possibly longer. Write for a sked to Alistair Murray at 12 Opinan, Laide, By Achnasheen, Wester Ross.

* * *

Over the same period G3SJV and G3VPS are operating 4m from Suffolk every evening and all day Sundays. They have several frequencies for cw and phone.

A big operation is being mounted by a group of Norfolkmen to provide a station that will be dx to most contestants during VHF National Field Day. Banding together as The National VHF/NFD Group, they have secured the distinctive callsign GB3NFD/P with which to operate from the Mull of Galloway (you can see six countries from there on a clear day). With eight licensed operators available to activate 4m, 2m, 70cm and 23cm, cw and phone all bands and ssb as an extra for "Two", the station will not confine its operations only to Field Day weekend but will be staying on for several days afterwards. Says Graham Suckling, G3WZM, the group's honorary secretary, "Anyone interested in skeds after NFD during the period 7-12 September on any of the four bands should write to G3WZM at Station House, Railway Road, Downham Market, Norfolk."

* * *

Even further afield will be G3VFD and G8APP. Their plan is to give 4m a good showing from EI-land during Field Day. Their EI visitors' callsign is not yet known, but there should be no missing them on their nightly telegraphy schedule with G6HD, 1900 to 1930 clocktime, 29 August to 7 September.

* * *

Clive Elliott, G8ADP, will be atop Hay Tor throughout VHF/NFD " . . . for the sole purpose of trying to get QSOs on 23cm" starting 70cm in the usual way. Shine beams Devonwards for a rare one on 432.

DATE CHANGE FOR '71 CONVENTION

Next year's VHF Convention will take place a week earlier than the date provisionally booked after the last one.

Please put a ring round Saturday 17 April on your 1971 calendar.

No change in venue: still The Winning Post, Whitton, near Twickenham.

Tech corner

From G3TPW (Steve Webb of Cambridge)

Here are a few further thoughts on the subject of all-transistor transmitters to add to the information which has been appearing in "Tech corner" lately. Using a Motorola MM1552 it is possible to build a transmitter that will deliver 75W output, frequency modulated; in other words, using high power with freedom from the tvi bogey thanks to the nbfm. A 24V rail is needed to realize this order of output. When the supply was reduced to 12V the output dropped to 35W, but this did permit the use of amplitude modulation should this be required or preferred.

Because 8W of drive are needed for the pa, a substantial driver unit should be built, again finishing up with an MM1552.

A suitable modulator offering 20W of audio at 10 per cent distortion uses two MJE3055s in push pull.

From G3FUW (Syd Webster, Hinckley)

It may be of interest that G6MUR/T, Brian Wade in Leicester, is now transmitting vision and sound by using

nbfm on the vision carrier. Several transmissions have been received by G3FUW in Hinckley, and no interference can be detected on the picture. A separate receiver is desirable for tv reception in this mode, and it should be equipped with a proper discriminator to receive the nbfm. However, I can receive the G6MUR/T video by slope detection, although of course there is quite a bit of vision buzz.

Although obviously nothing new is claimed for this technique, neither G6MUR/T nor myself has seen it reported in any amateur publication. We think it might interest other vision people. It certainly saves a lot of extra trouble and expense at the transmitting end.

From GM3TLA (David Pearson, Aberdeen)
Here is some information on the G8ARV exciter for use on 4m.

The changes in component values for the circuit shown on p. 840 of the December 1969 issue are for a 35MHz crystal:
C3, 15pF; C5, 47pF; C9, 68pF;
L1, 12 turns of 26 swg wound on 7mm former, slug tuned—the feedback to the crystal is by a one-turn link;
L2, L3, five turns 18 swg, internal diameter 10mm, 9mm long with 10mm leads;
L4, seven turns 18 swg, internal diameter 10mm, 12mm long with 10mm leads.
The original circuit uses the second transistor as a tripler. This should be equally feasible on 4m, using a 23MHz crystal with changes to C3, C5 and L1. As the revised circuit operates on about half the frequency of the original, the gain of the circuit on 4m is more than adequate.

LATE NEWS

1. On 26 July between 0200 and 0220 TF3VHF, the beacon station at Reykjavik, Iceland, on 70·275MHz was heard in Montreal, Canada, by VE2AIO. QRB 2,027 miles.

2. New world record on "13". On 11 July W4HHK and WA4HGN/P covered 249 miles on 2304MHz, both using cc telegraphy.

3. Transpacific on "Two". On 7 July the first New Zealand to California moon-bounce contact was achieved by ZL1AZR and K6MYC.
Details next month.

Skedspot

At Kingstanding near Birmingham, so called because King Charles stood there to watch the battle below, lives G8AVH. He appears on 433·35MHz every night from this magnificent site. Look for him after 2000gmt.

A few years back when G3MHW was down south he had the enviable reputation of being one of the strongest signals on "Four". The same goes today from his present 500ft site near Chesterfield, helped by a 6-element Yagi and 50W to a "Six Forty". The mixer vfo allows freedom of movement over the whole of the band. His UK county score on 70MHz is 59: he requests skeds with any "Four-men" in Northumberland and Huntingdon.

BEACON STATIONS

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

Here and there

"Remind readers about the Perseids meteor shower in August. The BAA Handbook gives the peak for 12 August. I will be making the usual radio count using Gdansk on 70.31MHz"—BRS15744. May we add a recommendation to watch G3CCH on the cw end of 2m. He has skeds going with LZ and OK among others and has already worked TF3EA seven times via M-S on "Two".

* * *

Do not begrudge the Welsh mountain-toppers their successes. They work for them. Read this: "The last 4m portable contest was thoroughly enjoyed by all four of us from the top of Pen-y-Fan in the Brecon Beacons (2,906ft), and was entered in truly portable fashion, all equipment, 120lb total weight, being carried two miles and up 1,500ft from the nearest car access point"—from G3VFD.

* * *

"Compared with last year I've managed a greater percentage of phone QSOs on 4m (60 per cent against 25 per cent), but several gotaways on a.m. could have been firm contacts on cw. I'm sure a keying socket and bfo would greatly increase the dx potential of some of the small portable mobile rigs"—ZB2BO.

* * *

"The IARU VHF/UHF Contest runs concurrently with VHF/NFD. It is easy to enter. All that is necessary is for the lads to enter their kilometres score in the points column for IARU purposes and add the score according to the radial system on the back. The quickest way to do this would be to fold the sheet nearly in half from top to bottom (VHF NFD Rule 19).

"When we of the VHF Contests Committee have completed our checking from radials and corrected any gross errors in kilometres, the logs will be passed on to SRAL (Finland). We hope that this simplification will encourage more entries in the international event"—G3JKY.

* * *

G3TTV, 12 Hazel Close, Mildenhall, Suffolk, offers 4m crystals 11710kHz and 11738kHz (70.26 and 70.428MHz) sealed FT243 types in exchange for 8MHz HC6U types suitable for "Four".

THE MONTH ON THE AIR

A monthly feature by JOHN ALLAWAY, G3FKM*

WHEN listening around the bands your scribe is frequently tempted to wonder just how much less trouble would be experienced from breakthrough on television sets if only we all took the simple precaution of seeing that our transmitters were properly tuned and operated. Overmodulation ("flat topping") on phone and key clicks on the cw mode are two certain ways of running into trouble with one's neighbours both on and off the air. How many operators of commercial equipment take the trouble to really *read* their instruction manuals? How many operators realize just how little movement they should produce on their meters on speech peaks to obviate flat topping? Linears with built-in ALC circuits are not always without blame since dry joints and component failures have been known even in these.

G3YMC reports receiving QSL cards for contacts on the hf bands and wishes it to be known that he is currently active only on 160m during university vacations, and has not had any contacts on 7, 14 or 28MHz.

Neil Sanderson, A6992, of 10 Oxgangs Medway, Edinburgh EH13 9LP, offers his services to anyone requiring a QSL manager.

Top Band news

At the May ARRL board meeting it was suggested that ARRL should organise a 160m contest "orientated to promote activity in this band of frequencies". Further developments are awaited with interest.

An interesting report of a dx opening on the band between 19 and 21 June has been submitted by GM3WDF who reports PY1MGF, PY2BJH and ZP9AY all at good signal strength on the 21st at around 2300. He made contact with PY2BJH and ZP9AY, and all three stations were worked (on the 19th) by GM3YCB, who in fact received a Q5 report on his ssb signal from PY1MGF. Equipment at GM3WDF consists of a KW2000A and 132ft end-fed aerial 30ft above ground, and at GM3YCB, a 2,500ft long end-fed aerial at 40ft above ground and running alongside the Forth and Clyde Canal!

News from overseas

Mike Dransfield, 5N2AAF, has written to say that he expects to be leaving Nigeria at the end of the year and returning to continue his dxing from G3JKO. He intends to make maximum use of the time remaining to him and will give special attention to the three lf bands (160, 80 and 40m) as soon as the rainy season ends in September. Mike points out that W7VRO only acts as his QSL Manager for the USA and Canada in order to save applicants in those countries postage, and he deals with his own cards for all other contacts.

Another well-known dxer has returned to the UK—this time Maurice Caplan, VS6AA, who arrived on 17 June. Maurice's home call is G3NWQ and all requests for QSL cards should be sent to him there to be dealt with before his departure for Germany in September. He would like to pass along thanks to the many friends who have made operating from Hong Kong such a pleasure, and he says that it is his experience that UK stations are the most courteous operators on the dx bands, and certain southern Europeans the most ill mannered!

Ray Jarvis, 5Z4IR (formerly VS1HG), is the third overseas G to return home and will be back at his G2BPC QTH in July (see *QTH Corner*).

Anthony Blythe (6 Lime Road, Southwood, RAF Colerne, Nr Chippenham, Wilts) wishes it to be known that outstanding cards for contacts with the following calls during the periods indicated may be obtained by applying (with sae) to him at this address. The calls are: ZC4AB (11/9/60 to 30/6/62), 5B4AB (1/7/62 to 29/10/62), 9G1FB (24/7/63 to 9/6/64), 9M2TB (25/1/67 to 29/3/69).

Mike Matthews, G3JFF, writes from Singapore to say that he will be G3JFF/MM from HMS *Blake* during July and August and will be in the VS6, JA, KR6, and DU areas. He will be running 350W p.e.p. to a vertical on 14,150/21,150kHz ssb, and 14,025/21,025kHz cw. Following this trip Mike will return to the UK in mid-September; previous G3JFF/MM episodes have been on HMS *Triumph* (1954–1955) and HMS *Cook* (1960–1961). Mike is president of CHC Chapter 81 (/MM Chapter) for 1970 and contacts with him count for Maritime Mobile awards and CHC Chapter 81.

9V1PM (ex-G3WRN) is enjoying his stay in Singapore but says that UK signals are still a little scarce and that those he hears are mostly oldtimers or the holders of new callsigns. Colin will be returning to Scotland at the end of the year.

Awards

Brian Edwards, G3RJB, custodian of the **West Mercia Counties Awards** has now moved to "Whitegates", 41 Winston Road, Putson, Hereford, and all future applications should be directed to this address.

Readers' attention is drawn to the awards issued by JARL. In all cases applicants must submit QSLs and a list of them showing date, time, frequency used, mode, signal reports and location. If this list is certified by the awards manager of an IARU member society QSL cards need not be sent. All contacts/reports must have taken place since 30 July 1952. Applications must be sent to JARL Awards Manager, PO Box 377, Tokyo Central, Japan, together with the appropriate number of IRCs—10 in all cases except for the HAC Award which requires five.

All Japanese Districts (AJD)
QSOs with all JA districts JA1–JA0 (SWL–AJD for listeners).

Worked All Japan Prefectures (WAJA)
QSOs with all 46 prefectures (HAJA for listeners).

Japan Century Cities (JCC)
QSOs with 100 or more different cities (JARL will supply a list for three IRCs). JCC-200, JCC-300 etc issued as separate awards. SWL–JCC for listeners.

Asian DX Award (ADXA)
For confirmed contacts with 30 Asian countries including Japan (not KA).

Heard All Continents (HAC)
Confirmation of the reception of signals from all six continents.

The Worked All Malaysia Award (WAMA)
Issued by MARTS, PO Box 777, Kuala Lumpur, Malaysia.

Requires certified list of log data and QSL cards (certified by two club or society members) relating to the following contacts: 10 with VS1/9V1/9V0; 10 with VS2/9M2; one with VS4/9M8; one with VS5; and one with ZC5/9M6 (total 23). Applicants should send 10 IRCs to the hon secretary at the address above.

The 6-CR6-D (Six CR6 Districts) Award
Issued by LARA, Box 484, Luanda, Angola.

This requires QSL proof of contacts with six different Angolan districts since 15 August 1969 and is available to listeners and transmitting amateurs. It will be endorsed for band or mode if required and full log data plus the QSL cards and five IRCs should be sent to LARA. There are 15 districts in Angola.

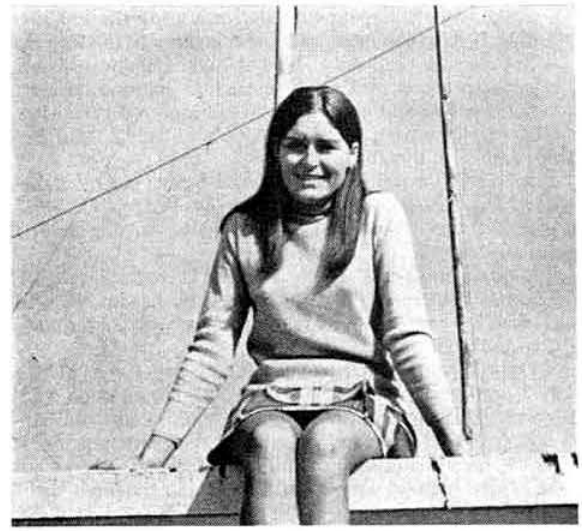
* * *

Further changes have been made in the requirements for the **Mayflower 70 Award.** The qualification now is contacts with any five stations in Devonshire, or with any five members of the CHARN Fund committee (these are G2YM, G3PKO, G3VUC, G3WDQ, G3WOB, G8QO and EI5M), or with any combination of stations from the two groups. Certified lists of QSOs, plus 8s 6d, should be submitted and the award is available to listeners. All profit goes towards equipping the Cheshire Homes with radio equipment and readers will be pleased to know that since the fund was started some 20 months ago over £450 has been raised. Ten homes have been equipped already and three more will be in the near future, leaving 28 to be dealt with. This will require a further £750 to carry out and donations would be gratefully received by Mr W. Clarke, G3VUC, 66 Fillace Park, Horrabridge, Yelverton, Devon, PL20–7TE, who is the secretary/treasurer of the fund.

DX news

The station which has been reported to be very active on cw recently using the callsign HH2G appears to be following a similar pattern of operating to that followed by the pirate cw "HH9DL" and appears to share the latter's lack of authenticity. The genuine HH2G has been off the air for 10 years or so.

Yvon, FP8CY, has recently been staying with FH8CE and operated as FH8CY. He will return to Comoro in October and will then be active on all bands.



Much in demand as the holder of a rare callsign, Jinny, 9N1RA, has now left Nepal but will soon be on the air with a VU2 call from India

As reported previously, K2IXP is interested in obtaining permission to operate from the Laccadive Is. He is in Asia at the moment and may visit and operate from the QTHs of 9N1MM and AC3PT. There is a possibility that if Larry is successful he may be joined by Gus, W4BPD, for the AC and VU trips.

5VZDB is quoted as saying that the only current Togo licensees besides himself are 5VZAT and 5VZWD. However, 5VZWT (who is F8TW) and 5V4JS are being worked quite frequently on ssb. Gus says that the 5V4 prefix is not authorized for amateur use. He returns to France soon and then expects to go to Tchad.

W4IBK/9B, who claims to be on Taiwan, seems to be a pirate. However, it is possible that there will be more activity from BV soon.

Roger Weston, G3SXW, is now licensed as YA1R and will be on the air sporadically from Kabul with this call. He will always be found on 14,020 or 21,020kHz cw and QSLs should be sent via G3TXF (see *QTH Corner*).

Roy, ZM1AAT/K, who has been putting in such a fine signal from the Kermadec Is, is due to leave the islands in October and may be moving to Chatham Is where he will no doubt use the callsign ZM1AAT/C.

Torres, CR8AJ, is likely to be back in Portugal at the end of July and his address will be: Horacio Torres, Rua Luis Camoes, Vila Sobral 10, Laranjeiro, Portugal.

TT8AF requests QSL applicants not to mention amateur radio or his callsign on letters to him, which should be addressed to Jean Fremont, BP 444, Fort Lamy, Tchad. TR8MC now asks for QSLs via W2YY.

AX9KY, Cocos Keeling Is, closes down on 18 August. QSLs should continue to be sent via VK2SG and for direct reply more than one irc should be sent.

IT1SEZ/IU is scheduled to be on the air from Ustica Is during the period 5 July to 5 September. IT1SEZ also operated for a time as IT1SEZ/IF from Favignana Is.

Ara, formerly PY7AWD/0, who is located on Fernando de Noronha Is, has now been issued with the callsign PY0AD.

Stations in Riihimaki (Finland) are using the prefix OI3 during 1970 to commemorate the centenary of the Riihimaki—St Petersburg railway. The Riihimaki 100 Award is being offered to those who work seven OI3 stations during the year; it is free and applicants should send a certified list of QSOs to Riihimaen Kolmoset r.y., Nuorisotalo, Murtokatu 5, Riihimaki, Finland.

An HW-100 transceiver, tri-band beam and other items have been despatched to ST2SA by WA5REU, K6KA, K4NZU and others, and Sid should be on the air in the autumn on ssb.

A new station on Easter Is is Father Dave Reddy (K2BUI) who has been given the call CE0AL. He has an NCX-1000 transceiver and has been reported as often to be found in the yl ssb net on 14,332kHz.

DU1FH is reported to be planning a half-size quad for 80m and a full-size ditto for 40m, both mounted on a 150ft tower. This should produce quite a pile-up on the lf bands.

A group of scientists will attempt the journey from HC8 to VK on a raft in the near future. They may stop at Jarvis Is. There is radio equipment aboard and they may use the call HC9EP.

The Lincoln (Nebraska) ARC will be running a special radio station from the Nebraska State Fair from 3 to 9 September. Its callsign will be KF0NEB.

It seems that stations in Mauritius and its dependencies have now adopted their newly allocated numeral type prefixes. Stations in Mauritius itself are using the 3B8 prefix and W4BPD is using the callsign 3B6CP from Agalega Is.

UK5IAA reports that UA1KAE (Moldezhnaya, Antarctica) will be looking for European contacts on 28,050 and 28,570kHz from 2000 to 1500 until December 1970. The operator is Victor, UT5TG.

CR6CA says that he is the only active rtty station in Africa and is to be found on 14,090kHz. He also favours 7045–7055kHz cw at 2300, and 3,505–3,510kHz cw at 0100 and will move to ssb if conditions allow.

Contests

The 16th European (WAE) DX Contest

0000 8 August to 2400 9 August (cw).

0000 12 September to 2400 13 September (phone).

