radio communication

November 1971

Journal of the Radio Society of Great Britain

JUST LOOK AT THE WEATHER!

Part 1. Receiving satellite pictures. *p. 748*

November 1971

radio communication

Volume 47 No 11 Price 30p

CONTENTS

FRONT COVER

A 10-turn helix for satellite tracking being operated by boys of the Douai School Radio Society. The ground plane is 6ft square and the helix is of 14swg copper wire supported on a square wooden lattice structure, 16ft long. Counterbalance is provided by heavy wooden blocks, and steering is done manually by the handles at the back

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

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

New solid State Receiver for the Junior S.W.L.

Transistor General Coverage Receiver SW-717

- **All solid-state circuitry mounts on printed board for quick, error-free assembly.**
- **BFO (beat frequency oscillator) control improves code reception.**
- **Solid-state circuitry for stable long life, instant co-operation.**
- **Band selector switch lets you choose on AM and three SW overlapping bands.**
- **Mode control gives separate positions for AM and code reception. Has 'standby' to cut out signal while receiver stays on.**
- **Headset jack on front panel readily accessible for private listening.**
- **Bandspread dial allows maximum station separation.**
- **Relative signal strength meter for precise signal location.**
- **Built-in speaker.**

An economic introduction to Shortwave Listening; Take up the fun and fascinating hobby of shortwave listening. An interesting and absorbing project for the whole family; just follow your Heathkit manual and you assemble the SW 717 in a few hours. The Heathkit SW 717 puts local AM stations and shortwave broadcasters from around the world as near your table or bookcase: Continuous tuning from 550 kHz to 30 MHz, divided into four bands, lets you roam the globe . . . listen in on foreign broadcasts from Europe, Asia and America; amateur radio operators in every country; ships at sea and weather bulletins.

Are you considering Amateur Radio? Some 400,000 persons of all ages in almost every country in the world are following a hobby that is in many ways unique. Radio amateurs with their own transmitters and receivers in their homes, communicate with fellow enthusiasts over hundreds and thousands of miles. Many expeditions have kept in contact with the rest of the world with the help of amateur radio. Amateurs have also often helped in emergencies in conjunction with crashed aircraft or ships in distress.

SW 717 SPECIFICATIONS: Frequency Coverage: Band A. 550 kHz to 1500 kHz. Band B. 1.5 MHz to 4 MHz. Band C. 4 MHz to 10 MHz. Band D. 10 MHz to 30 MHz. **Meter** indicates relative signal strength. Headphone jack, Headphones or an external speeaker. Loudspeaker built-in. **Controls:** VOLUME with on-off switch. MODE (am, standby and CW) BFO. MAIN TUNING. BANDSPREAD TUNING. ANL (on-off). **Transistor Complement.** 40673: mixer and RF amplifier. 2N3393: audio preamplifier. 2N5232A: i-f amplifier, AGC amplifier. MPF 105: oscillator. S2090: final audio amplifier. S2091: S2091: final audio amplifier. X20A829 Audio driver. **Power Supply:** Transformer operated. Full wave bridge rectifier. **Power Requirements:** 120 VAC or 240 VAC 50/60 Hz 6 watts. Order your SW-717 4 band AM/SW Receiver today, tune in on the world through SWL.

Kit K/SW-717 £29.80 Carr. 60 P.

LOWE ELECTRONICS

119 Cavendish Road, Matlock, Derbyshire

Matlock 2817 (2430 evenings) Bill G3UBO Alan G3MME

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Sim, GM3SAN, 19 Ellismuir Road, Baillieston, Nr. Glasgow. 041-771 0364

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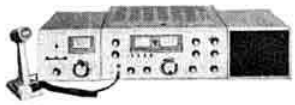
260W p.e.p. 80 to 10m, 0.3 microvolt sensitivity, 2.4kHz (6db) 4.2kHz (60db). Optional 600Hz CW filter £15. Built-in AC and DC power supplies, built-in WWV 10MHz and CB band, noise blanker. 25 & 100kHz calibrators, built-in VOX, ± 5kHz clarifier, break-in CW with side tone, 1kHz dial readout, selectable SSB, AM capability, built-in speaker, microphone, crystal channels, dual VFO adaptor, 10FET's 3IC, 31Si Tr, 38 Si diodes, one 12BY7A driver, two 6JS6A final amp., 13½"W × 6"H × 11½"D, weight 30lb. £230.
Accessories: External VFO FV-101 £35, external speaker SP-101 £10.

560W p.e.p. 80 to 10m, 0.5 microvolt for 20db S/N (14mHz SSB). 2.3kHz (6db) 3.7kHz (60db). Optional 600Hz CW filter £15. Built-in AC power supply, built-in WWV 10MHz band, 25 & 100kHz calibrators, VOX, clarifier, break-in CW with side tone, 1kHz readout, selectable SSB, 15½" × 6¼"H × 13½"D, weight 45lb. £195.
Accessories: External VFO FV-401 £35, external speaker SP-400 £10.



A twin to the FTdx560, but with the optional CW filter fitted, a fan-cooled PA, and a noise blanker £215.

240W p.e.p. 80 to 10m, crystals available for full coverage 28-30MHz £1.75 (28.5-29.0 fitted). 2.3kHz (6db) 4kHz (60db), 0.5 microvolt sensitivity. Pre-mixed oscillator chain, 240W conservative rating—speech peak 300W, VOX, PTT, break-in CW, CW sidetone monitor, 100kHz calibrator, clarifier, etc. £132. 13½"W × 5½"H × 11"D, weight 18lb.
Accessories: A.C. power supply/speaker £35, FV-200 VFO £35, DC-200 power supply £40.

2m FM mobile 25W. 12 channels (144.48, 144.60 and 145.00 supplied). Runs straight from the car battery. Double conversion Rx with 0.3 microvolt for 20db S + N/N ratio sensitivity. Deviation set at 5kHz but adjustable. Built-in speaker 6½"W × 2½"H × 10"D. Weight 4lb complete with microphone. £80.

Carriage: We deliver FREE via Securicor usually within 24 hours, but guaranteed to any part of the country within 48 hours. It is also nice to know that they handle your gear GENTLY.

Other new stuff includes the YD846 mike at £5 (this is the one supplied with the FT-101—sound nice, don't they?) and the deluxe table mike YD844 at £10. Keys £1, EK-9X keyers £8.20, low impedance padded headsets £2.50 without plug, £2.60 with stereo plug, 12 hour digital clocks £5.80. Crystal filters KVG XF-9A, B, C, D and M all in stock, and Kokusai. Fresh batch of Asahi dual meter SWR meters £6.80. Power meters/Dummy loads, these are a very superior job, switchable 20 or 120 watts, VSWR 1.2 or better, 50ohms 3-500mHz £32, 75ohms 3-150mHz £30. VHF men—at last a decent piece of gear at a reasonable price. VHF mobile whips: the G-Whip ⅝ vertical at £4.10 plus 15p postage—just the job for the mobile 1C-2F, 1C-20 or FT-2F. All prices post free except where stated.

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Peter Ward, G3XWX	47 Radstock Avenue, Ward End, Birmingham, B36 8HD

Please drop us a line enclosing s.a.e. and we'll send you all our guff.

We also offer H.P. facilities—minimum 10% deposit.

Hours: Tuesday to Saturday 9-5.30 (closed for lunch 1-2 and all day Monday).

73 de Alan and Bill

SOLID STATE MODULES

63 Woodhead Road, Solid, Lockwood, Huddersfield, HD4 6ER. *Telephone 23991*

We'll try a bigger spread this month, not because we're bothered about others doing it. But the space was becoming a bit cramped, and we've more new stuff coming along. Nowadays we probably sell more stuff as a result of personal recommendations—and the previous supplyees coming back for more, than we do through these adverts.

However, still going like hot cakes:

THE SENTINEL DUAL GATE MOSFET 2 METRE CONVERTER
★ Low noise figure 2dB.
★ Gain 30dB.
★ Dual Gate MOSFETs in the R.F. amplifier and mixer for excellent overload and cross modulation characteristics.
★ Size only 2½" × 3" × 1¼" aluminium case—silver hammer finish with black trim.
★ IFs always in stock: 4-6MHz, 9-11MHz, 14-16MHz, 18-20MHz, 23-25MHz, 24-26MHz, 28-30MHz.
★ A NEW I.F. for those receivers that don't tune up to 30MHz—27·7-29·7MHz.
★ Price **£13.75.**
Incidentally—don't be misled by the low price—we make a lot at a time—with large quantity buying and this helps to keep the price down.

THE SENTINEL DUAL GATE MOSFET 4 METRE CONVERTER
★ Same specification as the 2 metre converters.
★ Ex stock I.F.s: 25-25·7MHz, 28-28·7MHz.
★ Price **£13.75**

Also selling more and more.

THE SENTINEL LOW NOISE FET 2 METRE PRE AMPLIFIER
★ Low noise figure 1dB
★ Gain 18dB.
★ Not only do they improve the N.F. of most converters but help if you have an I.F. breakthrough problem, and increase front end selectivity.
★ Size—matching our Sentinel Converters. Price **£6.50.**
Lots of activity now on 70cms.