All bands 3·5 to 28MHz. Single-operator and multi-operator single transmitter categories. Single operators may only operate for 36 hours and the 12 rest hours may be taken in up to three periods, clearly indicated in the log. Contest QSOs take place between Europe and the rest of the world and count one point, except on 3·5MHz where they count two points. Exchanges consist of RS/T plus serial QSO number, starting from 001, and stations may be worked once on each band. The multiplier for European stations is the number of DXCC countries plus JA, PY, VE, VO, VK, W/K, ZL, ZS call areas (and UA9 and UA0).

The final score is the total QSO points plus QTC points multiplied by the sum total countries from all bands. QTC traffic may be sent from non-European stations to European stations and consists of reports of contacts made earlier—each one reported counts one point. QTCs should record time, call, QSO number of station reported and may only be passed once—a maximum of 10 QTCs to any one station per band is allowed.

There are three classes of entry: (a) up to 200W input, (b) more than 200W input, and (3) new licensees (less than one year). Official log forms should be used and may be obtained from WAEDC Committee, D-8950 Kaufbeuren, POB 262, Germany.

Contest QSOs may be used for credit for the **WAE Award** provided that the log of the station claimed has been submitted and that application is made within one year of the contest.

* * *

The Ten Metre Band Contest

1300 22 August to 0100 24 August.

This is a new venture organized by the West Valley ARC of Woodland Hills, Calif. Contacts may be on any mode and each station worked once only. Points are one per QSO, one for each country worked and three for each continent, and there is no multiplier. Stations exchange signal reports only and contacts in the AA Contest may be counted. Send logs to WB6UHF, 22213 Burbank Blvd, Woodland Hills, Calif, 91364, before 24 September.

* * *

Preliminary results of the **1969 CQ WW DX Contest** (cw section) were received just before going to press. Only two UK stations feature in these—**G3HCT** who is to be congratulated in coming world third on 21MHz, and **GD3TXF** whose multi-operator single transmitter entry was world sixth in that category.

* * *

Top scores in the **1969 CQ WW DX Contest** (phone section) have been received from W1WY. In the 1·8MHz section **GM3YCB** came world second with 1,080 points, top being VE3BS (1,947 points). On 3·5MHz **G3IGW** was world third with 21,775 points (top scorer: CT2AT, 51,129 points). **G3NLY** was world third on 7MHz with 62,880 points (top: SM5BPJ, 138,061), and on 21MHz **G3HCT** world second

QTH Corner

AC0A/GR	W2MZV, Box 102, Yonkers, NY, 10702, USA.
DX0PAR	PARA, Box 4083, Manila, Phillipine Is.
F8ITU	F90E, 4 Av. H. de la Touche, 92 Chatenay Malabry, France.
F0VQ/FC	via DJ8UT, Andreas Helwing, Panoramaweg 16, 8901 Leitershofen, Germany.
FG7AC	BP 411, Pointe-a-Pitre, Guadeloupe.
FG7TG	via W5OB, 2609 Halsey Avenue, New Orleans, La, 70114, USA.
FH8CY	Yves Seguineau, 63 Bd. E Orieux, 44 Nantes, France.
FW8BO	Thomas Savelli, Box 28, Noumea, New Caledonia.
HC2GG/1	Rainer Radloff, PO Box 244-A, Quito, Ecuador.
HB0AJH/P	Paul de Graaffe, Rue L'Envers 12, CH-2605, Sonceboz, Berne, Switzerland.
HS4ADF	via WB4HIJ, 306 11th St E, Bradenton, Fla, USA.
HS6ADE	via K0BHM, 10809 Johnson Drive, Shawnee, Kansas, 66203, USA.
HS0ISB	PO Box 2008, Bangkok, Thailand.
IT1SEZ/IF **IT1SEZ/IU**	Silvano Armenta, PO Box 143, Palermo, Sicily, Italy.
KA1B	WA8NZH, 706 Johnson, Bedford, Ohio, 44146, USA.
W4VPD/KS4	W4VPD, Enos Schera Jr, 8254 SW 37th St, Miami, Fla, USA.
K5QHS/KS4	K5QHS, Box 588, Stuttgart, Ark, 72160, USA.
MP4QBK	via K4MQG, 1114 Crestview Drive, North Augusta, SC, 29841, USA.
OX5BL	via K5JXP, 2412 S Bowen Rd, Arlington, Texas, 76010, USA.
PJ4PS	PO Box 383, Curacao, Netherlands Antilles.
SV0WY	T. Apostalos, 2140-15 Comm. Det., APO NY, 09223, USA.
VQ9/F/A	(see AC0A/GR)
VR4CG	PO Box 310, Honiara, British Solomon Is.
YA1MLX	Mrs M. Shumway, US Embassy, Kabul, Afghanistan.
YA1R	via G3TXF, Holt Cottage, Kingston Hill, Surrey.
3B6CP	see AC0A/GR.
5V4JS	via 5N2AAJ, PO Box 794, Lagos, Nigeria.
5Z4LS	P. N. Henwood, G3RWF, 45 Weetwood Lane, Leeds 16, Yorks.
ex-5Z4IR	Ray Jarvis, 109 Low Road, Burwell, Cambs.
6Y0UIR	via 6Y5RA, JARA, 76 Arnold Rd, Kingston 5, Jamaica.
9H1U	J. J. Vella, Mayfair, off Ursuline St, Guardamangia, Malta GC.
9X5WJ	via W1MIJ, 58 Felch Rd, North Natick, Mass, 01762, USA.
9Y4AA	J. A. Neiger, PO Box 473, Redwood Estates, Calif, 95044, USA.

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

Correction. In *QTH Corner* last month the entry for **5N2KPT** was incorrect. This should have been: via G2FKS, G. D. N. Wilcock, 19 Cavendish Avenue, Cambridge.

with 832,016 points (top: CW0AA, 1,068,552). Congratulations to these entrants; a more detailed account of UK results will be given at a later date.

* * *

In the **RNARS High Speed Morse** run for June the following obtained certificates/stickers at the speeds indicated: ON5OJ (40 wpm), G3VPO (35 wpm), G3OKA (30 wpm), G3FPI, GM3KPD, G3XIV, G3YFW and swl P. Hudson (all 25 wpm), EI2BB and G3YUG (20 wpm).

Expeditions

GM3FSV will be in **Orkney** between 3 and 10 August and will be active on all bands 160 to 15m with special emphasis on 160 and 40m for the benefit of those working towards the WAB and WABC Awards. He will use cw and ssb.

VE7IG is reported to be planning a visit to **Brunei** and hoping to operate as VS5RB from the home of VS5MH for about a week. VS5MH himself will be moving to New Zealand in October.

Gus Browning continues his travels in the Indian Ocean. After a very difficult session on **Geyser Reef** as AC0A/GR (where he made 6,000 contacts) he proceeded to **Farquhar Is** (VQ9/A/F) and then **Blenheim Reef.** Some trouble is being experienced with his vertical aerial and a replacement is awaited.

The long-anticipated operation from **Manihiki Is** by ZK1AJ has been re-scheduled to commence about 28 July and may not last for many days. However, John hopes to leave the equipment (which has been supplied by K3RLY and WA5REU) on the island.

According to **West Coast DX Bulletin** an attempt was made recently by DJ0UJ (ex-TA2BK) to obtain permission to operate from Albania. He was in Tirana for a six-day holiday and took a transceiver with him. This was deposited with the customs, but he was told that "regretfully they could not grant amateur permits to anyone". Bahri speaks Albanian and has relations in Tirana. DL7FT is reported in the same publication to be having visa problems.

Another projected expedition, this time the F0NH/FO8 group, who hoped to visit **Clipperton Is** during July, seems to have fallen through, at least for the time being, due to transport difficulties. However, there is a report of a scientific group from an American university visiting the island during the autumn and efforts to provide some amateur activity are being made.

Information on the forthcoming **San Felix Is** activity mentioned in an earlier *MOTA* is restricted to an unconfirmed report that CE0XN may appear on the air around 12 August.

A Belgian expedition will be visiting Central Africa for 10 months commencing November 1970. They hope to be on 14, 21 and 28MHz cw and ssb using an HW32A transceiver and will have a callsign using the prefix OR5.

Despite the situation mentioned in the fifth paragraph of this section of *MOTA*, OH2BH/ZA appeared on 14,196kHz ssb on 10 July and transmitted intermittently for a couple of days. At the time of writing it was rumoured that the single band transceiver being used had been seized by the authorities, and the future of the expedition seemed to be in some doubt.

ZK1AJ's visit to Manihiki Is may possibly be over by the time this is in print, but arrangements are being made to send equipment to ZK2AF on Niue Is and he will be on the island for a period of several years. K3RLY, WA5REU and the "No Name DX Association" also hope to provide equipment for use by 5W1AR during short visits to the Tokelau Is (ZM7) some of which may take place in November.

KH6CHC is reported to be going to Palmyra Is (KP6) around 24 July for 10 days. Frequencies to be used by KP6AL will be 14,050, 14,205, 21,050, 21,345, 28,050 and 28,510kHz. Some VR3 operation may follow.

The KA1B operation was abandoned after the expeditioners arrived on the island and found that there was no accommodation. It may be repeated in September.

1970 Countries Table

	1.8MHz	3.5MHz	7MHz	14MHz	21MHz	28MHz	Total
G3JVJ	4	66	18	37	23	26	174
G8VG	3	21	28	34	55	49	190
G3VPS	9	12	10	60	18	10	119
BRS25429	3	101	79	136	130	110	559
A6148	5	84	19	49	46	68	271
A7054	1	84	4	62	73	3	227
A6265	3	80	75	186	157	126	627
A5489	—	70	17	89	60	122	358
A6248	4	59	68	160	120	106	517
BRS27880	4	54	42	116	89	59	364
A7006	17	32	28	181	179	137	574
A6278	3	44	36	76	24	29	212
A6904	10	36	47	149	145	95	483
A6023	5	38	39	78	37	19	216
BRS30694	6	24	29	70	61	44	234
A6098	4	21	12	26	37	25	125
A6242	2	19	7	38	26	29	121
A6553	1	16	14	41	72	53	197
ORS31427	—	14	13	181	115	120	438
A6992	—	—	—	161	—	35	196

(This month's table is in order of 1·8 plus 3·5MHz totals)

SWL reports

Listener readers will be interested to know that A5182 has received a letter from VE3ACD (who acts as QSL manager for many dx stations) saying that due to the very large number of reports he receives for stations under his care he is unable to QSL them unless they give a list of at least four or five stations worked by the station reported (in proper order) and noting the reports given out to the stations worked.

Reports wanted

G3MWP requires comparative reports from outside Europe on his 7, 14 and 21MHz 50W cw transmissions. He is active 0530 to 0630 and at weekends. His address is 67 Sebastian Avenue, Shenfield, Essex.

GB3SX

Reports of reception of the beacon station GB3SX (especially from outside the UK) would be very much appreciated. The beacon transmits on 28,185kHz with a power input of 25W. Please send reports to G3DME, Altadena, South View Road, Crowborough, Sussex.

Band reports

Conditions on the whole have been very similar to those obtaining during the last period reported, and have included some openings into Australia as late as 2330 on 28MHz. Exceptional propagation conditions appear to have existed on that band during the period 22–24 June, one report records a contact between 3Z1AGE and PZ1AH at 0328.

Among those contributing this month were: G2CDT, G2HKU, GW3AX, G3AAE, GW3AHN, GM3CFS,

Propagation Predictions

August will be the last month with poor summertime conditions, which will be specially noticeable on **21** and **28MHz.** Then they will improve to reach their best in October and November.

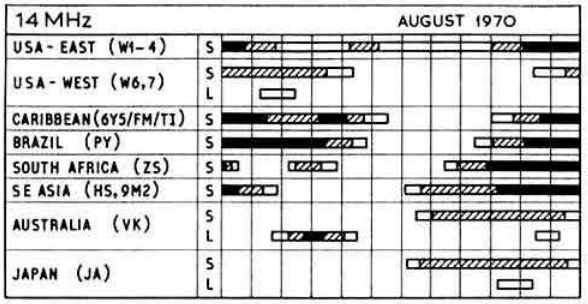
On **28MHz** North America will only be heard in exceptional circumstances. Neither will traffic with South America be certain, but contact with South Africa will be better. Finally a slight improvement in dx conditions to South-East Asia and Australia can be expected.

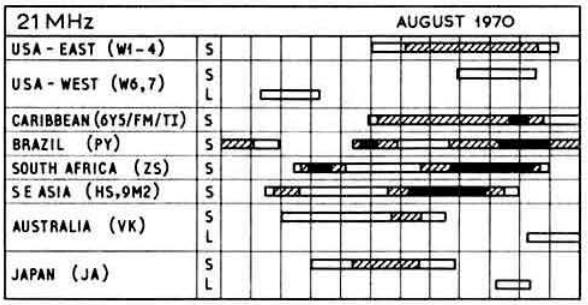
Traffic with North America will be certain again on **21MHz** in the early evening. The propagation path to western North America will also show some improvement on the previous month. As the nights lengthen in the northern hemisphere and shorten in the southern, traffic areas in the northern hemisphere (North and Central America and East Asia) will generally cease earlier than the previous two months, but to areas in the southern hemisphere (South Africa and Australia) the opposite will be the case. As compensation for the continuing poor dx conditions this month, the sporadic short-skip conditions will continue on the hf bands.

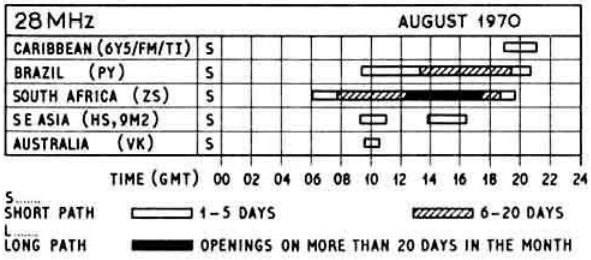
14MHz will continue as a night-time dx band. The conditions to North America will, however, worsen slightly in the early morning. In the late afternoon contacts will be possible with South Africa, South-East Asia, Japan and Australia, though often badly affected by European QRM. During daytime 14MHz will still be an ideal band for European traffic and maximum distances will increase as autumn approaches.

The latter also applies to **7** and **3·5MHz.** In the latter half of the night on 3·5MHz the dead zone will only interrupt local traffic on rare occasions.

The provisional sunspot number for June 1970 was 106 with activity fairly evenly distributed throughout the month. The peak period of solar activity was on 14 and 15 June with daily numbers of 182 and 185, respectively. The predicted smoothed sunspot numbers provided by the Swiss Federal Observatory for October, November and December are 90, 88 and 86, respectively.







G3KGM, G3KWK, G3VLX, G3VYF, GM3WDF, G3WPO, G3XVM, G3YWX, G3ZHI, GM4QK, G5BM, G5JL, G8VG, BRS2098, BRS17567, BRS27880, A6023, A6248, A6265, A6403, A6947, A6966 and A7006, to all of whom thanks are due.

Stations listed in italics were on cw, all others on ssb.

1·8MHz. 2100 PA0PN (home-made converter with Trio TS510).

3·5MHz. 2000 EP2DX, 5Z4KL. **2100** CR6IV, CR7s IV, MJ, ZB2A. **2200** CR6s IV, MJ, ZB2BY, 5V4JS, 9J2DT. **2300** VP8KF, VU2BEO, ZS6BMD, 6W8DY. **2400** CE3ZN, EL2CB, OD5BA.

7MHz. 0000 CR6PC, YV1BI, *ZS1MH*. **0100** TU2BB, *5T5BG*. **0200** EP2TW. **0400** ZLs 1SE, 3WO. **0600** CO2DC. **2100** CR6GA, CR7GJ. **2200** OY9LV, PYs, TR8s DG, MC, VP2VI, 9V1PP. **2300** CT2AC, EA8HA, EL2Y, PY0AD, *9J2XZ*.

14MHz. 0000 *6Y5SR*. **0600** AX0KW, CE0s AE, TS, FO8s, VR6TC, *ZM1AAT/K*. **0700** F0QD/FC/P (QSL to G3JIJ), FK8BK, M1AP (on a.m.). **0800** HK0BKW, KS6s DH, DJ, 9G1BF. **1200** AX9AC (QTH PO Box 5122, Boroko, Papua—include four IRCs for airmail reply). **1300** *DL7FT/ZA*. **1500** TA1MT. **1600** *F0WJ/FC* (QSL via W5QNY). **1900** *KL7DTH/KG6* ZB2A. **2000** ZD7SD, 9M6HM. **2100** AP2KS, VQ9E. **2200** CT1FIL ("Fair International Lisbon"), FG7AC, HH9DL, 5V4JS. **2300** UA9VH/JT1 (Zone 23), MP4TDK, TN8BK.

21MHz. 0000 HC6CL (PO Box 383, Umbato, Ecuador), *KV4FQ* (QSL via WB2CDZ), *VP2KN*. **0500** CE0AE, FB8XX, FM7WF, 5Z4LS (QSL via G3RWF). **0600** TU2BU. **0700** KS6DH, ZM1AAT/K. **0900** HM4FA, 5U7AR. **1000** VR2EK. **1100** KS6DH, MP4TDA, VK9AC, VK9VM (T.N.G.), VR1L, *VR2FO* (50W to dipole), 7Z3AB. **1200** *TA3AY*. **1300** KW6EG, *SU1IM*. **1500** ZD3D, 9V1PA. **1600** *FM0XF* (DL5RI). **1700** TJ1AW, 5V4JS. **1800** *VS9MZ*, 7Q7JD. **1900** CR3NS, VP8KL, *VQ9/A/F*, *UA1KED*, *ZP0BK*, *HB9YC/4W1*, 5B4ES, 9M2FK. **2000** HB0LL, 5T5BG. **2100** *AC0A/GR*, YN2AB, ZC4IK, ZD8JK. **2200** M1KVC, OX3BE (quick QSL via OZ8KW). **2300** JY1, 8R1J.

28MHz. 0900 FH8CE, *HS5ABD*, VK9XI. **1000** FB8XX, VU2DK. **1100** XW8BP. **1200** CR4BB, M1A, MP4MBC, *UA1KAE*, 5N2AAF. **1300** OJ0DX. **1400** FR7ZW, *ZD8RC*. **1500** *CE3ZK*. **1600** ZS3HT. **1700** *AC0A/GR*, *EA6BD*, 3V8AL, 5T5BG. **1800** *FH0VP*. **1900** HB0LL.

Sincere thanks to all correspondents, and especially to the following for permission to use material from their publications: 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*), the **Ex-G Radio Club Bulletin** (*W3HQO*), **DX'press** (*PA0TO*), **DX News Sheet** (*Geoff Watts*), **International Communications** (*Euradio*), **QUAX** (*G3DME*), and the **DX-ers Magazine** (*W4BPD*). Please send all items for the **September** issue **to reach G3FKM** no later than **10 August**, for the **October** issue by **2 September (note the early closing date)**, and for **November** issue by **12 October.**

SOCIETY AFFAIRS

A brief report of the Council meeting held at Society HQ on 8 June 1970

Present: *Dr J. A. Saxton (President, in the Chair), Dr E. J. Allaway, Messrs B. Armstrong, A. Hunter, E. G. Ingram, G. R. Jessop, A. C. Morris, L. E. Newnham, C. 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).*

Apologies for absence were received from Messrs J. O. Brown and R. J. Hughes.

Norman Caws, G3BVG

The President confirmed that he had written to Mr Caws advising him of Council's decision to elect him an honourary member. It was agreed that Dr Saxton should present the special badge to Mr Caws privately at a suitable opportunity.