SM70 70cms FET CONVERTER
★ Low noise figure 4·5dB
★ IF output 144-146MHz for connection into a 2 metre converter. This arrangement means that we can produce a high performance 70cms unit for only **£13.75.**

THE SPITFIRE 2 METRE A.M. TRANSMITTER
★ 5 watts input. At least 2 watts output.
★ 12 volts operation
★ Modulation wave shaping gives good, clean 100% audio.
★ Size 4½" × 2½" × 5½" deep.
★ Audio monitoring point for headphones. Price **£22.00**

THE SPITFIRE MODULATOR
★ Same size and appearance as the transmitter. Price **£10.00**

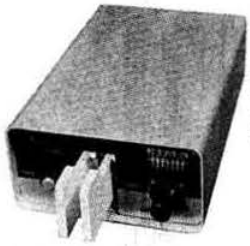
SOLID STATE 9MHz SSB GENERATOR
★ Selectable USB, LSB and CW.
★ 0·2 volts into 80 Ohms output.
★ Sideband suppression 45dB. Carrier suppression 50dB.
★ A sound basis for your SSB transmitter.
★ Price **£11.00** less filter and carrier crystals.

We can also supply from stock the range of KVG 9MHz crystal filters.

XF9A	SSB	2·5KHz	**£11.00**
XF9B	SSB	2·4KHz	**£16.00**
XF9C	AM	3·7KHz	**£15.00**
XF9D	AM	5 KHz	**£15.00**
XF9M	CW	0·5KHz	**£11.50**
Carrier crystals			**£1.50** each

2 METRE VFO—after a lot of development we should have available, by now, a 2 metre output VFO. In keeping with our "from stock" policy, we won't advertise it until next month—but an SAE will bring you details and delivery.

CW — SPACEMARK — RTTY

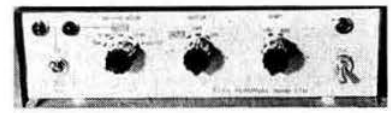


NEW SAMSON ETM-3 SQUEEZE-KEYER

Cuts keying effort—makes such characters as C, Q, Y, F, L, AR, SK, etc. with fewer paddle movements. Use either as normal twin-paddle auto keyer or as iambic-mode squeeze-keyer.
● 4 ICs, 6 transistors, 2 diodes. ● Built-in AC PSU. ● Constant 1:3 dash-dot ratio. ● Compact, weighs only 2½lbs. **LIKE THE WELL-KNOWN SAMSON ETM-2** (used by coast stations and by big ships all over the world) it has: ● Watchmaker-assembled keying-lever movement. ● Silent reed-relay (400V, 1A contacts). ● Sidetone. ● TUNE button. £24.75 post-paid UK.

Still selling... **SAMSON ETM-2** Keyer, £21 (£22.20 with mercury batts.). **SAMSON STA** Speaker/Amplifier for ETM-2/ETM-3, £2.75. **JUNKER** Precision hand key, superb professional model, £8.95. **BAUER** keying/paddle unit for your El-Bug, £2.75.

Model TTU solid-state FSK CONVERTER-KEYER



For two-way RTTY all you add is a transmitter/receiver and a surplus teleprinter (they're cheap!). The TTU gives you instant all-in-one-box RTTY. ● Superb performance even under poor band conditions. ● Sophisticated state-of-the-art circuitry—Integrated circuit, 45 semi-conductors, Butterworth filters. ● Switched for 170/850 Hz shifts, copies any shift from 1000 Hz down to a few Hz. ● Offers automatic control of printer, Autostart and Bell-Auto. ● For transmission, choice of 170/850 Hz FSK/AFSK. £115 post-paid UK.

RTTYers will also be interested in... **ST-5 and ST-6** complete kits or PCBs. Ready-tuned **BUTTERWORTH** filters. 88mH **TOROIDS**, 75p per pair post-paid. **PRINTSET DL6EQ RTTY TU** Basi-kit, BP & M/S Filters, Tuning Indicator, AFSK—and other PRINTSET VHF, SSB, CRO and El-Bug Basi-kits.

Stamp or large SAE will bring you 18-page Catalogue RP6 with all the details.

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FREQUENCY COUNTER. This is a new 234 VAC or 12VDC 50 Mhz counter which reads to 1Hz! We will check everyone against our counter prior to despatch. No leaflets available yet, sorry. Price? Under £100.00.
TRANCEIVER FT401, 500w p.e.p.
This is based on the well proven FT560 but has a noise blanker and blower in addition. The cw filter can be fitted as an optional extra.

YAESU/SOMMERKAMP 12 month Guarantee backed by full Service and Spares.

FT101/277 Transceiver ..	**£230·00**	FV200 Remote VFO	**£36·00**	FT560/747 Transceiver.. ..	**£195·00**
FT101 cw Filter	**£11·90**	FR400/500 Receiver ..	**£120-£160**	FT401 Transceiver	**£215·00**
FV101 Remote VFO	**£36·00**	FL400/500 Transmitter	**£130·00**	FV401S Remote VFO	**£36·00**
SP101 Speaker	**£10·00**	SP400 Speaker	**£10·00**	FF50DX Low Pass Filter ..	**£6·20**
FT200/250 Transceiver ..	**£132·00**	FL2000B Linear 1.2 KW ..	**£130·00**	YD844 Table Mic.	**£11·00**
FP200/250 AC Supply	**£36·00**	FL2500 Linear 2 KW	**£118·00**	YD846 Hand Mic.	**£5·00**
DC200 DC Supply	**£40·00**	FT2F 2m Transceiver	**£80·00**	FP2AC AC PSU for FT2F ..	**£25·00**

KW We are now South Coast distributors of K.W. equipment. Ex stock Atlanta Mk. II **£200.** KW2000B, **£240.** E-Z match **£13.50** (40p). Dummy Loads Z 50Ω each, **£7** (25p). 24 hr delivery on this KW equipment.

USED EQUIPMENT (3 month guarantee if over £45).
KW atlanta, as new **£170.00.** Trio JR500 **£53.00** as new. TRIO 959DE, as new **£35.00.** Sommerkamp FL400, excellent **£100.00.** Digital 500, our demo. model, **£250.00.**

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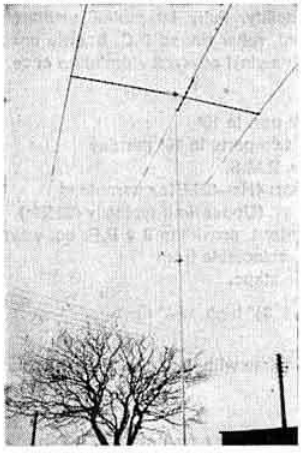
Now you can part exchange your used equipment for a new Heathkit for which we are agents.

Your 'SINGLE-SOURCE' of TOWERS, MASTS, ROTATORS & ANTENNAS. Believe it or not we actually keep towers & masts for 'OFF THE SHELF' delivery service which you will not find anywhere else so once you've made your mind up we'll do our best at 'WESTERN ELECTRONICS' to make you get another *HAPPY CUSTOMER.*



TELOMAST with TA33

TELOMAST

These are galvanised steel masts which telescope down to 10'. They can be extended up to 30', 40' or 50' with antennas up to TA33 jnr. size. They can be erected single handed and rotated from ground level.

	Mast only	*Mast and Rigging*
30' ...	£14·40	£19·50
40' ...	£16·50	£25·50
50' ...	£19·50	£31·50

TELETOWERS

The finest value in guyed, galvanised steel towers which telescope down to 25'. Price (carriage paid) 42' **£72·00,** 57' **£93·00,** 79' **£112·00,** 101' **£148·00.**

30' HAMTOWER

A self supporting steel galvanised tower for HF band rotary antennas. Comes in easily erected 10' sections. Price (carriage paid) **£47·00.**

VERSATOWERS

Self supporting telescope tilt-over galvanised towers for 20', 40', 60' or 85' at **£92·00, £121·00, £146·00** or **£275·00,** 120' guyed at **£380·00.**

ROTATORS

AR 10 **£18·00** (40p)
AR 22R **£25·00** (65p)
TR 44 **£40·00** (75p)
Ham-M **£70·00** (80p)

New 1971 CATALOGUE (15p).

You ought not to be without your copy listing these and masts/towers and a lot of other extras.

LONDON AGENT—Roger Wilkins. Tel: 01-845 6290 After 6.0 p.m.

Hours of business Mon-Fri. 9-1pm. 2-5.30pm. Sat by appointment.
*Your "one stop" single source of towers mast antennas etc.
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INCORPORATED 1926

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QTC AMATEUR RADIO NEWS

Events Diary
Because of the lack of information received for inclusion in the Events Diary kept by Mr E. W. Yeomanson, G3IIR, it has been decided by RSGB Council to discontinue this service.

Commonwealth surface mail
Surface mail letters from Australia, Canada and Trinidad will now cost more as a result of a decision by the postal authorities of these countries to end their preferential Commonwealth postage rates. It will also cost more for people in the UK to pre-pay replies from these three countries. Instead of Commonwealth reply coupons, which cost 4p, they will have to send international reply coupons, which cost 10p.

There are now eight countries which have abolished their special Commonwealth postage rates, the remaining five being India, Malawi, Nigeria, Pakistan and Papua. Air mail is not affected. One other Commonwealth country, Ceylon, ceased exchanging Commonwealth reply coupons at the end of 1970.

USA magazines
Due to the dock strike on the east coast of the USA there may be long delays in the receipt of magazines and books from USA publishers.