Zone G meeting

Mr Hunter reported briefly on the Zone G meeting, and stated that he was satisfied with the attendance. Council agreed that the frequency of zonal meetings was largely a matter for local arrangement, but two meetings per year seemed appropriate.

Membership and affiliation

It was resolved:

(i) to elect 64 corporate members and 29 associate members;
(ii) to grant corporate membership to three associates;
(iii) to waive the subscription of seven members due to blindness or other disability;
(iv) to grant affiliation to the Bicester Amateur Radio Club; MIRA Sports Club Radio and Electronics Section; and Portsmouth Polytechnic Students Union Electropode Society.

East London RSGB Group

The East London RSGB Group had requested that a Council member or headquarters representative should attend their meeting on 20 September to answer questions on "RSGB and Representation".

Christopher Columbus Award

The International Communications Institute of Genoa had enquired if the RSGB wished to submit names of radio amateurs for consideration for the Golden Medal and Diploma of the Christopher Columbus Award.

After discussion the Council resolved to make no recommendation for 1970.

BATC Convention

The British Amateur Television Club had asked that a representative of Council attend the BATC Convention Dinner in Cambridge. Council resolved that the zonal Council member, Mr Hughes, should be asked to attend this function to represent Council.

Minutes of committee meetings

Council approved the minutes of the HF Contests Committee (3.4.70), Technical Committee (5.5.70), Mobile Committee (11.5.70) and Finance & Staff Committee (18.5.70).

Other business

Mr Stone reported that the VHF Convention had made a satisfactory profit and substantial sales of Society publications had also been made. Attendance had been 372.

Mr Scarr mentioned that provisional arrangements were being made to hold a Region 9 ORM in May 1971.

It was reported that a useful meeting had been held with the Ministry of Posts and Telecommunications to clarify the intention of the UK administration with regard to the forthcoming Conference on Space Communications.

Mr Stevens reported that copies of the revised Operating Awards Leaflet would be included in the August issue of *Radio Communication*. The new certificates were at present being printed, and the revised requirements would take effect from 1 January 1971.

As the RSGB Exhibition would be held at an earlier-than-usual date this year, Council approved a scheme whereby visitors to the exhibition who wished to purchase the new edition of the *RSGB Amateur Radio Call Book* could self address envelopes so that copies could be despatched post free to them on publication.

Council was in session for $2\frac{3}{4}$ hours

Michael Owen, VK3KI, Federal President of the Wireless Institute of Australia, signs the visitors' book in RSGB headquarters under the eyes of G3FRV and G2BVN. Mr Owen is on a world tour of IARU societies, dealing particularly with the forthcoming space conference

YOUR OPINION

The Editor
Radio Communication

Sir—I write to express my full agreement with the views expressed by G3FZW in a letter published in the June issue of *Radio Communication*.

It is vital to our interests that the Society should continue to represent the British radio amateur movement in a firm and positive manner at future international conferences, also with our own licensing authority. For this purpose more money is needed and if it should prove to be necessary to double the present

membership subscription fee we should be prepared to accept the necessity without grumbling.

The alternative to a strong RSGB means our rapid decline and eventual extinction; already powerful commercial interests are pawing the ground in their impatience to take over our narrow frequency bands and some of them have not waited for international agreement before working inside them!

Your faithfully,
Robert E. Wilkinson, G8CTF

The Editor
Radio Communication

Sir—I have every sympathy with BRS30328 in his difficulties, being one of the few, and I mean few, who send RSGB slow morse. I also find that some radio amateurs deliberately interfere with this service, but fortunately there *are very few* of these selfish individuals. I only wish that some more persons would volunteer their services, then a really comprehensive country-wide service could be provided. I know people will plead lack of time, but to send 30 minutes of slow morse needs only an hour of your time. I manage this twice a week, and also I am on the committees of the RNARS, EARS and BOAC Speedbird Radio Club, and am also a serving member of RNXS. I also participate in most contests, national, international, and ones like MCC, AFS, NFD, etc.

I know my friend Mr MacBrayne, G3KGU, will be very pleased for any extra volunteers for the slow morse service; you do not have to be the world's best cw operator to send slow morse.

Yours faithfully,
D. F. J. Walmsley, G3HZL

The Editor
Radio Communication

Sir—It was with a certain sadness, but with no surprise, that I saw the ¼-wave vertical (June issue) condemned as "not a dx transmitting aerial" and dx working with it "difficult if not impossible".

It would seem from these comments that the current feeling is that a beam aerial is not only an aid in dx working, but has become an essential pre-requisite thereof, without which dx hunting is not possible.

Obviously a beam makes things easier, but to say that a vertical is not a dx transmitting aerial is inadmissable, and I am surprised to see G3SAA's judgement published without editorial comment.

I have always found the ¼-wave vertical to be excellent for dx working. While not wishing to boast (my only wish is to encourage newcomers not to fall into G3SAA's frame of mind) I have regularly had 569/579 from VK on 20m, and have got 579 from Japan using 5W input on 15m more than once; using a multiband vertical system tuned against four 20m radials on both bands.

In the time I have been licensed I have worked all states and over 130 countries using 75/150W of cw to either ¼-verticals or indoor dipoles.

The addition of a cubical quad to the aerial farm increased the score by a mere five countries and annoyed the neighbours no end.

We are supposed to be in this business for self-training in wireless telegraphy, so let us get the key out, put up a vertical and we might degenerate into button-pushing telephone operators a little later than we look like doing now.

Yours faithfully,
R. G. D. Stone, G3YDX

The Editor
Radio Communication

Sir—For the past two years a number of local radio amateurs in the High Wycombe area have joined together to stage an exhibit and station (GB3WAR) for the Wycombe Show in September. As we are a non-club group, last year we thought we would offer free advertising to any club within a 30-mile radius which wanted it. Accordingly we looked through the various magazines for addresses and wrote to some 30 clubs. We were rewarded with 12 replies. These clubs were duly displayed on our maps which excited a fair amount of interest. The trouble is that costs are rising and we, as an independent group with no source of income, cannot afford to repeat this exercise for such a low return. May I, therefore, through the medium of *Radio Communication* ask any club which would like this free publicity to contact me with the following details: (*a*) Name of club, (*b*) Address of meeting place, (*c*) Date and time of meeting, (*d*) Name and address of person to contact for further information.

Yours faithfully,
A. C. Butcher, G3FSN

The Editor
Radio Communication

Sir—In reply to Mr Jones, GW3HAW, I should like to say that the letter on pollution, published under QTC in the April issue of *Radio Communication* and sent by the Society at my suggestion, concerned primarily those who are not even attempting to communicate but nevertheless pollute the radio frequency spectrum. I refer to contact devices, electric motors, overhead power transmission lines, etc which were such a high proportion of the causes of interference mentioned in an article based on Post Office statistics.

I must admit also to some surprise at Mr Jones' comment on amateur transmissions. Let us realize that we are AMATEURS, that part of the object of amateur radio is self-training. If we were perfect we would not require further training. Furthermore, experimentation is another of the objects of amateur radio and in the course of experiments bad transmissions are naturally bound to arise. Surely our frequency allocations are allocated to us to *train* and *experiment* on, not for the purpose of exhibiting perfect signals.

It will be a sad day for amateur radio when we cannot show toleration: (1) to those who may put out a bad signal in the process of self-training; (2) to those who are experimenting with systems of modulation, different microphones or keying methods, etc; and (3) to those who happen to have faults on their equipment which they have not yet succeeded in locating and curing.

When one hears professional operators, paid to transmit with all the resources of broadcasting organizations, emitting spurious radiations on the exclusive amateur bands, I feel we need not be ashamed of the standard of signals generally heard from amateurs who are doing it unpaid, in their spare time, and often with limited resources.

As I read the editorial in the April issue, it referred primarily to vhf, and was designed to encourage the use of our existing allocations not to frighten people off for fear of radiating imperfect or defective signals.

The editorial was entitled "Use or Lose".

Yours faithfully,
E. M. Wagner, G3BID

RSGB Lecture

British Trans-Arctic Expedition 1968/69

Lecture by Sqn Ldr F. W. Church, member of the expedition, with D. J. Collins, G2FLB, and R. G. Shears, G8KW, who planned and operated the G7AE section of the Arctic to UK radio link.

The success of the recent polar walk from Alaska to Spitzbergen by Wally Herbert and his three colleagues depended to a large extent upon the reliability of the radio communications link. Freddie Church, operator of the expedition's Arctic radio relay station and on the spot supply organiser, together with Dennis Collins and Roly Shears, will describe and illustrate with slides the problems not only related to radio equipment and communication but also of the polar crossing by Wally Herbert, Ken Hedges, Allen Gill and Fritz Koerner.

Monday 28 September 1970

Institution of Electrical Engineers,
Savoy Place, London WC2

Buffet tea 6pm. Lecture 6.30pm

Members intending to be present are requested to advise RSGB HQ so that catering arrangements can be made.

RADIO AMATEUR EMERGENCY NETWORK

by S. W. LAW, G3PAZ*

It is not considered to be good form to use another writer's material but we are sure that G5UM will not object to the underlining of his item in last month's *Four Metres and Down* which concerned an unnamed transmitter who told a military station that it was trespassing on the "exclusive amateur band" of 4m—he could not have been more wrong! We have hitherto deliberately avoided this point in writing about 4m, as one does not crow about a gracious privilege granted by those high in authority only after long and careful deliberation. Now let it be quite clear—**the military were there first**; the authorities only granted the concession of amateur operation on the band after long discussions with the RSGB on the strict understanding that no interference was to be caused to the legitimate users.

A small sector of the band was specially set aside for RAEN operation after further discussion, having regard to the importance of their commitment to the user services. That this restriction has now been removed reflects great credit on those who have given so much of their time and skill to demonstrate that RAEN can indeed provide a viable system for emergency communications in time of need. So please remember—we use 4m as a privilege. The RAEN Committee will be only too pleased to advise new groups on the choice of a 4m channel.

Basic truth

Again we beg leave to quote from last month's issue. This time we turn to *VHF Personalities* which featured the G2AVC/G3GOX team of the Surrey RAEN Group. G3GOX (Ann) is quoted as saying "We think that membership of a properly organized and trained group is very necessary if one is not to be more of a hindrance than a help in an emergency".

Thanks, Ann and Harold; we are not ashamed to aver that this airing of what we think to be an obvious truth is good to hear. We have too often suffered the hail of verbiage from those who hold other views. Let them now digest this clear pronouncement and consider it well!

Compatibility

Readers of "Rocket Opera" (Science fiction to you) will be quite familiar with the solution of the problem of the alien space vessels meeting in the void, fraternising, but not wishing to reveal their home bases. Solution? Change ships, thus acquiring each other's techniques peaceably. Having fixed your attention thus, may we applaud the recent trend toward the holding of "joint exercises" between neighbouring RAEN Groups; while re-iterating the plea for a hard look at the problem of compatibility of interface, ie plugs, sockets, connectors and so forth. Have you a stock of adaptors so that the changes could be rung on any gear you might have to swop around in a hurry? Could you loan a couple of rigs to the next county (or they to you) without wasting valuable time chopping off and refitting different aerial plugs? Get together with the others and talk it over. The sooner the better.

Those aerials

Have you tried the 5/8 wavelength whips yet? We hear enthusiastic reports from a number of stations on both 4m and 2m, and that some even claim to have had success with a "dual" whip which operates on both bands equally well although in different modes. Let us know if you have any tips to impart on the subject and we will spread them around.

While on the subject; have you tried dual-band quads for /P?

The Newsletter

The mid-1970 Controllers' Newsletter should be around by the time this is in print. Comments, suggestions and contributions will be very welcome. Help the RAEN Committee to help you to help each other!

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

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

Honorary secretary, RAEN Committee: **Mr. E. R. L. Bassett, 57 Upper St Helens Road, Hedge End, Southampton, SO3 4LG.**

RAEN Group of the Month

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

The Surrey Group

Group controller: John Whitney, G3MFB, 104 Grand Drive, SW20.

Group control channel, 70·365MHz; Group traffic channel, 145·150 MHz.

The Surrey RAEN Group was founded in 1959 with a membership of 12 licensed amateurs and was originally known as the Surrey and Thames Valley Group. Membership now stands around the 50 mark, with at least 45 licensed to transmit.

Until 1968, joint exercises were held with the Surrey County Constabulary, and a main station was installed in their headquarters, but late in 1968 the county constabulary withdrew support on the grounds that the established police communications would fulfill all emergency needs.

Good contact is maintained with the British Red Cross Society, and a number of base stations are held in readiness to be installed, should the need arise, in various divisional headquarters throughout the county. Surrey RAEN is included in the Surrey County Council emergency plan, and frequent exercises are held to prove the group's equipment availability and traffic capability.

The previous group controller, John Kingston, G3VK, gave valuable service on the National RAEN Committee before being forced to resign for domestic reasons. During recent years much progress has been made under the guidance of the energetic group officers. To quote from a recent Surrey "Handbook" . . . "by means of self training in message handling and in technical matters relating to equipment, the radio amateur is able to provide a dependable and efficient service at very short notice."

Thank you, Surrey!

OBITUARIES

E. Baldwin, G3UFM

Eric Baldwin died suddenly at the age of 35 on 30 June. Very active on the hf bands, he took part in many contests under his own call-sign and as one of the team operating GB2SM. He was one of the seven founder members of the Echelford ARS, and the society was represented by G3YCQ, G3JUL and G3RHF at his funeral.

C. W. Newell, G3SBK

Charles W. Newell, G3SBK, of Challock, died on 30 June. He had been a member of RSGB for many years.

G. W. Riseley, G3FW

Gordon Riseley died on 10 June at his home in Market Harborough, aged 63. First licensed in 1938, he was active on the hf bands up to the time of his death. Until fairly recently he also operated mobile.

K. Scott, ZS1BV

Ken Scott, a well known OT of Cape Town, died on 25 June. For more than five years he had daily contacts with G and provided propagation checks, and had a regular daily schedule with Ws, ZE, 5N2 and CT1.

CONTEST NEWS

BERU 1970 results

The Thirty-third BERU Contest held on 7-8 March will go down on record as having coincided with very bad conditions, particularly during the second day.

The cause of this was a major solar storm which gave vivid Aurora displays and a grand opening for the vhf men! Conditions were bad on all bands, but particularly so on 21 and 28MHz.

A further trial was that ARRL decided to run the second leg of their phone contest over the same weekend, and this must have curtailed activity from VE as well as others who had been on in the first section of the ARRL contest. The clash of dates was not the fault of the RSGB, which notified the date to IARU 12 months previously and kept to that date —it was the Americans who made the change.

The Senior Rose Bowl was won by R. J. E. Mills, VQ8CR, with a score of 5,357 points from 517 contacts. Runner-up and winner of the Junior Rose Bowl is D. M. MacVicar, VP7DX, with a score of 4,624 points; this station was placed 24th last year and so has made a spectacular climb up the table.

Third place and the Colonel Thomas Rose Bowl goes once again to D. L. Courtier-Dutton, G3FPQ, with a score of 4,475 points, this being a repetition of the 1969 result. In fourth place was A. J. Slater, G3FXB, with 4,456 points.

In fifth place was the 1969 winner of the Low Power Section, André Saunder, 5Z4KL, who, running his low power transmitter, notched 4,425 points.

All the leaders' scores were considerably down on last year.

Receiving Section

Once again, and for the fourth time running, Eric Howell, BRS24775, wins the Receiving Rose Bowl with a score of 3,940 points, a figure well down on his 1969 total. Second place goes to R. S. Stott, BRS18013, with 2,795 points, followed closely into third place by E. R. Sherlock, BRS6604, with 2,782 points.

Equipment

VQ8CR, operating from Mauritius, used a HT32 transmitter and a SX117 receiver. Aerials consisted of cubical quads for 20, 15 and 10m and inverted Vees for 80 and 40m.

VP7DX ran only 55W to a Johnson Ranger and a Racal receiver. Three-element tri-band Yagi for 20, 15 and 10m and inverted Vees for 80 and 40m.

G3FPQ used a Central Electronics 100V transmitter and a home-built receiver; a ¼-wave vertical for 80m, a ½-wave vertical for 40m, and a tri-band quad for 20, 15 and 10m completed his aerial system.

G3FXB used a KW Viceroy transmitter, SB301 receiver, inverted Vees for 80 and 40, and a tri-band quad for 20, 15 and 10m.

In the receiving contest the winner used a Drake 2B, a 29ft vertical and a 10m ground plane. The runner-up had a Trio 500, a 100ft long wire and a 10m dipole.

Comments on rules

A few stations objected to separate logs for each band and could see no reason for this. The answer is that it makes the work of checking by the HF Contests Committee a lot easier, as groups of people can check different bands at the same time. 5Z4KL, a staunch supporter of the Low Power Section and who was hoping to make a hat trick in this section, thinks we should have dropped the Senior Section and limited everyone to 25W.

Other suggestions are to drop 80m and to limit operating time to 24 out of 48 hours.

What about teaming up with REF and other national societies to get more activity? BERU stands for British Empire Radio Union; the British Empire no longer exists but while we are running a Commonwealth only contest it would be odd to let in the Ws, JA etc, unless they want to join the Commonwealth!

A suggestion that the 1971 BERU should be brought forward to mid-January. It does not appear to clash and, of course, as far as G is concerned means that the bands close earlier, and this allows for some sleep! What about the Southern Hemisphere boys?

All suggestions are very welcome and will be considered when the rules for 1971 are being finalized.

Comments from the HF Contests Committee

The entry is down from 94 to 76, which is sad, but was not predictable as the committee chose a clear week-end well in advance and could not, of course, foresee the sunspot activity. The Receiving Section remains more or less static and seems to be a Eric Howell's benefit!

Generally the logs were of a good standard but there were some which left a lot to be desired. Those overseas entrants from far away who send their logs by 2nd class surface mail do not make things easy and it may well be that air mail only will be the rule next year.

Activity

This was much lower than usual and the lack of VE stations was commented on by most entrants. However, there were a lot of stations on who did not send in entries; a pity this, as it is nice to have a large entry.

Check Logs

The committee is grateful to the following for sending in check logs: G3UP, G3DYY, G3VHL, G3ATU, G5OJ, VE3EK, VP9BK and F. K. Tesch.

The following entries were not accepted: G3GFG, late entry; G3KSH and G6CJ, Rule 6—no check list. These logs were very useful as checks.