IARU Region 1 conference
The next triennial conference will take place at Scheveningen, Holland, commencing on 15 May 1971. The RSGB delegation will be led by the President-elect, Mr R. J. Hughes, G3GVV, and will include Messrs D. A. Findlay, G3BZG (general manager) and Mr L. E. Newnham, G6NZ. The Society's serving vhf manager will be the fourth member of the delegation. The conference secretary is Mr R. F. Stevens, G2BVN. The membership of the Region 1 division of the IARU now consists of 36 societies, with the national societies of Romania and Liberia now in process of being admitted to membership.

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

Class A	13,904
Class B	2,900
Class A/M	2,671
Class B/M	491
Television	210
Model control	20,489

Valves going cheap
Headquarters recently received a gift of valves—some old —some new. Any club, school, association or group which may have a need for replacements are invited to send a stamped self-addressed envelope to the General Manager, RSGB, for a list of types available. There are a few vintage EF50s but very many current B7G or B9A types. A charge of 5p per valve will be made to cover post, packing and handling.

ITU membership
It was recently announced by the International Telecommunication Union that the Kingdom of Tonga had been elected as the 124th member of the ITU.

Wavelength 2·73mm
Soon after the decision of the Space Conference to allocate a new amateur band at 24GHz comes information on an experiment carried by the Radio and Space Research Station, using a frequency of 110GHz (2·73mm) over a path of 2·62km. Aerials used in this experiment were paraboloids, 45cm in diameter, giving a gain of about 45dB.

Proposed new club
It is proposed to form a radio society or RSGB town group in the Harrogate-Knaresborough area. Anyone interested in this project is asked to contact Mr R. Troughton, 2 King James Road, Knaresborough, Yorks. Telephone. Knaresborough 3494.

Silver Jubilee
The Bury & Rossendale Radio Society will hold a dinner dance on 29 January 1972 to celebrate its silver jubilee. It will be held at the Elton View Hotel, Bury, and past members will be particularly welcome. Tickets at £2.25 each may be obtained from G3SUI, and G3RSM at 13 Rhiwlas Drive, Bury, BL9 9DD, or may be reserved at 50p each.

Ropes
Samples of a man-made fibre rope have been received and the prices quoted seem very competitive. Details and samples may be obtained by sending a foolscap sae to: H. Hill, G3ZRB, 2 Lakeland Drive, Royton, Lancs.

Can you help?
Mr H. R. Lodge, BRS191, 62 Guernsey Gardens, Wickford, Essex, would like to borrow a circuit diagram of a Marconi Transarctic receiver type 933 and the handbook of the CR100, all expenses paid.

"20MHz digital frequency meter"

We are advised by the authors of "A 20MHz digital frequency meter using ttl integrated circuits", July and August 1971 issues of *Radio Communication*, of the following errors:

(1) Fig 7. Link marked C should be a line between 2P2B pins 12, 13 and 4P7A pin 2;
(2) Fig 8. Small piece of track missing between 4P7 pin 3 and pins 6 to 14;
(3) Page 525 line 3. For C34 read C24.

Beware! Chain letter

Several members have been annoyed by the receipt of a chain letter which they have been asked to copy and send to other radio amateurs. It purports to offer an opportunity of winning a considerable amount of money. Any member who does not know what to do when receiving one of these letters is recommended to ignore it.

Pirates caught

As a result of Post Office enquiries into the suspected unlicensed use of wireless telegraphy transmitting equipment, the following convictions have been obtained for using wireless transmitting apparatus without the appropriate licence, contrary to the provisions of Section 1 of the Wireless Telegraphy Act, 1949:

Mr J. W. Spendlove, 14 Sleetmore Lane, Somercoates, on 19 May 1971 at Alfreton Magistrates' Court. He was fined £15 on each of two charges, plus £15 costs and forfeiture of equipment.

Mr J. D. Morgan, 149 Kings Road, Brentwood, on 17 March 1971 at Brentwood Magistrates' Court. He was fined £28, plus £5 costs.

Mr P. L. Titmus, 239 Nork Way, Banstead, Surrey, on 27 May 1971 at Epsom Magistrates' Court. He was fined £25, plus £15 costs and forfeiture of equipment.

Mr S. Finkle, 52 Fernside Road, London SW12, on 27 May 1971 at Epsom Magistrates' Court. He was fined £25, plus £15 costs and forfeiture of equipment.

Mr D. Tuffnel, 130 Bridge Road, East Molesey, on 27 May 1971 at Epsom Magistrates' Court. He was fined £25, plus £15 costs and forfeiture of equipment.

Mr K. Oliver, 14 Hermitage Woods Crescent, Woking, Surrey, on 27 May 1971 at Epsom Magistrates' Court. He was fined £25, plus £15 costs and forfeiture of equipment.

Mr Szabo, 15 Dunkirk Street, Derby, on 6 May 1971 at Derby Magistrates' Court. He was fined £25, plus £5 costs and forfeiture of equipment.

Mr R. Grice, 4 Upper Duke Street, Liverpool, on 7 June 1971 at Liverpool Magistrates' Court. He was fined £20 on each of five charges and forfeiture of equipment.

Mr D. B. Pibworth, 333 The Meadway, Tilehurst, Reading, on 22 June 1971 at Reading Magistrates' Court. He was fined £10, plus £10 costs and forfeiture of equipment.

Mr S. H. Dove, 69 Shiplake Bottom, Peppard, Henley-on-Thames, on 22 June 1971 at Reading Magistrates' Court. He was fined £10, plus £10 costs and forfeiture of equipment.

Mr J. Ryland, Sedgehill House, Peppard, Henley-on-Thames, on 22 June 1971 at Reading Magistrates' Court. He was fined £10, plus £10 costs and forfeiture of equipment.

Mr F. Lowe, 62 Plainspot Road, Brinsley, Notts, on 17 June 1971 at Nottingham Shire Hall. He was fined £10 on each of two charges, plus £3 costs and forfeiture of equipment.

Mr P. H. Letch, 175 Whitmore Way, Basildon, Essex, on 1 June 1971 at Billericay Magistrates' Court. He was given a conditional discharge (3 years), and equipment was forfeited.

Mr M. A. Jarvis, Cawdor, Panman Lane, Holtby, Yorkshire, on 30 June 1971 at York City Magistrates' Court. He was fined £50 on each of three charges, plus £10.50 costs and forfeiture of equipment.

Mr P. King, 12 Cecil Rhodes House, Pancras Road, London NW1, on 28 June 1971 at North London Magistrates' Court. He was fined £50, plus £10 costs and forfeiture of equipment.

SWL News

It is proposed to include a regular feature devoted to news and items of special interest to the short wave listener in *Radio Communication*, commencing with the January 1972 issue.

Mr R. A. Treacher, BRS32525, has kindly volunteered to compile this feature and would be grateful if all items of news and comments on swl activities could be sent to him. His address is 392 Rochester Way, Eltham, London SE9 6LH.

The success of this new feature will depend on the support that all SWLs give to it.

Intruder alarm

An intruder alarm using a Gunn oscillator in a doppler radar system is described in a Mullard application note. The system has a range of 8m over a beam width of 30° in both the horizontal and vertical planes. An assessment of the performance of the detector is given in terms of the amplitude and frequency of the doppler signal measured as a function of target distance, velocity and azimuth.

Requests for the application note, entitled "Intruder detector based on the CL8630 Gunn-effect oscillator", and quoting reference number TP1200, should be made to the Communications Electronics Division, Mullard Ltd, Mullard House, Torrington Place, London WC1E 7HD.

BOOK REVIEW

Mullard Data Book 1971-2

The latest edition of the Data Book contains 187 pages devoted to information concerning semiconductors, valves, television picture tubes and components. A separate section contains the 1965/6 equivalents list of valves, tubes and semiconductors which, the publishers state, had been requested by many users. Each section has been arranged in alpha-numeric sequence and is printed on different coloured paper to facilitate reference. The book is an invaluable reference source to both professional and amateur. The Data Book, published by Mullard Ltd., is available from RSGB Publications, 35 Doughty Street, London, WC1N 2AE, price 30p plus 3p postage.

Looking ahead

3 December—RSGB AGM Royal Society of Arts, John Adam St, London WC2
6 December—Radio Amateurs Examination.
10 December—RSGB Dinner Club, Kingsley Hotel, London WC1.

1972
7 January—Presidential Installation; Bonnington Hotel, Southampton Way, London WC1.
22 February—RSGB lecture at the IEE.

JUST LOOK AT THE WEATHER!

Part 1. The reception of automatic picture transmissions from satellites

by REV P. W. SOLLOM, OSB, BSc (Eng), PhD, G3BGL*

THE changeable weather of the British Isles ranks high among topics of conversation on the amateur bands and in the street. A glance out of the window shows what the weather is doing here and now; a report on the radio says what the experts think it is going to do; but both leave one on the fringe of the mystery of what the weather is up to on the grand scale. Few projects can be more fascinating, therefore, than the one which gives access to the secret of this mystery—the reception of pictures from the weather satellites. Within a few minutes the weather situation over millions of square miles, as seen through the lens of the satellite's camera, is broadcast from a height of about 900 miles to everyone within line-of-sight range, ie about 2,000 miles. Two hours later the satellite is round again, covering a different strip of the earth, and gradually the whole vast picture is built up as the day progresses, by overlapping the individual pictures in their correct positions. From the Canary Islands to the North Pole, from Iraq to Newfoundland, the area is methodically photographed, and the pictures, which are sent out by APT—the automatic picture transmission system, can be received in England.