Transmitting Section

Posn	Callsign	Points	Posn	Callsign	Points
1	VQ8CR	5,357	37	VE3BJK	1,876
2	VP7DX	4,624	38	G6XL	1,830
3	G3FPQ	4,475	39	G3IGW	1,725
4	G3FXB	4,456	40	VE2LY	1,540
5	5Z4KL	4,425	41	MP4BHM	1,535
6	G5WP	4,350	42	G3APN	1,495
7	VE1TG	4,270	43	G2HLU	1,475
8	ZM4BO	3,665	44	AX3ZL	1,460
9	VK5NO	3,640		G3VW	1,460
10	9H1CB	3,630		GM3CFS	1,460
11	G5RI	3,580	45	G2DU	1,450
12	VO1AW	3,570	46	ZB2BO	1,415
13	VE2WA	3,550	47	G3JKY	1,315
14	VE2AYY	3,540	48	G2NH	1,300
15	G3FXA	3,510	49	9V1OT	1,285
	9V1PB	3,510	50	G3WSL	1,280
16	AX2BPN	3,255	51	9H1BB	1,255
	VS6BC	3,255	52	G3VYI	1,175
17	VS6FX	3,225	53	G3KPU	1,150
18	VK3MR	3,105	54	G2BW	1,075
19	G2DC	3,035	55	G8KU	1,050
20	VK2GW	3,025	56	G8QZ	1,000
21	ZC4CB	2,925	57	AX2BJL	990
22	VE7UZ	2,810	58	G3ICH	880
23	ZM1HV	2,615	59	9V1PM	825
24	9H1BP	2,590	60	VE3BMB	785
25	G5RP	2,575	61	G2AJB	760
26	G6RC	2,445	62	VE5PM	650
27	G2QT	2,240	63	VE1AE	635
28	G3GGS	2,180	64	AX2OW	560
29	VS9MZ	2,165	65	GW3JI	525
30	VE3EWY	2,140	66	G2BLA	500
31	G3SJE	1,975	67	VE5SC	475
32	G5VU	1,940	68	G3WP	400
33	VE7HQ	1,925	69	G3NOM	275
34	AX7CH	1,920	70	9G1HM	100
35	G3TR	1,905		G3ZEN	100
36	VE3BWY	1,890			
	VE3AU	1,890			

Receiving Section

Posn	Name	Points
1	Eric Howell, BRS24775	3,940
2	R. S. Stott, BRS18013	2,795
3	E. H. Sherlock, BRS6604	2,782
4	D. C. Piccirillo, 5N2-099	2,440
5	R. F. Stanbridge, BRS31879	1,410
	E. Trebilcock, BCRS195	1,410
6	S. Jesson, BRS30628	1,380
7	B. J. Potter, A6664	1,180
8	K. Nad, WIAL2949	380

Salisbury DF Qualifying Event (Results)

Seventeen teams signed in at the start at Picket Post in ideal weather. The New Forest being remote from the recognized centres of df activity, the organizers (Salisbury & District SW Club) sincerely thank those who travelled long distances to take part.

When the sites were selected the approaches were well guarded by swampy ground, but a month of drought had dried out the area and the easy going encouraged several of the team ladies to come right to the transmitters; only too frequently they are like nightingales, heard in the undergrowth but never seen.

Roads no longer there and railway tracks which had become roads convinced a few teams that investment in modern maps was overdue, while locked gates on forest tracks caused some hasty recalculations.

Both transmitters were five miles from the start, "A" (operated by G3OBW and G3PLQ) to the north-east and "B" (G3HCL and G3ZJJ) to the south-east. Most teams chose to take the "B" station first, probably because the initial bearings indicated that the "A" station was considerably nearer the tea venue.

The first three arrivals had not previously qualified and, subject to official confirmation, Messrs Simmons, Mollart and Hawkins go forward for the National Final in September.

Some 60 guests and their hosts enjoyed a slap-up home-brew tea organized by Mrs Kimber, mother of G8COO. In his welcome, G5YN, President of the S & D SWC, invited the winners to identify the main factor of their success. In order of finishing they attributed it to speed, cunning and luck. Mr G. T. Peck, on behalf of the RSGB, thanked the organizers.

Posn	Competitor	From	Time of arrival "A" Stn	"B" Stn
1	A. Simmons	High Wycombe	1521	1426½
2	E. L. Mollart	Marlow	1524½	1426
3	M. Hawkins	Colchester	1526	1425½
4	W. J. North	High Wycombe	1526½	1425½
5	J. R. Vickers	Faringdon	1542	1433
6	J. M. Sonley	Poole	1545½	1435
7	O. L. Harding	Lincoln	1605	1450½
8	R. J. Pearce-Boby	Oxford	1617½	1451½
9	T. C. Gage	Cookham	1454½	—
10	A. E. L. Brown	Poole	—	1504½
11	P. Woollett	Edenbridge	1517‡	—
12	P. J. O'Connor	Poole	—	1520
13	K. Lennard	Oxford	1537½	—
14	G. T. Peck	High Wycombe	—	1610
15	V. F. Cotton	Bournemouth	—	1618

(Two competitors failed to locate either transmitter)

432MHz Open Contest, 30-31 May 1970

Nearly all the 44 entrants for this contest agreed that propagation conditions on paths from most parts of the country appeared to be about average. Despite this the best contact, between G3NNG/P in Berkshire and PA0EZ in Hilversum was a respectable 471km. The number of entries was 50 per cent up on last year, the number of stations recorded as active being slightly less at 175.

In Section "A", Roger Taylor, G8BBB, finally overtakes G8AKE by quite a large margin of points. Third place was taken by GD2HDZ.

The 50 per cent increase in entries was evident in Section "B" with three entries this year, winner and runner-up being G8BBY and G3WXI/A, respectively.

In the portable section Arthur Russell, G8AWS, operating solo as usual, pulled away from G3NNG/P to win. G8DIZ/P with 320 points came in a close third.

Comments on the rules were few and complimentary. From G8AUE: "Timing right and scoring system ok—nothing to say wrong!" On the subject of cover sheets many people omitted small details such as best dx, county code, QRA, and even claimed score! It would also be helpful if people put their comments on the back of the cover sheet as requested. Many people seem unaware of the definition given to QTH, and stations were heard giving several alternatives, not all on the 10-mile map.

Comments from entrants: G8BBB and G8BGQ, the two ssb stations, rightly complain of the number of stations who appeared to be unaware of this mode. GC2FZC requests that more stations turn their beams south. From G3NKL: "I did not know there were so many stations workable at such range on 70cm under average conditions." From G8AWZ/P: "Poor activity." G3NNG/P was using a completely transistorized station and queries how the power should be declared when using a varactor multiplier.

Subject to Council approval, certificates will be sent to G8BBB, G8AKE, G8BBY, G8AWS/P and G3NNG/P. In addition, G8BBB will receive the Council Cup as overall winner.

Section "A"

Posn	Callsign	Score	QSOs	County	Best dx	Power	Aerial
1	G8BBB	377	74	CE	370	150*	2 × MB
2	G8AKE	278	71	LR	290	150	4 × 14 ele
3	GD2HDZ	191	21	IM	409	40	PB
4	G8AUE	170	52	DY	246	50	14 ele
†	G8AYN	160	53	SY	248	35	2 × MB
5	G8ARM	151	50	LD	298	12	2 × MB
6	G3PMX	129	32	EX	215	14	PB
7	G3EEZ	112	34	SD	243	60	2 × 10 ele
8	G8APZ	99	39	MX	220	30	PB
9	G8AVC	97	33	DY	235	30	PB
10	G8AWO	90	37	—	—	120	MB
	G8AKT	90	27	BD	198	24	24 ele
12	G8BGQ	89	44	HF	120	30*	PB
13	G3OHH	85	31	SD	227	25	PB
14	G8BGX	84	36	—	—	35	PB
15	G8ABI	73	30	—	115	5	8/8
16	G5UM	67	28	LR	162	24	14 ele
17	G3COJ	65	22	BS	280	150	14 ele
18	G3NKL	61	11	LE	261	30	PB
19	G8BAV	59	29	DY	172	23	PB
20	G8BWO	54	24	SD	124	14	PB
21	G3EHM	50	27	—	130	15	14 ele
22	GC2FZC	44	7	GY	340	20	10 ele
23	G8BQH	37	29	BS	95	50	PB
24	G8AVG	36	12	WE	180	15	PB
25	G2WS	33	13	ST	163	70	11 ele
26	G8VN	23	13	LR	90	20	10 ele
	G8AQZ	23	12	ST	116	28	8/8
28	G8CTT	16	13	KT	60	30	PB
29	G8BKR	12	9	GR	74	8	8/8

* Also used ssb
† Adjudicator unchecked score
PB = 18 ele Parabeam
MB = 46 ele Multibeam

Section "B"

Posn	Callsign	Score	QSOs	County	Best dx	Power	Aerial
1	G8BBY	282	74	NR	330	150	4 × 27 ele
2	G3WXI/A	123	39	—	—	90	8/8
3	G8ADP/A	60	17	GR	220	12‡	14 ele

‡ DC power in on 144MHz

Section "C"

Posn	Callsign	Score	QSOs	County	Best dx	Power	Aerial
1	G8AWS/P	365	88	SD	304	25	MB
2	G3NNG/P	336	70	BE	471	25††	MB
3	G8DIZ/P	320	75	SY	425	150	PB
4	G8DDC/P	314	83	NR	305	150	MB
	GW8BVP/P	314	62	BR	275	25	MB
6	G8AEV/P	274	63	SE	346	25	64 ele stack
7	G8BCG/P	226	67	SD	395	12	PB
8	G3TTV/P	217	58	BS	294	10	PB
9	G3UBX/P	149	41	SD	206	30	PB
10	G8AWZ/P	125	20	NK	385	25	MB
11	G8CDL/P	98	38	BD	158	25	PB
12	G8BGW/P	86	36	DY	174	10	8 ele
13	G3RZG/P	40	11	DT	270	18	MB
14	GW3UUS/P	30	12	MH	130	5 (op)	8/8

†† Power out on 144MHz

BARTG VHF RTTY Contest 1970

Licensed amateur radio stations within Zones 14 and 15 are permitted to use rtty as a mode of operation. Portable operation will be permitted, but must be from one location for the duration of the contest.

When: 1700gmt Saturday 24 October until 1700gmt Sunday 25 October.

Bands: 144MHz and 432MHz amateur bands. 70MHz amateur band for UK stations. (This will be considered as a separate contest during the same period).

Stations may not be contacted more than once on any one band. Additional points can be claimed from the same station if a different band is used.

Messages will consist of:
(a) Message number,
(b) Time gmt,
(c) RST report,
(d) QRA Locator (Standard five symbol locator) on QTH given either as a town or as a bearing and distance in kilometres from a town.
The town MUST be identifiable on a normal tourist road map.

Points:
(a) All two-way rtty contacts will score in accordance with the distance chart below.
(b) All stations will receive a bonus of 200 points per country worked including their own.
(c) Band multipliers as follows: 70MHz and 144MHz bands score x 1, 432MHz band, score x 10.

Distance:

0–50km	scores	1 point
50–100km	scores	3 points
100–200km	scores	6 points
200–300km	scores	10 points
300–400km	scores	14 points
400–500km	scores	18 points
500–600km	scores	22 points
600–700km	scores	26 points
700–800km	scores	30 points
800–900km	scores	34 points
900–1,000km	scores	38 points

Scoring:
(a) Two-way exchange points x countries worked per band.
(b) Country points x band multiplier.
(c) Total score = (a) + (b).

Logs: Use one log per band. Logs to contain: message number, time gmt, callsign of station worked, RST of his signals, QRA or QTH received, estimated distance and points claimed.
Awards: Certificates will be awarded to the top scorers, fixed and portable, on each band in each country. The judge's decision will be final and no correspondence can be entered into in respect of incorrect entries.

Send your logs to: Ted Double, G8CDW, BARTG Contest Manager, 89 Linden Gardens, Enfield, Middlesex, England.
All logs must be received by 21 November 1970 to qualify.

World RTTY Championship

This award, which is sponsored by the Italian magazine *CQ Elettronica*, is awarded annually to the radio amateur who has shown a high degree of ability to operate rtty during a period of one year. The system of awarding points was arrived at after discussion with and agreement between the committee of BARTG, the Alex Volta Society and the committee of the Giant RTTY Flash Contest (Run by *CQ Elettronica*). The result of the first championship is now to hand and the winner is Arthur Blave, ON4BX, and he will shortly be receiving his plaque.

The various rtty societies directly involved with this award take turns in nominating the winner for the year for which each particular society is responsible, and the 2nd World RTTY Championship will be the responsibility of the British Amateur Radio Teleprinter Group.

2nd World RTTY Championship

The objects of this award are as follows:

1. To promote greater interest for the rttyer taking part in the various rtty contests.
2. To increase the competitive spirit during the course of the contests held in one year.
3. To make available an award to the radio amateur who has demonstrated his ability to operate rtty during a period of one year.

At the present time, the contests which count towards this award are:

1970 BARTG Soring RTTY Contest,
1970 DARC RTTY WAE Contest,
10th World-Wide RTTY DX Sweepstakes,
1970 Alex Volta RTTY Contest,
1971 Giant RTTY Flash Contest.

The committees of BARTG, the Alex Volta and the Giant RTTY Flash Contest wish to thank the committees of the DARC and CARTG societies for their permission to make use of their own contest scores in arriving at the final scoring for the "World Champion of RTTY". It is hoped that other societies who organize international contests will join in this idea to increase interest in the rtty mode for radio amateurs.

In order to arrive at the final score and to decide the winner, the following points system will be used for each contest: 30 points to the winner, 25 points for 2nd place, 22 points for 3rd place, 20 points for 4th place, 18 points for 5th place, 17 points for 6th place, 16 points for 7th place, in decreasing progression to 1 point for 22nd place and all other entrants. For the final score for the year, only the best four scores, out of a possible five, will be used for each operator.

In order to take part in this championship it is not necessary for entrants to send in a claim, as the entries of all competitors will automatically be included.

The 1970 Championship will start with the 1970 BARTG Contest and finish with the 1971 Giant Flash Contest.

The 1970 World Champion of RTTY will receive a plaque, and prizes will be awarded for the leading positions in the final score. *CQ Elettronica* will make available the awards for each year.

It will be the responsibility of the British Amateur Radio Teleprinter Group to nominate the winner for the year 1970 and this society will notify *CQ Elettronica* of the results in order that the awards can be made.

80m Field Day 1970

1. **The General Rules** for RSGB HF Contests, as published in the January 1970 *Radio Communication*, will apply.
2. **When:** 0900gmt to 1600gmt on Sunday 13 September 1970.
3. **Multi-operator entries** will be accepted. A maximum of two operators per station will be allowed.
4. **Contacts:** CW (A1) only in the 3·5–3·6MHz band. The location of the station must be sent.
5. **Power:** the maximum power input to the pa stage must not exceed 10W. The power for all parts of the station must be derived entirely from dry batteries or accumulators. The practice of 'float' charging the batteries or accumulators is not permitted.
6. **Trophy:** the Houston Fergus Trophy will be awarded to the winning station.
7. **Logs:** column (5) should be headed "Location of station contacted".

Entries must be addressed to RSGB HF Contests Committee, c/o D. Thom, G3NKS, "La Collinette," 6 Bracken Close, Copthorne, Crawley, Sussex.

Contests calendar

8–9 August—WAE DX Contest (cw)
9 August—DF Qualifying Event, Chelmsford; Rules in July issue
10 August—144MHz SSB; Rules in July issue
15–16 August—70MHz CW; Rules in July issue
5–6 September*—VHF NFD and IARU Region 1 VHF Contest; Rules in March/May issues
5–6 September—IARU Region 1 VHF/UHF Listener Contest; Rules in June issue
12–13 September—WAE DX Contest (phone)
13 September—80m Field Day; Rules in this issue
20 September—DF National Final, Slade
3–4 October*—IARU Region 1 UHF/SHF Contest; Rules in May issue
3–4 October—IARU Region 1 UHF/SHF Listener Contest; Rules in June issue
10–11 October—28MHz Phone; Rules in May issue
24–25 October—7MHz CW; Rules in June issue
24–25 October—CQ WW DX Contest
7–8 November—7MHz Phone
7–8 November—144MHz CW
14–15 November—Second 1·8MHz
20–21 November—Malta Independence Day Contest (cw/phone)
27–28 November—CQ WW DX Contest
6 December—144 MHz Fixed Station
*To coincide with IARU Contests

MOBILE RALLY NEWS

Derby Mobile Radio Rally, 16 August

Held at the Ryknеld Schools, Bedford Street, Derby, this will be the thirteenth rally organized by Derby & District ARS. Admission and parking free.

Talk-in stations: G3ERD/A on 160m; G2DJ/A on 2m; and G8DBY/A on 4m. All the usual attractions for which this rally is renowned. Main prize in the Grand Prize Draw will be a solid state hi-fi stereo equipment.

Further information from Tom Darn, G3FGY, "Sandham Lodge", 1 Sandham Lane, Ripley, Derbyshire DE5 3HE. Tel: Ripley 2972.

Swindon Mobile Rally, 23 August

At 15 Maintenance Unit, RAF Wroughton, two miles south of Swindon, off the A361. Completely covered main exhibition area, a whole runway for car parking, and acres of grass for picnics.

Talk-in stations: G3WEF on 160m and G8AVG on 2m—this is an exceptional 2m location—from 1000bst.

Many popular attractions and contests for all the family.

Further information from G3LTZ, 3 Westhill Close, Highworth, Swindon, Wilts.

Bromsgrove & District RC Mobile Picnic, 23 August

At Worcestershire County Museum, Hartlebury Castle, Nr Kidderminster. Special car park reserved for the picnic. Talk-in stations on 144·32MHz and 1·9MHz.

Plymouth RC Mobile Picnic, 23 August

At the Scenic Car Park, Harrowbeer, Yelverton, Nr Plymouth. Talk-in stations on 160m and 2m.

Preston ARS Radio Mobile Rally, 30 August

At Kimberley Barracks, Deepdale Road, Preston, adjacent to Preston North End Football Ground, from 10am to 6pm. Free admission and car parking. Main routes signposted. Leave M6 at Intersection 31 (A59).

Talk-in stations: G3KUE/A on 160m and G3YJM/A on 2m. All the popular stands and attractions will be there.

Further information from Mr G. Windsor, 26 St Gregory's Road, Preston PR1 6YB.

1970 RSGB Scottish Mobile Rally, 19 September

At the David Livingstone Memorial, Blantyre, Lanarkshire, approximately 10 miles south-east of Glasgow. Approach from the south via A74 and M74.

Talk-in stations operational from 10am. Rally commences 12 noon. Meals and refreshments available. Working demonstration of radio controlled models, trade shows, mobile installation competition, and various other attractions.

The memorial features the birthplace of David Livingstone and includes spacious grounds. Admission charge covers parking and admission to the memorial museum.

All enquiries to G. A. Hunter, GM3ULP, "The Bungalow," Broomside Braes, Camp Road, Motherwell, Lanarkshire.

Peterborough Mobile Rally, 20 September

At Walton Senior School, Mountsteven Avenue, off Lincoln Road, Peterborough, from 2pm until 5pm.

Talk-in stations will be G3QS on 1,980kHz and G3RED on 2m.

Everything will be under cover. Trade stalls, giant surplus sale—bring all your gear, entertainment for the family. Plenty of parking and picnicking space.

Further details from G3KPO, QTHR.

Harlow and District ARS Mobile Rally, 27 September

At Magdalen Laver Village Hall, near the A11 about three miles from Harlow New Town, usual attractions with ample parking space. Talk-in stations on 160m and 2m from 9.30 a.m., callsign G6UT/A. Further details from B. G. Capper, G8CUA, 124 Peterswood, Harlow, Essex. Tel: 27217.

SPECIAL EVENT STATIONS

Plymouth Radio Club, 19 July-15 August

GB2USA will be operating from the PRC's clubroom between the above dates. Stations wishing to obtain the Mayflower '70 Award Certificate should send log extracts confirming QSOs with either GB2USA (operating ssb on all hf bands), or with three members of PRC, or with three Plymouth City stations, to I. Dawe, G3SPI, QTHR, enclosing 2s or two IRCs. Applications valid until November 1971.