Can be received. What exactly does this mean? It means a £10,000 commercial installation if reception is to be guaranteed under all conditions whenever a satellite is 2° or more above the horizon. But it means a challenge to radio societies, school science groups, short wave listeners, and amateurs generally, to see what can be done on a shoe string, and how team work or individual initiative can pay off. The purpose of this article is to provide information on which to evaluate the utility and possibility of building a workable APT receiving system in the light of the workshop facilities, junk box stores, test equipment and technical know-how that may be available. The functional requirements of the system will be illustrated with reference to equipment which has already undergone considerable development and simplification, and suggestions for alternative possibilities will be mentioned, but full circuit details will not be given as few would wish to copy everything exactly. Inspiration for many of the circuits has been drawn from the *Radio Communication Handbook* and references to this are given in the Appendix.

Two-part project

The project falls into two parts: (i) receiving the APT signal from the satellite, and (ii) making pictures from the APT signal. This article will deal only with a photographic method of printing, based on an old tv picture tube which may be easily procured. It is a method which gives wide scope for do-it-yourself circuitry with valves, transistors, or integrated circuits and requires no special access to rare surplus equipment or sources of supply.

* Douai Abbey, Upper Woolhampton, Reading, RG7 5TH.

The system described requires a minimum of two operators for the production of live pictures: one to receive the signal while the other prints it. A single operator can do the job in two stages by tape recording the signal. The recording facility is required if further copies of the pictures are needed later, and it will be assumed that only a single track is used on a domestic type machine.

In order to get started on part (ii) of the project first, it should be possible to obtain a recording of a few pictures from someone who has a receiver and tracking aerial working. Once the pictures can be made from the test tape, the incentive to receive live transmissions would be considerable.

Group activity

Both parts of the project lend themselves to group activity, and are well suited to participation by a number of people with widely differing interests.

In part (i), sub-project groups might undertake:

(a) orbit predictions, (b) tracking aerial construction, (c) vhf converter, and (d) fm receiver construction.

In part (ii), the projects might be:

(e) picture tube adaptation and power supply, (f) scanning circuit construction, (g) line synchronization arrangements, and (h) the photographic requirements.

It is under these headings that the whole project will now be described, giving a sufficient briefing for each group to get started.

Orbit predictions

At the time of writing there is only one operational APT satellite, known as ESSA-8. Normally it transmits an eight-picture sequence while over the daylight sector of its orbit, up to four of which might be picked up at one receiving station. It is switched off during the dark sector so fewer pictures are available during the winter months. Until it developed technical trouble on 20 June 1971, a second satellite known as NOAA-1 (ITOS-2) was transmitting a much stronger signal than ESSA-8. It sent out an infra-red "picture" by a continuous scan system throughout its orbit, but interrupted the infra-red during the daylight sector to send APT. In the hope that another similar satellite will be launched to succeed NOAA-1, information on both this and ESSA-8 will be given where relevant.

The meteorological satellites are placed in a sun-synchronous orbit, ie they pass overhead at a fixed time of day; they do not, however, pass overhead daily, as the orbit time is not an exact fraction of 24 hours. An orbit is, to a first approximation, fixed in space, and the earth turns inside it. The orbit is nearly polar, passing over latitudes up to about 78°, and so there are two sections of the day at which the satellites come within range of England: once for a series of north–south passes, and once for a series south–north. ESSA-8 sends APT while passing N–S with its overhead