Tetbury Show & Carnival, 15 August

The Nailsworth & District ARC will operate a station in connection with this event. G8BEL/P on 2m and G3VVV/P on 20m. Further details from G8BEL, QTHR.

Uncle's Southend "Do", 16 August

The first meeting will be at 12 noon at the top entrance at the land end of Southend Pier. The second meeting, at the same location, will be at 3.30pm. The Liberal Hall has been hired for the day and teas, raffles, fun and games will be held. "Uncle" (G6NU) hopes to see you, wet or fine.

Zonk '70, 5 September

The Middleton District Scout Council will stage an exhibition and carnival, Zonk '70, in Alkrington Wood, Middleton, Manchester, on 5 September. The Middleton Scout ARC, assisted by local amateurs, will be operating GB3MID on all bands, a.m. and ssb. Details from R. Taylor, 57 Mellalieu Street, Middleton, Manchester.

Cumberland, 6-12 September

A special station, GB3CWR (or GB3CWI), will be set up in connection with the Cumberland Federation of Women's Institutes Golden Jubilee celebrations. Operation is hoped on all bands 1·8–28MHz cw/ssb/a.m., and possibly on vhf.

World Archery Championships, 10-12 September

The Rhondda RS will operate an exhibition station, GB3WAC, during the championships. The QTH will be the Tonypandy Sea Cadet's HQ, Scotch Yard, Tonypandy, and operation will be between 1000bst and 2200bst on all bands 80–10m a.m. and ssb.

Special QSL cards designed and produced by Rhondda Borough Council will be sent to all contacts. These cards will be enclosed in commemorative envelopes, and those to non-European countries will bear a special postmark.

Mobile rallies calendar

9 August—Woburn Abbey Mobile Rally.
9 August—Stratford-upon-Avon Mobile Picnic.
16 August—Torbay ARS Mobile Rally.
23 August—Plymouth ARC Annual Picnic.
23 August—Sheffield (SARC) Picnic.
23 August—Swindon and District ARC Annual Mobile Rally.
30 August—Preston ARS Mobile Rally.
19 September—RSGB Scottish Mobile Rally.

Looking ahead

19 August—RSGB Extraordinary General Meeting, 6.30pm in Lecture Hall of New Horticultural Hall, Greycoat St, London SW1.
19-22 August—RSGB Exhibition, New Horticultural Hall, London.
4 September—RSGB Dinner Club, Kingsley Hotel, London WC1.
16-18 September—IARC Convention, Geneva.
26 September—Region 10 ORM, Cardiff.
27 September—Region 1 ORM, Southport.
28 September—Lecture at the IEE. "The Trans-Arctic Expedition".
11 October—RSGB Scottish VHF Convention, Dundee.
27 October-1 November—4th International Convention of Radio Amateurs, Barcelona.
4 December—RSGB AGM.

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:
30 August—Preston Mobile Rally.
13 September—Region 1 Field Day. Local representatives have been circularized, further copies of the rules may be obtained from the regional representative.
27 September—Official Regional Meeting in Southport. Watch out for further details.
9 May 1971; 1971—Belle Vue Convention.

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

Ainsdale (ARC)—5, 19 August, 2 September, 8pm, "Morris Dancers", Scarisbrick.

Allerton (Liverpool) Scout ARS, North West Region—Thursdays, 8pm, Allerton Group Headquarters, Aigburth Vale, Liverpool 17. All Scouts interested in amateur radio are welcome.

Blackburn (East Lancs ARC)—6 August (Surplus equipment sale), 3 September ("Going mobile", by John S. Derbyshire, G3SSD), 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 each month with an informal meeting on the fourth Tuesday, 8pm, The George Hotel (Private room), Market Street, Bury. Secretary: *G3VVQ*, 411 Holcombe Road, Greenmount, Bury.

Carlisle (C & DARS)—Mondays, 7.30pm, Currock House, Lediard Avenue, Currock. Further details from A. Treanor, *G3FZG*, 171 Scotland Road, Stanwix.

Cheshire (Mid Cheshire ARC)—There will be no meetings during August. The next event is the AGM on 9 September. Technical Activities Centre, Winsford Verdin Grammar School, Grange Lane, Winsford.

Chester (C & DARS)—4 August (2m net night), 11 August (Technical forum), 18 August (Motor rally starting YMCA, 7.15. Details from G8AYW), 25 August (pre vhf nfd discussion), 1 September (2m net night), 8pm, YMCA Chester.

Douglas (D & DARS)—Second and fourth Wednesdays 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. Thursdays: Club top band net, 2030gmt.

Leyland Hundred Amateur Radio Group—Net nights: Thursdays, 160m at 2000gmt, 1,915kHz. Saturdays, 2m at 1900gmt, 145·8MHz.

Liverpool (L & DARS)—Tuesdays, 8pm, Conservative Association Rooms, Church Road, Wavertree. Secretary: *G3WCS*, 90 Childwall Valley Road, Liverpool 16.

Liverpool (NLRC)—14, 28 August, 11 September, 8pm, Labour Party Headquarters, 13 Crosby Road South, Liverpool 22. Secretary: M. Graham, *G3XMG*, 14 Albert Road, Liverpool 22.

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

Manchester (SMRC)—7 August (Df practice and activity night), 14 August ("Home built solid state oscilloscope", by H. V. Pierson, G3MXV), 21 August ("Aerial theory in practice", by G3MXV), 28 August ("Transistor power supplies", by J. McBurney, G8DNQ), 4 September (Dx night on the air), 8pm, Conservative Association Divisional Office, 449 Palatine Road, Northenden, Manchester 22.

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

Preston (PARS)—6, 20 August, 3 September, 7.30pm, "Windsor Castle" (Private room), St Pauls Square. Secretary: George Windsor, 26 St Gregory's Road, Preston.

Salford (Dial House Radio Society)—A society formed by GPO engineers. Wednesdays, 6pm, 8th Floor, River End of Dial House, Salford. Further details from the secretary at Dial House, Chapel Street, Salford 3.

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

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

Stockport (SRS)—Second and fourth Wednesdays, 8pm, The Blossoms Hotel, Wellington Road South. It is likely a formal dinner and reunion will be held later in the year to celebrate the 50th anniversary of the society—possibly October. Further details from the secretary: *G8BCG*, QTHR.

Thornton Cleveleys (TCARS)—5, 19 August, 2 September, 8pm, St John Ambulance Brigade Hall, Fleetwood Road North, Thornton, Blackpool.

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

Westmorland—Fridays, 7.30pm, 24 Park Road, Milnthorpe. All visitors welcome. Secretary: Jim Forrester, 44 New Street, Carnforth.

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

Wirral (WARS)—First and third Wednesday in 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)—Last Thursday in each month. The August event will be an informal get-together at the Red Cat Hotel, Greasby. Visitors and their wives are welcome. September visit by regional representative. Further details, including venue, from *G3OKA*, QTHR.

REGION 2 — RR K. Sketheway, BRS20185

Halifax (NHARS)—12 August (Open), 26 August (What are you doing to encourage new members), 2 September (Mini auction, including pie supper), 7.45pm, Peat Pitts Inn, Ogden, near Halifax. *G3MDW*.

Hull (H & DARS)—7 August (Swl night), 14 August ("Principle of colour television", by P. Everitt), 21 August (Talk on the BC221 by G3MVC), 28 August ("The short wave listener should never be bored", by swl I. Carreas), 7.45pm, 592 Hessle Road, Hull.

It is proposed to run a course of lectures for the RAE. These will be held at the club on Friday evenings, and will commence in September 1970 if there are sufficient applicants. Full details may be had at the club any Friday evening. M. Longson.

North Riding (NRARG)—Meets in the back room of the Ship Inn, Falsgrave, Scarborough, alternate Tuesdays and Thursdays, fortnightly. Details from secretary: Jeff Jones, G3VLM, Bingley Private Hotel, Albermarle Crescent, Scarborough. *G3VLM*.

Scarborough (SARS)—Thursdays, 7.30pm, c/o RAF Association, Fulbeck House, 3 Westover Road, Scarborough.

Sheffield (SARC)—Meetings on the fourth Tuesday of the month,

8pm. 23 August (SARC Picnic, Riber Castle—see *Radio Communication*. July issue), 25 August (Rag chew), 22 September (RSGB lecture by G4JW), The Cross Scythes Hotel, Dore, Sheffield.
South Shields (SS & DARC)—Fridays, 8pm, Trinity House Social Centre, Laygate, South Shields.
Sunderland (SARS)—Meetings on first and third Tuesdays of each month, 7pm, Sunderland Technical College. *G3XID.*
York (YARS)—Thursdays, 7.30pm, British Legion, 61 Micklegate, York.

REGION 3 — RR R. W. Fisher, G3PWJ

Forthcoming events:
23 August—Mobile picnic, Hartlebury Castle, organized by Bromsgrove & District Amateur Radio Club. Talk-in on 160m and 2m.
Birmingham (Slade)—14 August ("The construction of transformers", by N. B. Simmonds), 28 August (Visit to transformer factory), Church House, High Street, Erdington, Birmingham 23.
Coventry (CARS)—7 August (Lecture on aerials), 14 August (Night on the air), 21 August (Tape and slide lecture. RSGB library), 28 August (Night on the air), 8pm, City of Coventry Scout Headquarters, 121 St Nicholas Street, Radford.
Dudley (DARC)—11, 25 August, 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 Street, Hereford.
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.*
Rugby (R & DAR & EC)—Every Tuesday evening, 8pm. Club facilities include library, equipped workshop and component store, ssb and vhf stations, 10 Drury Lane, Rugby.

At the AGM on 14 May, Austin, G3CYH, was re-elected chairman, with M. Crampton, G8DLX, as treasurer and J. Wood, G3YQC, as secretary. All visitors and new members are very welcome. *G3YQC.*
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.
(S-o-TARS)—6 August (Junk sale), 22 August (Coach trip to London radio exhibition). Meetings held weekly on Thursday, 7.30pm, morse code instruction weekly, 7.45 to 8pm, 2a Race Course Road, Oakhill, Stoke-on-Trent.
Stratford (SoA & DARC)—7, 21 August, 4 September, 7.30pm, Halls Croft, Old Town Stratford. 9 August (Mobile picnic, more details from G3RPJ, QTHR. *G3RPJ.*
Sutton Coldfield (SCRS)—10 August (Preparation for vhf field day), 24 August, Sutton Town Football Club, Coles Lane, Sutton Coldfield. *G3XXJ.*
Telford (WARS)—Every Wednesday evening, 8pm. Present venue is the Church Hall, Union Free Church, Wellington, but this may be changed to Ketley Youth Club, Main Road, Ketley Bank. Mr D. Morris, 15 Morville Drive, Brooklands, Wellington.
Worcester (W & DARC)—Every Wednesday and Saturday evening, 7.30pm, Perdiswell Park, Droitwich Road. *G3VJN.*

REGION 4 — RR T. Darn, G3FGY

Derby (DADARS)—5 August (Surplus sale, 12 August (Meeting at Rykneld School—preparation for mobile rally), 19 August (Fifth df practice run. Club room open for non-participants), 22 August (Proposed visit to the Radio Communications Exhibition in London), 26 August (Tape and slide lecture).

The dinner and dance held at the Regency Rooms, Ilkeston, to mark the visit of the President and Council members on Saturday 20 June was an outstanding success. One hundred and thirty people enjoyed a good dinner and evening's entertainment. These special event dinners in the summer appear to satisfy the members and will be continued each year. We are currently looking for an excuse for June 1971.

All club meetings take place at 119 Green Lane, Derby, on Wednesdays commencing at 7.30pm. Visitors are always welcome. Slow morse instruction is also given to members on Tuesdays at 7.30pm.

Heanor (SEDARS)—Due to the school being closed there are no meetings in August.
Lincoln (LSWC)—Meetings are held every Tuesday evenings at 7.30pm, No 2 Guardroom, Sabraon Barracks, Breedon Drive, off Burton Road, Lincoln.

REGION 5 — RR S. J. Granfield, G5BQ

Bedford (B & DARC)—6 August (Vhf night—G3SOA and G8CXM) 9 August (Mobile rally, Woburn Park), 13 August (Insuring your radio equipment—discussion), 19-22 August (RSGB exhibition), 27 August (Mobileering hf and vhf—G3SOA and G3CWV), 30 August (Holiday weekend net, 3·7MHz), 3 September (Club project—noise bridge—G3FWA). Club meets at 8pm on Thursdays at the Dolphin Inn, Broadway, Bedford. (Morse classes at 7.30pm).
Cambridge (C & DARC)—Fridays, 7.30pm, Club headquarters, Corporation Yard, Victoria Road, Cambridge.
Dunstable Downs (DDRC)—Meetings held on Friday evenings at Chew's House, High Street, Dunstable, Bedfordshire.
March (M & DRAS)—Club meets on Tuesday evenings at Old Police Headquarters, High Street, March, Isle of Ely.
Peterborough (P & DR & ES)—Fridays, 8pm, in club shack at the old windmill behind the Peacock Inn on the London Road. Sundays at the riverside site at Alwalton (¼ mile walk across the cornfield from the A1 layby).
Shefford (S & DARC)—No meetings on 6, 13, 20 August. 27 August (Vhf planning finals club). Club meets on Thursdays, 8pm, Church Hall, Shefford, Bedfordshire.

REGION 6 — RR L. W. Lewis, G8ML

Cheltenham (RSGB Group)—First Thursday, 8pm, Great Western Hotel, Clarence Street, Cheltenham.
Gloucester (GRS)— No meetings until September.
South Bucks VHF Club—4 August (Rag-Chew), 1 September (Talk on conversion of surplus vhf equipment), 8pm, Bassetbury Manor, High Wycombe.

REGION 7 — RR P. A. Thorogood, G4KD

Over 350 new members in London Region 7 area have joined the Society since last October. Have you seen them or invited them yet! Lets all meet at the Exhibition Club Bar in the Main Hall.
Acton, Brentford & Chiswick (ABCRC)—18 August (Tests with G3CCD/F0UT), 7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick.
Addiscombe (AARC)—Second and fourth Tuesdays, 7.30pm, Toc H Hall, 158 Lower Addiscombe Road.
Ashford, Echelford (ARS)—Second Monday and last Thursday of month. 10 August (Construction night—prize for first and second place), 7.30pm, St Martins Court, Kingston Crescent, Ashford, Middx.
Barking (B & DREC)—Tuesdays and Thursdays, 7.30pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking.
Bexleyheath (NKRS)—Second and fourth Thursdays. 6 August (Members current projects), 20 August (vhf nfd and latest vhf techniques), 31 August (An exhibition station will be set up at Erith Show and Sports). 7.30pm, Congregational Church Hall, Chapel Road, Bexleyheath.
Cheshunt (CDRC)—First Friday of month, 7.30pm, Methodist Church Hall, opp Theobalds Station, Cheshunt. Telephone Telephone 01-524 0308.
Chingford (SRC)—Fridays, 7.30pm, Friday Hill House, Simmons Lane, Chingford E4.
Civil Service (CSRS)—First and third Tuesdays, 6.30pm, Civil Service Recreation Centre, Monck Street, Westminster.
Croydon (SRCC)—Third Tuesday in each month. 18 August (Another of G2YLs travellogues), 7.30pm, Swan & Sugarloaf, South Croydon.

The winner of the Dave Deacon Coronation Cup is Mike Fannell, G3YQW, runners-up were G3KGA and G3YQL. Tony Naylor, G3GHI, won the Basil Wardman Tankard. Runners-up were G3YQW and G3KGA. The best QSL card was from G3BFP with a card from 5N2ABA. Help is still required for vhf field day (operators and transport).
Crystal Palace (CP & DRC)—15 August ("Aerial erection", by

Frank Bennister, G3COX, and Eric Yeomanson, G3IIR), 8pm, Emmanuel Church Hall, Barry Road, SE22.

Dorking (DR & DRS)—Second and fourth Tuesdays. 11 August (Informal), 25 August (Meetings for vhf nfd organizing), 8pm, "Wheatshaft".

Ealing (E & DARS)—Tuesdays, 7.30pm, Northfields Community Centre, Northcroft Road, W13.

East London—20 September (G3FRV will give a talk on RSGB structure), 2.30–3pm, Wanstead House, Wanstead.

Edgware & Hendon (E & DRS)—Second and fourth Mondays. August (No meetings), St Georges Hall, 51 Flower Lane, Mill Hill, NW7.

Farnham, Bucks (Burnham Beeches RC)—Fortnightly on Mondays, Farnham Common, Village Hall, Victoria Road.

Gravesend (GRS)—Thursdays, 7.30pm, Northfleet Recreation Centre, Springhead Road, Northfleet, Kent.

Guildford (G & DRS)—Second and fourth Fridays, Guildford Engineering Society, Stoke Park.

Hampton Court (TVARTS)—First Wednesday in each month, 7.30pm, The Three Pigeons, Portsmouth Road, Surbiton.

Harlow (DRS)—Tuesdays (General). Thursdays (CW practice). Fridays (Junior). 7.30pm, Mark Hall Barn, First Avenue.

Harrow (RSH)—Every Friday. 7 August (W1BB slide/tape lecture Mk1 on dxing on top band), 14 August (Practical), 21 August ("Transistor transmitters", by G3HBW), 28 August (Mobile ramble), Correct date for JOTA Rally is now 16–18 October. 8pm, Harrow County School, Gayton Road, 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)—Mondays (RAE), 7pm. Weds (Morse), 7.30pm; Fridays (Club), 7.30pm. Whittington School, Highgate Hill, N19.

Ilford—Every Thursday, 8pm, 50 Mortlake Road, Ilford.

Kingston (K & DARS)—Second Wednesday in each month. 12 August ("Soldering by numbers". Some examples of kit building by Alan Humphreys, G8CLF), 8pm, Penguin Lounge, 37 Brighton Road, Surbiton.

The last meeting reported some activity in tracking down pirate radio stations with df receivers. Require another society to report.

Leyton & Walthamstow—Tuesdays, 7.30pm, Leyton Senior Institute, Essex Road, E10.

London (UHF Group)—First Thursday in each month. Next month there will be a discussion group on microwaves. 7.30pm, Whitehall Hotel, Bloomsbury Square, Holborn, WC1.

Loughton—Fortnightly on Fridays, Loughton Hall, Rectory Lane (Nr Debden Station).

Maidenhead (N & DARC)—Third Tuesday of month, 7.30pm, Victoria Hall, Cox Green, Maidenhead.

New Cross (Clifton ARS)—Wednesdays and Fridays, 8pm, 225 New Cross Road, SE14.

Paddington (P & DARS)—Thursdays, 7.30pm, Beauchamp Lodge, 2 Warwick Crescent, W2.

Purley (P & DRS)—First and third Fridays, 8pm, Railwaymans Hall (side entrance), 58 Whytecliffe Road, Purley.

Reigate (RATS)—First Wednesday in each month. 2 September (Vhf nfd details), 8pm, George and Dragon, Cromwell Road, Redhill. Meetings will in future start sharp on time.

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

Scouts (ARS)—Third Thursday of month. 30 August (Simple direction finding), 7.30pm, Baden Powell House, Queensgate, South Kensington, SW7.

Sidcup (CVRS)—6, 20 August, 3 September, 8pm, Congregattional Church Hall, Court Road, SE9.

At the last meeting W. E. Sutton, G3FWI, gave a talk on television outside broadcasts. Although including and demonstrating the technical aspects he included several anecdotes which ranged from humour to tragedy.

Southgate (SRC)—Second Thursday of month, 7.30pm, Civil Defence Hut, Bowes Road, N21.

St Albans (Verulam ARC)—5 August (Informal meeting. G3VER on the air at Salisbury Hall, London Colney), 19 August ("Vhf propagation", by G3DAH), 7.30 for 8pm, Town Hall, St Peters Street, St Albans.

Sutton & Cheam (SCRS)—Meets on the third Tuesday. No meetings in August. 8pm, The Harrow Inn, High Street, Cheam.

Welwyn (Mid-Herts ARS)—Second Thursday of month, 8pm, Welwyn Civic Centre, Welwyn.

Wimbledon (W & 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 D. Evans, G3RPE, 904 1262 for details).

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

Canterbury (EKRS)—Details of future events from G3MDO, QTHR.

Dover (SEK YMCA ARC)—Meetings held every Thursday at 7.30pm, YMCA Leybourne Road, Dover.

Eastbourne (SARS)—Meetings held on first Monday at 7.30pm, at the Victoria Hotel, Latimer Road, Eastbourne. Visitors are welcome.

Maidstone (M YMCA ARS)—All meetings held at 8pm, at the "Y" Sports Centre, Melrose Close, Loose, Maidstone.

Mid-Sussex (MSARS)—All meetings and club station at Marle Place, Leylands Road, Burgess Hill.

Worthing (W & DARC)—Meetings held every Tuesday at 8pm at the Rose Wilmot Youth Centre, Littlehampton Road, Worthing

REGION 10 — RR D. Thomas, GW3RWX

Blackwood (ARC)—Fridays, 7.30pm, Blanche Cottage, off High St, Blackwood, Mon. *G6BK*.

Barry College of Further Education (ARS)—Details of summer meetings from *GW3VPB*.

Cardiff (RSGB Group)—Monday 10 August (Arrangements for vhf field day), 7.30pm, TA Centre, Park St, Cardiff. *GW3GHC*.

East Glamorgan Raynet Group—Details for August meeting not available.

Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, nr Merthyr, Glam. Secretary: Mr F. E. Tribe.

Port Talbot (ARC)—Meetings second Tuesday of each month, 7.30pm, Trefelin Club and Institute, Port Talbot, Glam. *GW5VX*.

Pontypool (ARC)—Details of summer meetings from GW3JBH.

Pembroke (ARC)—Last Friday of each month, 7.30pm, at the Defensible Barracks, Pembroke Dock. *GW3LXI*.

Rhondda (ARS)—Meets at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glam. Details of meetings from GW3PHH.

Sully & District Short-wave Club—Tuesdays, 7pm, at the Annexe, Sully Bowls & Social Club, 59 South Road, Sully, Glam. Secretary: Mr Glyn Maggs, 3 Thorley Close, Cyncoed, Cardiff.

Swansea Telephone Area (ARS)—Tuesdays, 7.30pm, Telephone Engineering Centre, Gors Road, Townhill, Swansea. The society now has its own station, callsign GW3ZTK. Secretary: Mr M. D. E. Connor, 7 Glanmon Park Road, Sketty, Swansea. Telephone 23742.

University College, Cardiff (ARS)—Although meetings are suspended for the summer vacation the shack is available for local members' use. Students entering college next session are invited to contact the secretary, c/o Students Union, Dumfries Place, Cardiff.

University College, Swansea (ARS)—The mobile rally on 21 June attracted over 50 mobiles to the University Campus in Singleton Park, and the event proved very satisfactory. Next year it is hoped to have an even bigger rally, with more trade exhibitions and competitions.

The society is now one of the recognized student activities, and as such has been awarded a grant of £150 for equipment, which will mean greater scope to extend facilities next year.

Activities are suspended for the vacation, and interested new students for next session should contact the secretary, Students Union, University College, Singleton Park, Swansea.

REGION 12 — RR A. W. Smith, GM3AEL

Aberdeen (AARS)—Fridays, 7.45pm, 6 Blenheim Lane, Aberdeen. *GM3HGA*, telephone Aberdeen 33838.

Dundee (RSGB Group)—Thursdays, 8pm, 3 Magdalen Place (off Roseangle), Dundee. *GM3KYI*, QTHR.

Inverness (IRS)—Thursdays, 7.30pm, 4 Falcon Square (near Railway Station), Inverness.

Lerwick (LRC)—Tuesdays and Thursdays, 8pm, Annsbrae House, Lerwick. *GM3XPQ*, telephone Bixter 249.

Lhanbryde (MFARS)—Mondays, 7.30pm, St Andrews School, Lhanbryde, by Elgin, Morayshire. *GM3UKG*, telephone Clochan 225.

REGION 13 **RR V. W. Stewart, GM3OWU**

Lothians Radio Society (LRS)—13, 27 August (Open night with equipment on 2m), 7.30pm, Theatre Workshop, 66 Hanover Street, Edinburgh.

REGION 14 **RR N. G. Cox, GM3MUY**

Ayrshire (Ardeer Recreation ARC)—4, 6, 11, 13, 18, 20, 25. 27 August, 7.30pm, Ardeer Recreation Club, Amateur Radio Section, Stevenston, Ayrshire. Details from J. F. McCreight, *GM3DJS*, 10 Auchenharvie Road, Stevenston, Ayrshire.
Ayrshire (AARG)—30 August, 7.30pm, YMCA, Howard St, Kilmarnock.
Glasgow University (GURC)—No meeting during August.
Greenock (G & DARC)—7, 14, 21, 28 August, 7.30pm, Watt Library, Union St, Greenock.
Mid-Lanark (RSGB Group)—21 August, 7.30pm, YMCA Brandon St, Motherwell.

REGION 15 **RR J. Thompson, GI3ILV**

City of Belfast YMCA Radio Club—Mondays (Morse class and operating procedures), Wednesdays and Saturdays (Club nights), 8pm, City YMCA (3rd floor), 12 Wellington Place, Belfast, BT1 6GE. Information from YMCA General Office.

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)—Fortnightly, 7.30pm, 98 South Market Road, Gt Yarmouth. *G3HPR*.
Ipswich (IRS)—Details from *G3YWM*, QTHR.
Norwich (NARC)—Mondays, 7.30pm. 3 August (Modulation), 10 August (Informal), 17 August (Visit to Food Research Institute), 23 August (RAEN rally, Thetford), 31 August (Exhibition—by steam rally, Bawburgh). The Brickmakers Arms, Sprowston Road, Norwich. *G2CDX*, QTHR.
University of Essex Radio and Electronics Society—This has been re-organized and there is a change of committee. There will be very little activity until the new academic year but interested persons are requested to get in touch with Mr R. A. Gape, G8DQX, at Flat 3, Room 9, Tawney Tower, University of Essex, Colchester, Essex.

REGION 17 **RR C. Sharpe, G2HIF**

Farnborough (FDRS)—Meetings on the second and fourth Tuesdays in each month, 7.30pm, Railway Enthusiasts Club, 310 Farnborough Road, Farnborough, Hants. *G8BVM*.
N Berks (AERE, Harwell, ARC)—No meetings in August. See you on vhf nfd. *G3NNG*.
Portsmouth (PDRS)—Meetings every Wednesday, 7.30pm, Room 5, Twyford Avenue Community Centre, Portsmouth. Visitors welcome. G3DIT/A will be operating on all bands at the Southsea Show, Southsea Common, 7, 8, 9 August. *G3CNO*.
Reading (RDRC)—4 August (Informal book night), 18 August (Mobile mike-in on 2m and 160m), 7.30pm, Victory Public House, The Meadway, Tilehurst, Reading. *G3NBU*.
Southampton (SURC)—The Southampton University Radio Club invites any prospective members to join the vacation nets: 3·75MHz plus or minus 10kHz at 17.30bst, on Mondays and Fridays; 1·875MHz at 2100bst on Mondays. Further details of the club are obtainable from GC3XZC, QTHR. *GC3XZC*.
Swindon (SDRC)—23 August (Annual rally at No 15 MU, RAF Wroughton aerodrome, nr Swindon. Talk-in stations will be G8AVG on 2m and G3WEF on 160m from 10.30am). *G3JAP*.

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

Property of late G5BJ: Trio TS500E comp with psu, vfo and Shure mic, £150. Trio JR500 matching rx and spkr, £50. Heathkit C and R Bridge, £5. Weston analyser, £5. 2m convtr, £2. Stereo hdphns, £2. Apply to 83 Willclare Road, Sheldon, Birmingham, B26 2NX.

Property of late G8UO: 75W 80–10m a.m. tx (Geloso vfo, 2 × 807 p.a., 2 × 807 mod), comp with mic, mod psu, tx psu, Panda lpf and atu. Marconi CR100 rx comp with hdphns, spkr and handbook. Prospective buyers please write first to Mrs L. Beadle, 12 Cartmel Road, Keighley, Yorks, before calling.

Property of late G3BLU: ET4336, comp, £20. HRO, 8 coils inc bs 20, 15 and 10m, psu, £17. BC221 with psu, case damaged, £10. TCS-5 with ac and 12V dc psu, £12. G3VSB, QTHR. Tel Cheadle (Staffs) 2103.

KW2000, ac psu, Shure 401A mic, KW77 rx, fb cond, £190 ono, will separate. G3IFB, QTHR. Tel Churchdown 3792.

Heathkit Apache, £30. SB10, £10. Sae for details. G3YJE, QTHR, Tel 01-349 9060.

Six 813s, £1 10s ea. 813 bases and top caps, 10s a set. G3RVM, 27 Kingsthorpe Grove, Stratton St Margaret, Swindon, Wilts. Tel Swindon 6251.

Valves, trnsfmrs, chokes, misc parts for home constructor, sae list. Pyatt, 23 Arundel Drive, Orpington, Kent. Tel Orpington 20281.

Berco variacs, new, 1A, £3 10s, used exc cond. 2·5A, £3 15s. Also many trnsfmrs, chokes, meters, lektrokit, new comps. Send sae for lists. Kilner-Smith, 101 Oxford Road, Marlow, Bucks.

19 Set rx and tx + mod in gd wkg cond, spare 807 and instruction manual, £5 10s, buyer to coll or carr extra. Mees, 9 Oakfield Ave, Harrow, Middx. Tel 01-907 2638.

Eddystone S640 rx with matching spkr and S meter, £22. Withers 2m convtr, 14MHz i.f., £6 carr paid. Panda PR120V tx with hndbk, £25 ono. Buyer coll. G3JMO, QTHR.

ISWL *Monitor*, RSGB *Bulletins* and *Radcoms*, *Radio Constructor*, few odd copies *Practical Wireless*, *Bulletins*, *SWM*, etc. Sae list your requirements, odd copies or volumes. J. Harvey, 22 Elm Grove, Bromsgrove, Worcs.

HRO MX, realigned, with coils, psu and ldspkr trnsfmr, modded front end and anl, first offer of £17 secures, carr extra. Barrett, 25 Sketty Avenue, Swansea, Glam. Tel Swansea 24893 after 5pm.

HRO with psu and 7 gen cov coils + 14MHz bandspread, exc cond, £18. Also deluxe Joystick and 3A tuner, £3. Call or phone after 6pm. Startin, 105 Rock Street, Sheffield, S39 JB. Tel Sheffield 24562.

Ham tower, 30ft, buyer dismantles, £20 ono. Advance sig gen, 14–300MHz, £15. Pair TT21, £2. 160m tx psu, £8. 2–4m tx psu, £10. Sundry items, sae details. G8DT, QTHR. Tel Cheltenham 57969.

DX40U and VF1U, £25. 2m Communicator, £55. SB10U, £18. G3JMR, QTHR.

Eddystone EC10, vgc, with Eddystone catalogue No CP2924 hdphones, £42 10s. Clayton, Greengarth Hall, Holmrook, Cumberland. Tel Holmrook 663/664.

G2DAF Mk2, needs slight attention. Buyer coll over 20 miles. G3TQK, QTHR.

80m trnscvr after G3LUB (*Radcom* March–April 1968). Almost complete, rx wkg and tx to driver. Lin 5B257M, 12V–750V psu, £15 or exch broadcast car radio. G3HLG, QTHR. Tel Collingham 384.

Garrard 301 record deck, brand new cond, with Collard mono pick-up, £20 ono. Goodman 8in spkr in 2ft 8in by 2ft 1in by 1ft cab, £10 ono. Both items in top quality mahogany faced cabs. Isaac, 14 Tywern Road, Rhiwbina, Cardiff, S Wales. Tel Cardiff 63680.

EMI cc colour tv system, 9 units + 3 spares, b/w monitor only, camera ok on b/w, needs attention for colour, offers, cheap. Wanted: 3B24OM, RV2P800 valves. G3VVB, QTHR. Tel Slough 28014.

BC221, comp charts, power pack, £15. Labgear wide band multiplier, unused, £2 or offers. G3DGW, The White House, Potterspury, Lodge, Towcester, Northants. Tel Yardley Gobion 219.

EC10, perf cond, in orig box, little used, with manual, £42 ono. Allen, Rosswan, Dimmocks Lane, Sarrett, Rickmansworth, Herts. Tel Kings Langley 62438.

Colour tv rx rube: American 21in shadow mask, new, with data, £15, must be collected. PCR-2 psu, 15s. SCR 522 tx/rx, £3. 1MHz xtals, 12s 6d. G3IEE, 14 Leewood Way, Effingham, Leatherhead, Surrey. Tel Bookham 5439.

Osram DA41, TZ40, 18s ea, post extra. Wanted: rx. G2UZ, 2 Cliff Road, Leeds, LS6 2EY.

Hallicrafter Super Sky Rider with matching spkr and cab, vgc, £20 ono, buyer coll. G3VBE, 65 Montgomery St, Hove, Sussex, BN3 5BE

Sphinx ssb tx plus Delta control unit, £45, buyer coll. G3TNY, QTHR.

Heathkit OS-2 oscilloscope, 3in tube, perf cond, £17 10s. Simpson, 49 St John Street, Oxford.

Exch Minolta 16mm miniature spy type camera with case, lenses, filts, flash accessories, for Codar AT5 with 12MS and 12RC. G3ZEC, c/o Woodbine Cottage, Cadwells Lane, West Huntspill, Highbridge Somerset.

Grid dip oscillators: Heathkit tunnel dipper, as new, £18. Transistorized gdos 2 to 30MHz, £6. Both types in excellent cond. GW3YQM 4 Green Park, Pentlepoir, Saundersfoot, Pembs. S. Wales. Tel Saundersfoot 3351.

HRO MX, 7 coils, psu, ldspkr, £17. 4m Ranger tx, new modulator, £3. 4m homebrew convtr, £1 10s. 4m 4 ele beam, £1. Cornishman type tx, needs attention, £10. Cossor 4m tx, £2. All ono. G3VNC, QTHR. Tel Hertford 5515.

AR88D, brand new, plus set valves, headphones, manual, tested 3 weeks, £75, buyer must coll. Newey, 23 Lea House Road, Causway Green, Oldbury, Warley, Worcs.

Pair Wight traps, £1. Dynamotors (enclosed type) 12V input, £1, 24V input 10s, all post extra. Wanted: xtal mike. G3BSW, QTHR Tel Ascot 20992.

Minimitter top band rx (Q mult faulty). Several tu unit boxes with switches, coil formers, variable capacitors. G3SRI, 437 Helmshore Road, Rossendale, Lancs, BB4 4JR. Tel Rossendale 4620.

TA32 jnr, gd cond, £17, buyer coll or carr extra. G3VMY, QTHR. Tel Twyford 5621 evenings.

Waveguide suit X band, 12 useful bits, bends, twists etc, £4 or separately, post free. Mann, 45 School Lane, Milton, Cambs, CB4 4BS.

CR100, reasonable with Codar preselector, £15, not sold sep. Callers only. G8BZY, QTHR. Tel Otley 2269.

Factory built Heathkit 10–12U cro, spotless cond, £25 (cost £47). Heathkit RF–1U sig gen, mint, £10. Wanted: Newnes Odhams *Radio TV servicing*, 1962 to 1965 inc. Sherley-Price, White Gates, Mortimer West End, nr Reading, Berks. Tel Silchester 513.

Marconi CR150/2 rx, gd wkg order, £22 10s ono. Debney, 111 Penn Lea Road, Bath, Somerset. Tel 0225 23562.

KW2000A and ac psu, in immac cond, having had only a few hrs of use, £170, inspection invited. G3XLR, QTHR. Tel 01-607 8318 (9pm to 4.30pm).

BC221 with power amp, output 5W, comp in cab with psu, xtal in perf wkg order with book and comp circ diag, offers, need the space. G2MI, QTHR. Tel 462 1877.

Heathkit SB–301E rx, absolutely new cond, £120, suggest inspection, going QRT. G3HJT, QTHR. Tel 01-759 6487.

Cannonball ssb tx, new and unused, £25, pref buyer coll (80m model). G3OGD, 20 Bevan Ave, Talke Pitts, Stoke on Trent.

Marconi sig gen, TF390G, 16–150MHz, perf specimen with calibration book, £25. Also Class D wavemeter, mains psu and hndbk, £5. G8AVA, 181 Swanstead, Vange, Basildon, Essex.

Eddystone 898 dial, new £3. Tokai TC99 walkie talkie, 28·5MHz, as new, £7. Sphinx ssb/am/cw tx 20 (40)–80–160m + Delta control, £45. Foster, 50 Fairfield Rise, Billericay, Essex. Tel Billericay 54455.

Magazines: *Practical Wireless* and *Short Wave Mag*, 1961 to 1967, offers. G3URZ, QTHR. Tel Cambridge 55601.

AR88, fair cond, wkg, £12. Marconi HU11 fsk convtr, £15. BC221, calibration chart, mains psu, £15. Marconi cctv camera and control unit, £25. Zenith and vidicon, £25. Zenith Transoceanic 3000/1, perf, £70. Smith, 81 Kings Road, Brentwood, Essex. Tel Brentwood 2907.

1·4MHz usb and lsb xtal filts, comp with carrier xtal, offers, or exch for 455kHz sideband filt. 10kHz B7G xtal, 35s. G3NGK, QTHR. Tel Beaconsfield 3109.

22 set with transistor 12V psu, £6 or offers. Also 2½in scope, not wkg but gd for parts or rebuild. Offers. South, Aberdare, Crowborough Hill, Crowborough, Sussex.

HRO comp with 6 amateur band bandspread coils, psu and manual, vgc, £25 ono. Wanted: Eddystone EC10. Platts, 3 Birchwood Ave, Rawmarsh, Nr Rotherham, Yorks.

Heath V7AU valve voltmeter with hv probe, £10. Lafayette HA350, as new, with xtal and spkr, £38. B44 tuneable rx, £2. Avo r/c bridge, £2. QQVO6-40A, 30s. 10μA meter, 4in diam, 40s. G8AWV, QTHR. Tel 794 9934.

HA34 audio amp with circ, one year old, 55s. Electronic engineer with many additional parts, 50s. *Practical Electronics* transistor millivoltmeter, wkg, contains all new parts, 45s. Pope, 234 Derby Road, Chesterfield, Derbyshire.

R209 Mk 2 comp with spare valves, vibrator, connecting cables, hdphns and hndbk, £16, carr extra. Sanders, The Sconce, Badley Wood, Whitbourne, Worcs, WR6 5SS. Tel Knightwick 381.

DX100U, exc cond and appearance, spares, manual. Del reasonable distance, £40. Magazines since 1950, 50 for £1. GW3ENN, 22 Jestyn Close, Dinas Powis, Glam. Tel 3526.

Cossor 1035 Mk2 double beam scope, £15 ono. Double beam scope, £10 ono. G3YGR, QTHR. Tel 01-850 9248.

Television servicing valve set, nearly comp, 38 valves, about 50 radio valves, all new and boxed, £18. G8BYC, 56 Holden Park Road, Southborough, Tunbridge Wells, Kent. Tel Tunbridge Wells 29849.

Heathkit HP13 dc psu. SB101 mobile mount. G whip helical, 10/20m and coils for 40/80m, plus base. Also various bosh suppressors, £45 the lot or exch for Heathkit HA14 lin amp plus psu. G3UDR. Horseshoes, Stretton on Fosse, Moreton in March, Gloucester, Tel Shipston on Stour 8439.

Heathkit RA1 with 100kHz calibrator, £25. G3RSJ, QTHR.

Eddystone 750, £25, collect. 598 dial, 2 new TT21s for 2 6146Bs, G2DAF Mk1 tx filt comps + xtals. Offers, why. G3KMH, QTHR.

KW Viceroy Mk 2 tx, 180 pep, comp with psu, £70. CR100, £10. 150W a.m. rig, comp with psu, home brew, £25. CR100, tunable i.f.s, xtal oscillator, £20. Ssb rig, home brew, 60W, 80, 40, 20, 15m, £30. GM3LLB, 16 Udston Ave, Stonehouse, Lanarkshire. Tel Stonehouse 561.

20W tx tripler final on 2m with mod, xtal cont, 12V input, gc wkd, £3 15s post paid. Pp, heavy duty, 900–800–0–800–900V, 250mA, mercury vapour rectifiers with one spare 230V input, £5 post paid. Webster USA dynamotor, input 19V, output 390V 95mA, £3 10s post paid. G3JGJ, QTHR.

Leak stereo 30 transistor amp, perf, cost £49, sell £25. Rogers Cadet 3 stereo valve amp, cost £37, sell £20. Radon fm tuner in teak case, £12. Carr free. Cwo. G8BEN, QTHR, Tel Whittlesey 2499.

Uhf RX1294, 500–3,000MHz, £5. Radar range calibrator, AP 56007 wkg, £5. ASB 8 cavity + 446A, £1. QQ203–20, £1. GU5 rectifiers + heater trnsfmr, 1,500V, 30s. TDO3–5, 2C39A, 10s. CV52, VT90, 7s 6d. 4X150, £1 ono. G3OJE, QTHR. Tel 01-660 5717.

Xtals, valves, comps, sae for list. 1kV trnsfmr, 6·3V 3A, 55V taps, £1. 1,200V 200mA dc psu, £5. CR100 with rf, i.f., S meter, £10. Carpenter relay, very high speed, Phillips trimmers, 1s. Kimble, 23 Heol Ill Tyd, Caewerw, Neath, Glam. Tel Neath 3197.

Large number pre and post war valves, *Bulletins* (May 1950 to date), test equipment, old tvs, misc comps, service sheets, trnsfmrs, cathode ray tubes, transistors, *Practical Wireless* and *Practical Television*. Letters only please. Greenburg, 8 Hillersdon Ave, Edgware, Middx, HA8 7SQ.

Verifax copier, indicator ARI 5487, potentiometer 1007B, Ecko ratemeter 1037A, Dynatron scaler 1009E, pulse amplifier 1430A (with hndbk), Hartley 13A scope. Any footling offer if you'll collect. Ideal GM expo or holiday. GM8APX, QTHR. Tel Kinloch Rannoch 379.

2m Pye Ranger, dash mount, £8 10s. 2m Murphy ME960, 10W, with transistor rx, mod and psu, comp with control box, £10. Murphy MR878 base, tx wkg on 2m, £25. G8BBB, QTHR,, Tel Haddenham (Cambs) 355.

Solartron scope CD523S2. Marconi valve voltmeter. Muirhead tunable filt. Tx unit 127. Three 4X150 valve bases. G3XNH, QTHR. Tel East Horsley, Surrey, 3982.

Comp Codar /M station. T28, 12MS psu, AT5, 12RC control box, Tavasu (80 and 160m), £35 or why. G3AUZ, QTHR. Tel Worksop 3893.

3cm gear, British and American, includes scanner, test set, wavemeters, couplers, waveguide sections, etc, please state needs and max price. 230V potted trnsfmr 200V and 4V twice out, suitable VCR97, £3, sae. G3IUD, QTHR.

Parkair 2m tx, comp manual, Shure ptt mic, xtal, ae changeover, fully metered, cw facility, mint, £60 ono. HRO, comp coils, psu, £20. JXK 18–20 i.f. 2m convtr, £14. G8BKF, QTHR. Tel Wellington 55355.

Heathkit O12U scope, £16. Avo type 3 gen, £10. Both reasonable cond. AR88 mains trnsfmr, new, £3. 9MHz filt and xtals, £7. 4CX250 base, 30s. 813 heater trnsfmr plus 6·3V, 30s. Pref coll. G3DKJ, QTHR. Tel Ringwood 3243.

Valves: 5B254/7 (min 807s), 10s ea or swop 4 for 5BP7 tube or sim P7 phos tube. Also OCP71 new. Offers. G3MGC, QTHR.

Panda PR120V tx with hndbk, gd cond, £25. Buyer coll or will del NE area. G3JMO, QTHR.

Codar CR45RB (factory built), 550kHz–30MHz, recent comp sevice and alignment by manufacturers. Perfect cond, £8. Carr paid. Kent, 4 Haig Road, Bedlington, Northumberland.

AR88D with hndbk and S meter, £25. Pye high band dash mounting Ranger, with hndbk, £10. Rack mounted Elizabethan comp tx, £15. Buyers please coll. G3GWR, QTHR. Tel Hebden Bridge 3256.

Eddystone 898 drive unit, new and unused, £5. Taylor, 23 Green Lane, Bayston Hill, Shrewsbury, SY3 0NS.

PCR rx comp with built in psu and ldspkr, £7. Wanted: Xtal for 1155kHz. GM3SOM, Culag, 16 Kimmeter Place, Annan, Dumfriesshire.

EMI tape recorder model L2A, 5in spools, int batts or 12V ext input. Separate record and replay amps etc. £15 ono. Shaw, 2 Park Piece, Kineton, Warks. Tel Kineton 661.

Trnscvr TR1986, 124·5 to 156MHz in 10 channels, 24V, clean cond, gd wkg order, comp with 10 xtals and control box, full circuit, £10. Also TR1936, sim to TR1986, suitable for spare set. Barnes, 105 Godstow Road, Wolvercote, Oxford. Tel Oxford 57697.

PCR3, mains psu, needs attention, £4. HE30, gd cond, £12. Bayreuth solenoid operated bi-directional 2 speed tape recorder, mechanically sound, electronics need attention, £20. *Practical Electronics*, November 1964 to April 1968. Offers. Gill, 38 Woodfield Road, Braintree, Essex.

National NC188 rx, 5 bands. Also model A Central Electronics sideband slicer with AP1 adapter inc instruction book for both. Best offer for the combination. GW5AHU, QTHR. Tel Reynoldston 236.

RTTY: Excellent 24V dc Creed 7B, sprocket feed. Gd 110/160V dc 7B friction feed and psu. Type 44 perforator, 6S3 auto-tx with new head. Offers. G3LYD, QTHR. Tel Sharnbrook 306.

2m tx, QQVO3-20 pa, 25W input, plate and screen mod with pair of EL34 in pp, comp with fully metered psu in matching case, £12. Buyer inspects and coll. G3WXO, 9 Calverton Road, Stony Stratford, Wolverton, Bucks. Tel Stony Stratford 3346.

Resistors: glass tin oxide, high stab, 1d ea or 8s per 100. BC107, 1s ea. Post and packing extra. Cowl Gill motor, £4. G8AYN, QTHR. Tel Lodge Hill 4671.

G2DAF rx part built, 14 new xtals, cab, drive, etc, £25. Capacitors: 3 8μF 2500V, 2 8μF 2000V, 1 4μF 2500V, 3 4μF 1500V, 6 2μF 2500V, paper. 2s per μF per kV. G3VUT, QTHR. Tel 01-550 9300.

Hallicrafters SX146 rx, as new, £85. (Orig price over £160). Will take rx in part exchange. Snowden, Swainsea Lane, Pickering, Yorks. Tel 2560.

Cannonball tx, 160m, psu, £22. 35W 4m tx with mod, £7. DET24 and 70cm cavity, £3 15s. ACT22 and QRO 70cm cavity, £6 10s. 3cm rx 723A/B, £7 10s. 2C39A, 15s. Pair 2W 28MHz trncvrs, posh jobs, £20. Sae lists. G3ZGZ, 5 Summerville Ave, Staining, near Blackpool.

Heathkit Mohawk rx, 160–10m ham bands only, £50. HRO 5T with 5 gc coils and psu, £12. R209 Mk2, £9. GEC vhf rx, xtal cont front end, 90MHz max freq, £5. ALA2 panaramic adaptor, i.f. about 29MHz, built in psu, £9. 2 large smoothing chokes, £2 ea. GI3TLT, QTHR, Tel Bangor 4888.

Codar AT5 tx, T28 rx, cont unit, /M psu and whip ant, all immac cond, £35 ono. G3WTB, Brooklands, Long Moss Lane, New Longton, near Preston, Lancs.

Trio 9R59DE, £30. Hardly used. Codar preselector, £8 (with psu). Joymatch 4RU atu, £3. Buyer must coll or will post for extra £1. Austin, 9 Mansfield Road, Sheffield S12 2AE.

30ft sectional mast, £2. £20 worth of components etc in tx/rx (transistor), £5. Details on request. GW8BXN, QTHR.

Cossor 1320 wobbulator/patt gen, £7 10s. CT84 scope, 230V, with spare tube, £7 10s. Both as new with hndbks. Carr extra. G3RNV, QTHR.

KW Vespa Mk2 with ac psu, £85 ono. Linguaphone Spanish course, unused, £8 10s. G4CP, QTHR. Tel Bloxwich 77821.

KW Viceroy Mk3G, £80. G2DAF Mk2 with metered psu, £45. CT38, £12 (with data). Can deliver 100 miles. G3WBT, QTHR.

Wireless World. Bound vols (32–40) 1933–1937. Unbound vol 31 and part vol 30 (21 copies), part vol 41 (24 copies). Proceeds to school club funds (G3KZA). Offers pse. G3JWC, QTHR.

AR22 rotator and control unit. Gd cond, £15 plus carr or coll. GM3VXR, 70 Leven St, Motherwell, Lanarkshire. Tel Motherwell 66597.

B2 tx/rx, unmodified, mains or batt operation, complete with manual leads, xtals, coils and morse key, in orig case, vy gd, £28 10s ono. Wright, 34 Webbs Way, Stoney Stanton, Leicestershire. Tel Soarbrook 404.

Pye Ranger, vibrator type with rx 2nd local osc xtal, cascode rf stage, resprayed, £8. 6V inverter trnsfmr, 250V at 150mA approx, £1. 360 degree position indicator with special pot, £2. 15m G-Whip. G3TTV, QTHR.

AR88LF rx, vgc, £25 ono. 358X rx with psu, coils, vgc, £15 ono. TCS13 tx/rx, hvy psu, vgc, comp station, £20. Sae. View weekends. Morgan, 40 Crockerton Road, London SW17.

New BC108 transistors, 2s ea or 12 for £1. Also 50V scrs. Mohican rx, £19. Callers only by arrangement. 5 and 30MHz padaptors. Sae. G3JGF, 68 Strathcona Ave, Bookham, Surrey.

Codar T28 160 and 80m rx, vy gd cond, £10 ono. Thorn, 121 Harrow Road, Langley, Slough, Bucks.

Vanguard Mk2, new 6146, 10–80m, in ex cond, offers over £25 or why. Wanted: mains or batt tape recorder. Andreang, 10 Vermont St, Beverley Road, Hull, E Yorkshire. Tel 0482 45140.

Rf bridge B601 Wayne Kerr and source detector, £30. Telegraph distortion measuring set tx type 5B, £65. Hall, 22 Maple Drive, Beverley. Tel 0482 885854.

Rae correspondence and G3HSC beginners morse courses, both comp, £6. Smillie, 150 Millhouses Lane, Sheffield, S7 2HE. Tel 363069.

3ft diam met balloons, 11s ea. 275ft reels aluminium wire, 11s ea. Prices include post. Ideal for balloon supported verticals. G3XKV, 15 Avenue Road, Brentford, Middlesex. Tel 01-560 8671.

2m valve convtr, 28–30MHz i.f., mint cond, £6. Hopkinson, 6 Avondale Mount, Shipley, Yorkshire, BD18 3NU. Tel Shipley 52096.

Pye base station, 2m, comp with 6/6 beam, coax etc, £25. Webb, 37 Alwyne Grove, York. Tel York 25798.

R216 with matching psu, offers. TU7B, £1. Teleprinter 3X, gd copy, £9. Reperf 44 Mk2 for 230V ac, £6. W/S 19 Mk3, cable, hndbk, £7 1132A, mint, boxed, £8. 32 coil set, £3. G3CTR, QTHR. Tel 01-237 4604.

2m mosfet convtrs, 1·8–3·8, 22–24MHz i.fs., £6 10s ea. Xtals: 1845, 9500, 7040, 1901, 3670, 3578, 3536, 7014kHz, 7/6 ea. Boxed Ferranti 6AC7s, 7/6. 52 Set atu, 30s. 5mA meter, 10s. Many octal valves for callers. Angell, Littlemead, 46 Upton Park, Slough, Bucks. Tel Slough 21086.

WANTED

2m Communicator, cond unimportant, must be cheap. G8ABA, QTHR.

Hallicrafters S27 rx, 19–144MHz, or Eddystone 770R vhf rx, 19–165MHz. Must be in wkg order. Bush, River View, Hagg Bank, Wylam, Northumberland.

Pye Cambridge, low band, dash mounting, must be in gd cond. G3IKN, 14 Willow Drive, Bracknell, Berks. RG12 2HX.

DX100U, must be fb cond. Will coll 50 miles. G3WGL, QTHR. Tel Glossop 4981.

Newly formed school radio society would appreciate cheap or unwanted gear to equip station. Please, no junk. GW3YBN, Porth Grammar Technical School, Porth, Glam.

Swl requires HRO, psu and basic coils. Must be in gd wkg cond and suit for ssb. £10 to £20 offered. Details to Cross, 1 Oak Ave Penwortham, Preston, Lancs. Tel Preston 42013.

Labgear E5033 pi-tank assembly. Heavy ceramic 5 position progressive shorting switch. HRO senior, proper set of bs coils plus gd home made coil for 21MHz. Gd cond items pse. G3JFC, QTHR. Tel 01-854 6646.

200μF electrolytic capacitors, 450V wkg. Mains trnsfmr: Sec 2000V at 500mA. Sale: Brush xtal mic. Instant heat soldering iron. All cheap. G3KH, 133 Station Road, Cropston, Leicester, LE7 7HH.

HC6/U 24MHz xtal (Pref Zone C) or 48/72MHz xtal for 2m. Prew, 13 Five Elms, Fairstead Estate, Kings Lynn, Norfolk. Tel 61554.

HW32A, psu and mic, £50. TA33Jnr, £15. CDR rotator, £7 10s. Going QRT. G3OUQ, QTHR. Tel Hinckley 3390.

RSGB blazer badge, wire or cloth (wire pref). 50 or 100W tx, cw-a.m., 10–80m for /A wkg. G3WGL, QTHR. Tel Glossop 4981.

FT243 or HC6/U xtals on 5650, 5775, 6183, 8433, 8517, 8683kHz and HC6/U holders. Also borrow or loan manuals on Marconi Atalanta marine rx and BC1147A US Army rx. G3KBI, 12 Skelton Road, Brotton, Saltburn by Sea, NE Yorks. Tel Brotton 312.

Aerial rotator and indicator to suit vhf beam. Also 2m yagi or sim directional beam. State price and cond. Hobro, 20 Bedwardine Road, St Johns, Worcester, WR2 4HZ.

Aircraft tx type BC950A. 4 to 4·55MHz HC6U xtals. Pye Bantam, Pocketfone or similar. Robertson, 12 Hazel Close, Mildenhall, Suffolk.

Mods to WS38 Mk3 and conversion to top band, borrow to copy, postage refunded. Homer, 79 Gordon Road, Dartford, Kent.

AR88D manual, tuning knob, alignment and trimming tools and rf

section cover. Also HC6/U or HC18/U 47·33, 35·5 or 71MHz xtal. Barnott, 13 Rudham Ave, Grimsby, Lincs. Tel 0472 78495.

Mains trnsfmr to give 250V at 200mA and 6·3V at 3A. Have, for sale, quantity of recent *PW, SWM*, 1s 6d ea or 10s doz, sae all enquiries. Stokes, 4 Thornleigh Ave, Thornes, Wakefield, Yorkshire.

FT243 or HC6U xtals, 5650, 5775, 6183, 8433, 8517, 8683 or nearest. Also loan or buy manual for Marconi Atlanta marine rx. G3KBI, 12 Skelton Road, Brotton, Saltburn by Sea, NE Yorks. Tel Brotton 312.

Any info for a Motorola tx, radio T-416/GR, loan or buy circ diag, hndbk etc. Clank, 20 Rolls Crescent, Manor Farm Est, Rawmarsh, Rotherham, Yorks.

SB401E tx. SB620 analyser. HW17A trnscvr. SB601E scope. Tilt-over tower, 40 to 80ft. TW Communicator 2 and 160. Hy Gain TH3 beam. G3UXX, QTHR. Tel Fairoak 270.

Rtty terminal unit with own and —80-0+80V dc psu. Also 100kHz and 2682kHz 10X xtals. Cullen, 3 Athelstan Road, Harold Wood, Romford, Essex. Tel Ingrebourne 42676 (45566 office hours).

Rxs. Tx (ssb pref). Units not wkg not objected to if reasonable. Also hf and If i.f.s, xtal modules, ics, small caps, diodes, pots, resistors, transistors and tuning caps etc. All letters answered. Tynan, 29 Elm Walk, Stevenage, Herts. Tel Stevenage 51297.

Ant assembly AS-410/URD-2, part of rdf set, AN/URD-2A, inc R-256A. Navships 900555, panoramic adaptor rdf. Navships 900527, radio rx rdo. Typebox and pallets for Teletypewriter mod 28. Barry-Peters, Blue Coat School, Wavertree, Liverpool. Tel 051-733 1407/8.

160-80m convtr to mw car rx (tuneable), transistor pref. Details, price etc to G2DHV, QTHR. Tel 01-300 1649.

Manual for R103 Mk2. Thomas, 20 Llanbeblig Road, Caernarvon.

Gd rx, can only afford £6. Must cover 160 and 80m. For sale: 52 set (Canadian), needs attention. Smith, 17 Anthonys Ave, Lilliput, Parkstone, Poole, Dorset. Tel Canford Cliffs 79401.

2m transistor convtr, suit i.f. for RA1, reasonable price. Wilson, 47 Arlington Drive, Alvaston, Derby.

Tri-band beam, rotator, indicator, linear and Collins rx. G3ODT, Station Cottage, Bampton, Tiverton, Devon.

R1155 rx in non-wkg order (parts requ), must be cheap. Britton, 2 Redford Road, Windsor, Berkshire. Tel Windsor 66242 (evenings).

Circ and/or handbk for the Murphy trnscvr TR821 or TR821/25. G8CQU, QTHR.

Loan of plans and/or info to convert a tv into an oscilloscope. Horne, 48 St James Road, Carlisle, CA2 5PD. Tel 23694 after 5pm. Transistorized gdo and Trio spkr. GI3HCG, QTHR.

Rx, such as BC788, for 27MHz to 140MHz, any offers. Cooper, Gt Baddow Comp School, Chelmsford, Essex. Tel 57144.

Valves for HA14, 572B. Have 4CX250B (pair), exch or state price. GW3DZJ, QTHR. Tel St Asaph 3333.

CR100 rx, faulty, any condition acceptable (even incomplete), please state price anywhere. Bentley-Briscoe, 27 De Vere Gdns, Cranbrook, Ilford, Essex. Tel 01-554 6631.

Type 4RF (or similar) tuner for Joystick. G3RSJ, QTHR. Tel Pakenham (Suffolk) 675.

Early wireless books, magazines, catalogues, share certificates, morse keys, valves, parts (marine or amateur before 1925). K8IKO, Box 222, Worthington, Ohio 43085, USA.

Preselector tuner 1·5-4MHz transistorized, 12V dc for /M rig with Belling-Lee sockets, price? G2DHV, QTHR. Tel 01-300 1649.

Trio JR310 rx. Robbins, 17 St Georges Crescent, Aycliffe, Dover, Kent.

Purchase circ and details of vhf rx unit type 62H AP61357. G3CDG, 24 Poulden Court, Seletar, Singapore 28.

Crank-up tower. G3LDI, QTHR. Tel Wymondham 3463.

Vintage rx (xtal, valve or combination). Also books or descriptive lit, period 1920 to 1928. Cash or exchange. Neale, 11 Pine Drive, Wokingham, Berks. Tel Eversley 2626.

RSGB pubs: *Helping hand to amateur radio; How to become a radio amateur*, (both 1938); *Twenty-one years of progress* (1933); *What is amateur radio* (all editions). G3IDG, QTHR.

144MHz QRO 4X150A pa using quarter-wave line on 19in rack chassis. Please state price. Ludlow, Meiros, 32 Rhys Street, Edmondstown, Nr Rhondda, Glam. Tel Tonypandy 2768.

Good 220V Ballast tube for Hallicrafters S77 rx (Hallicrafters part no 24B874). Warren, School House, Strete, Dartmouth, Devon.

Antique wireless equipment for club radio museum: Xtal sets, bright emitter valves, horn spkrs, radio books, catalogues and mags (anything prewar). G3KPO, Peterborough AR & ES, Jersey House, Eye, Peterborough, Hunts.

Ac psu and spkr for KW2000. GM3ACL, QTHR. Tel 041-952 2866.

A new set of valves for CR100: KTW62 (7), X66 (1), DH63 (1), KT63 (1), U50 (1). G3LBN, QTHR. Tel Walkern 352.

Modern transistorized circ for building ssb adaptor to attach to Eddystone EC10 (Phasing or synchronous). Manley, PO Box 13, Bahrain, Arabian Gulf, Tel Bahrain 4221.

Circuit and/or hndbk for sig gen Taylor model 65B. Peck, 7 Elm Drive, Brightlingsea, Essex. Tel Brightlingsea 2725.

Labgear quad spider for 5Z4DW. Reply to G3AWY, QTHR. Tel Portsmouth 33106.

Slow morse record; ex-govt box type kite. Both must be in gd cond. Harvey, 22 Elm Grove, Bromsgrove, Worcs. Tel Bromsgrove 6941.

Circ diag or hndbk for R1475 rx. Also bfo xtal (600kHz) for same. Underwood, 6 Bell Lane, Narborough, Leics.

Hndbk, review, or personal reports on Star SR550 rx. Borrow or buy why. All gen helps. Hooper, G3YZL, 8 Pitchcombe Gdns, Bristol, BS9 2RH. Tel 683717.

Hallicrafters S27 circ/hndbk, buy or borrow. G3GOX, QTHR. Tel 01-570 1873.

Modified Pye Vanguard, ideal high power /M 2m, self-contained trnscvr, 12V supply, comp with halo and xtals, £40. G8BUL, QTHR.

Mine detector, ex WD, must be wkg, please state price and cond. Freeman, 39 Nursery Drive, Banbury, Oxon.

Minimitter or Panda atu. G2DTO, QTHR. Tel 01-653 7315.

Ranger or similar for 2m /P El operation. Transistor uhf co nvtr G8CEF, Ballylynch, Carrick-on-Suir, Ireland.

G and D CTR-70. G3FNV, QTHR.

Tri-bander or similar with alloy mast and rotator, together or sep. G3HSG, 17 Wykeham Way, Haddenham, Aylesbury, Bucks. Tel Haddenham 7328.

Buy or borrow circs, manuals, for xtal calib 7 Mk2. Simon Minstrelle recorder. Hitachi WH817 portable. TCS12 rx. GEC miniscope instruction book. Buy UM0 or UM1 trnsfmr. Shepherd, 72 Westerland Ave, Canvey Island, Essex, SS8 8JS.

Buy or loan details on BCC 715ME vhf rx, especially conversion det to 2m tunable. Jones, 131 Highfields Road, Chasetown, Walsall, Staffs. WS7 8QT. Tel Burntwood 6654.

B5K valve base or source thereof. G3XUA, QTHR. Tel 0602 73685.

Eddystone 358 rx, circ or hndbk, buy or borrow. G2FQS, QTHR. Tel 01-845 6807.

Vibrator psu, 12V in, 1½V and 90V out. Also RAE correspondence course. Sharpe, 22 Coniston Court, Kendal St, London, W2. Tel 01-262 7132.

For swl: 19 Set with A and B section, with or without tx. Reasonable price paid. Also S meter for Hallicrafter S40B or circ. Illman, 134 Baslow Road, Totley, Sheffield, S17 4DR. Tel Sheffield 365345.

KW E-Z Match and KW swr indicator (75Ω). State price and cond. G6NB, QTHR.

701A crt. G3XPU, QTHR. Tel 01-837 8688 during day.

Hallicrafters S27 rx, must be ok. Gd price given. Tilly, 54 Ashton Vale, Bristol, BS3 2PP. Tel 663515 during evenings.

Approx 2kW self-regulating 240V generator, engine not essential. G3SUV, QTHR. Tel Earls Colne 519.

100W carbon resistor, 50Ω or near. Also 1A rf meter. Exchange BM3 mic comp or sell, £1. Also require 6CH6 valve. G2ANB, QTHR. Tel Hockley (Essex) 3278.

KW Vespa and psu, mint cond Mk1 model. Gd price given. Details to G3JZB, QTHR.

HW17, must be mint. G5NN, QTHR. Tel Winslow 2498.

TA33jnr or TA32/33jnr conversion kit. Also quad spiders, 10-15-20m quad comp with fibre-glass arms. G3YBM, QTHR. Tel Burgess Hill 3851.

Codar T28 rx. State age, cond and price. Dawbarn, 8 Daylesford Close, Parkstone, Poole, BH14 8DY.

LOWE ELECTRONICS

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AGENTS (evenings and weekends only)—**Alan 4 Southwick Street, Southwick, Brighton. G3MME Southwick 4887**

Sim 19 Ellismuir Road, Baillieston, Nr. Glasgow. GM3SAN 041-771-0364

See you at the RSGB Exhibition 19th-22nd August, when I'll likely have some new gear for you to drool over. Don't miss the FE-600 and 3500 linear! Two metre men—we may have something to interest you. I'll also be at the Derby Rally on 16th August. Apart from this, please remember we are CLOSED ALL OF AUGUST.

Receivers

Trio JR-500 £45.
Lafayette HA-350 £55.
Hallicrafters SX-111 and matching speaker £55.
Eddystone EA-12 £120.
BC-639A—100-155MHz. Requires psu but very clean and respectable-looking £12.
Hallicrafters SP44 panadaptor (455 kHz) £25.
BC-312 £10.
AR88 cabinets by Philpotts, new £5.
Lafayette HA-500 £30.
Lafayette HA-600 £40.
KW-201 £75.
AR88D's £30-£45
Sommerkamp FR-100B £85.
Hammarlund SP-600 £85.
Eddystone 680X £55.
B210 £25.
Marconi Miniature H.F. Rx £30.

Transmitters

Yaesu Musen FL-400 a gift £100.
FL-1000 linear £70.
Hammarlund HXL One linear £100.
SB10U £20.
DX100U £30.
Sommerkamp FL-200B, as new £95.

Transceivers

Hallicrafters Tornado £140.
Drake TR3 £200.
KW2000A £150-£170, choice of four.
Swan 350 £175.
Paros £100.

Sundries

CT52 scope £18.
Cossor 339A scope and manual £12.10.0.
Cossor 1035 £15. Cossor 1049 £15.
Marconi universal impedance bridge TF373/B £8.
BC221J £20 } both **accurate**
BC221AH £20 }
Taylor 67A sig. gen. 100 kHz to 240 MHz £15.
Noise generators CT82 £12.10.0.
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Morse keyers. The popular Katsumi EK-9X keyer, in stock £7.15.0.
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Speech compressors. Katsumi £7.15.0.
Mobile transistor power supplies. Beautiful jobs ex police cars. Pos. or neg. ground giving 150, 250 and —20 v.d.c. Write for circuit diagram. Fully tested. £4.10.0.
Filters: Medco L.P. filters, 50 ohm with SO239 sockets, £5. 75 ohm with Belling Lee sockets, £4.10.0. Medco H.P. filters, 27/6d. Kokusai 455 and KVG 9 MHz.

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6AQ5; 6DC6; 6EW6; 6GH8; 6GK6; 6JD6. All at 15/6d.
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5736; 6AQ8 27/6d. 7360 42/6d. 6BZ6 12/6d.

P.A. Valves

6JB6A 6JM6A; 6JS6C; 6KD6. 35/- each. Matched pairs no extra charge.
61B6B's £2.12.6.

Don't forget to allow for postage. We'll refund any excess in cash.
In addition, we usually have the odd bit of test gear and station sundries—send me a large s.a.e. and I'll tell you all about it, including the new FE-600. Got gear to flog? Test gear? If it's nice, we'll either buy it or flog it for you on commission. Want H.P.? No problems.
Finally, may I remind you — see you at Derby, 16th and the RSGB Exhibish 19th–22nd August, but we're CLOSED the rest of AUGUST.

73 de Bill

P.S. Don't forget our Motorway service for new and second-hand gear, even if you only want to look at it.

AMATEUR ELECTRONICS G3FIK

TRIO TS-510 TRANSCEIVER. If you are at the stage where you are contemplating changing your rig or have recently been successful in obtaining that precious license we shall be delighted to send you return post information on this outstanding transceiver. The TS-510 is a first class buy in all respects as so many users have learned and if this sounds horribly like typical sales patter then please listen around the bands and enquire of the man who is operating one. When it comes to buying gear of this class the greatest mistake one can make is to consider the price first and to gloss over the probable deficiencies of the equipment in question. This is a fatal error and our advice to the unwary is to forget the fact that the TS-510 is the cheapest name transceiver on the UK market today at £180 complete with matching PSU and concentrate solely on performance, reliability and after-sales service. If, after investigation, you come up with the answers we anticipate, we shall be very pleased to let you have full details of the 510 and how we can help you with your purchase through our finance terms. Thanks to the fact that we have been extremely busy we are now in a very poor state as far as stocks of used equipment are concerned and would be interested to hear of any equipment which you have for part exchange. We are particularly interested in receivers of all types and at all prices and if you are not buying at the moment we may still be interested in outright purchase.

The items listed below are priced to *include* carriage unless otherwise stated which is deductable on goods collected.

HAMMARLUND SP600JX RECEIVER. Another excellent specimen **£95.0.0**
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AR88D RECEIVERS. We have a small quantity of BRAND NEW and little used sets, priced as follows:—
Grade One. Complete with trimming tools and handbook. **£77.10.0**
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Grade Three. Very little used and well above average condition. **£67.10.0**
Please note that carriage by passenger train on AR88's is 50/-d plus a fully refundable deposit of £5 on the special transit case employed.
EDDYSTONE EB35. TRANSISTORIZED AM/FM RECEIVER. This is in mint condition and a genuine bargain at **£46.0.0**
MEDCO LOW PASS FILTERS. FL50A 50 ohm, Belling Lee connectors **£4.12.0**
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LESON DESK MICROPHONES. Incorporating transistorised pre-amp with gain control. Employs PTT Pressel.

As mentioned above we require commercial equipment of all types and would be interested to hear from you should you have gear to dispose of. Please state required price when writing.

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Application is invited for the post of **WIRELESS TECHNICIAN** in the wireless workshops at Police Headquarters, Randolphfield, Stirling, to work on maintenance, installation of VHF/UHF fixed and mobile radio telephones, and other electronic equipment. Applicants should have completed a recognised apprenticeship and have some recent experience in radio telephone maintenance. Formal qualifications an advantage.

Salary scale will be N.J.I.C. Technical Grade IV–£1,130 per annum, rising by annual increments to £1,300 (12½% increase pending). N.J.I.C. conditions of service will apply.

Applications detailing experience and qualifications, together with copies of recent references, should be lodged with the Chief Constable, Police Headquarters, Randolphfield, Stirling, not later than 19th August 1970.

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We wish to contact an enthusiastic, knowledgeable radio amateur living within easy travelling distance of Liverpool, and who would be prepared to represent us in first line maintenance of an interesting and fairly complex electronic system, occasionally, during out-of-office hours.

Interested amateurs should be on the telephone and be prepared to turn up within 48 hours of being called by the public service using the system.

Please contact us for further details:

K. V. Franklin, G3JKF, Telephone: 0293-28080
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QTHR

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455kHz FILTERS. 6kHz and 600 Hz bandwidth. £9 ea. TX valves, crystals. S.a.e. list. EG QQV03-20A, £1. Gooday, 10 Waveney Drive, Chelmsford.

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MISCELLANEOUS

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THE SENTINEL DUAL GATE MOSFET 2 METRE CONVERTER

If you read the RSGB equipment review last month you will see that the only criticism was that the general presentation and construction lacked a professional touch. Since we read the original manuscript of this report some months ago, we've been working on this and now present the converter with a full quality, professional finish. Items like quality screw or plug in coloured terminals for the supply. All these additions considerably increase the cost of manufacture, although for the time being, the price remains unchanged at **£12.10s.0d.**

IFs available:	4–6MHz, 9–11MHz, 14–16MHz, 23–25MHz, 24–26MHz, 28–30MHz.
Noise figure:	2dB
Supply:	12 volts
Size:	2½" × 3" × 1½" in box finished in silver hammer enamel.

THE SENTINEL LOW NOISE FET 2 METRE PRE AMPLIFIER

The FETs and components are selected for a noise figure of less than 1dB. Gain of 20dB. Boxed as the converter. Price: **£6.10s.0d.**

We'll be staggering down the M1 to the Exhibition with Sentinels and a.b.w. some modules for an all solid state transmitter and a complete 2 metre transmitter. So C U THR.

EMSAC

"Some weeks ago I purchased from you a Nuvistor 2 metre converter, and after using the device I feel I must write and congratulate you on producing such a good piece of equipment at a very reasonable price. The performance goes way beyond my expectations." G8- - - Orpington.

"The converter CN2 arrived safely two days ago. May I say it is a really nice job, pulling in f.b. signals. . . ." JPP Teeside.

". . . Nice to see such a good range of products available for the amateur. Keep up the good work!" GM3- - - Lincoln.

"Thought you would like to hear that the EMSAC CN2 which I collected from you on Sunday morning works very well indeed, just on a rod dipole. . . . I collected calls from Cornwall, Essex and France; not bad for a start." EJW Totton.

"After hearing the results I get from my EMSAC CN1 2 metre converter just using a 19' + 19' dipole a friend of mine said he was thinking of getting on to 2 m very soon, so will you please send details of the CN1 together with all your other products to . . ." WJP Kettering.

These are some of the nice things said by some of the many people who put pen to paper during the last few weeks. We continue to provide good value for money and our goods will be on display for your inspection at the Radio Engineering and Communication Exhibition. We will try to carry sufficient stock to satisfy the demands of those who wish to purchase at the Show. For those who prefer to order by post we can now offer a C.O.D. service as well as the usual C.W.O. At this time all goods advertised are ex stock for immediate delivery. We look forward to meeting you at the Show. (Stand 27.)

,Mike/G3IAR

CN1 **190/-.** P. & P. 4/6.
2 Metre converter. Double Nuvistor cascode design. Band-width better than 4db over band. Measured NF better than 3db. Complete with 38·666MHz crystal for 28–30MHz IF. Low Z cathode follower output. Well proven design.

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RF actuated keying monitor 50–70 ohms, plus morse practice oscillator. Audio mixing from receiver, phone jack socket, volume control, pitch control, loudspeaker. Smart case to match other EMSAC gear. Requires PP6 internal battery.

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All band vertical suitable for 1·8–30MHz. 7–23 ft fully adjustable.

GD1 **80/-.** P. & P. 4/6.
Multi band dipole 5RV type. 102 ft. horizontal (18g.), 110 ft. feeder, fibre glass encapsulations.

GD2 **60/-.** P. & P. 4/6.
Smaller version of GD1. 55 ft. top and 90 ft. feeder.

The EMSAC range also available from G3RYV, 20 Allenby Road, Maidenhead, Berks. Tel: Maidenhead 22551. Evenings/weekends. *SAE with enquiries please*

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Modulator. 4 5B254M's in P.P. Parallel; Matched for 4X150A's in parallel, speech amp., VOGAD, and clipper. With circuit. Size: 8 x 10 x 12. Carr. £1 **£10**

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Photo and circuit of any of the above supplied separately for £1, credited if unit purchased.

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103BE Mobile Tx/Rx. FM. .. .. Carr. 30/- **£12**

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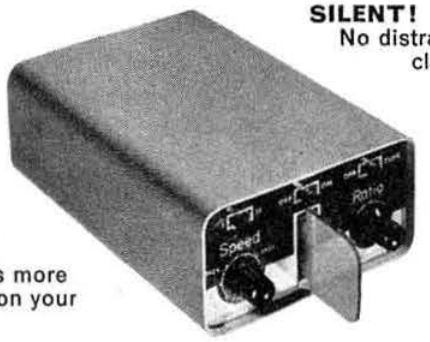

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DATE..... *SIGNED*..... *CALLSIGN, BRS or A No*.....

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INCORPORATED 1926

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DUKE OF EDINBURGH, KG

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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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Signed _____

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* Please delete where inapplicable.

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