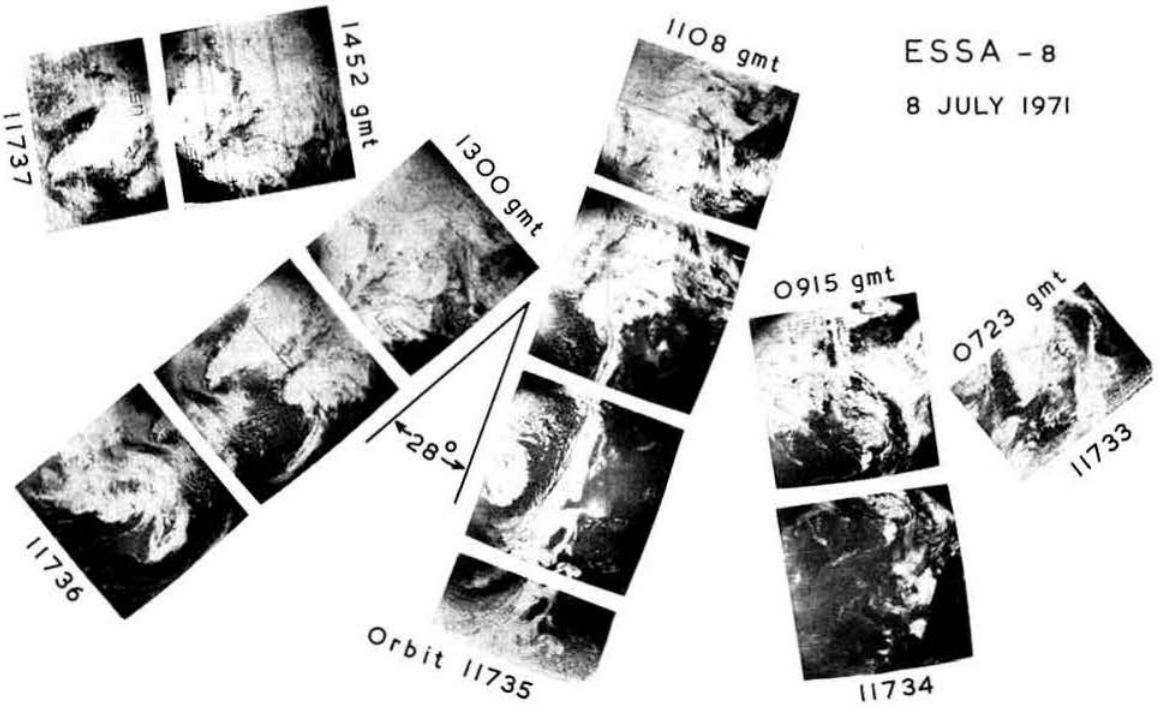


Fig 1. Seven complete pictures, and parts of five more can be received from the APT satellite, ESSA-8, each day during the summer with the system described in this article. The strips of pictures from successive passes are arranged every 28° to allow for earth rotation, and the corresponding cloud or land features then recur in correct relative attitudes. White areas are cloud formations, or snow in polar regions. Snow-covered Greenland appears in the last two passes

time in the late morning; NOAA-1 sent APT during S–N passes which were overhead in the afternoon (and hence much more suitable for school activities than ESSA-8). Its predecessor TIROS-M (ITOS-1) operated on a similar schedule.

With the equipment to be described here, about 12 pictures or part pictures can be received each day in summer from ESSA-8. Fig 1 shows in miniature the prints from five successive orbits which are spaced in time by about 1hr 52min, and so the earth has turned about 28° between each pass. If the strips of pictures are laid out with this angle between them, the main features which reappear from successive viewpoints are more easily recognized. About $\frac{1}{5}$ of each picture overlaps the next one in the same pass.

The prediction job is to determine three things: (i) when to look for the satellite, (ii) where to look into space to follow its transit, (iii) what area of the earth appears in each picture. This third point will be discussed at the conclusion of part 2 of the article.

For amateur purposes a graphical method may be used to predict when to expect the satellite to come within range. Fig 2 shows the time at which ESSA-8 will have risen to about 20° above the horizon ("solid-copy" signal) for its higher angle passes. In summer it will have been audible coming out of the noise for about 3min before this, but in winter it is well above the horizon when it switches on. Note that the date calibration is repeated every nine days. For prediction purposes, the time scale is arranged to slide down the vertical axis of the graph (separate piece of paper pinned over), and is moved down $1\frac{1}{2}$min every cycle of nine days, ie times are 15min later in 90 days. Only the plotted points apply on each date, so there are only three passes per day shown on this graph, but extrapolation to one more pass earlier and later is reasonably accurate. On alternate days, the times jump by about half an orbit period, so a rule-of-thumb may be stated: relative to a given pass today, 50min later tomorrow and also 1hr 2min earlier.

The beamwidth of the tracking aerial is sufficiently wide to permit the use of an approximate method, such as is given in Fig 3 for predicting the azimuth and elevation angles for steering the aerial. The track follows one of the curves which cross the diagram. These curves are calibrated in gmt along the dotted line, A, at the top of the chart. This is the time at 20° elevation as predicted from Fig 2 for the pass being followed. The appropriate curve (or an interpolation) is then used to read off azimuth and elevation for successive times, starting from the datum time on line A. The dotted lines B . . . G are drawn at 2min intervals to indicate the progress of the satellite. It may be necessary to interpolate bearings more frequently, eg at 1min or $\frac{1}{2}$min intervals, to keep the aerial "on-the nose" if receiver sensitivity is only marginally sufficient. In practice an S-meter is used for precise direction finding, the predictions being an invaluable guide to avoid loss of signal by over-wide searching.

Provision must be made to have accurate knowledge of the time while tracking. Observations, at known times, of azimuth and elevation (by beam swinging with the S-meter)

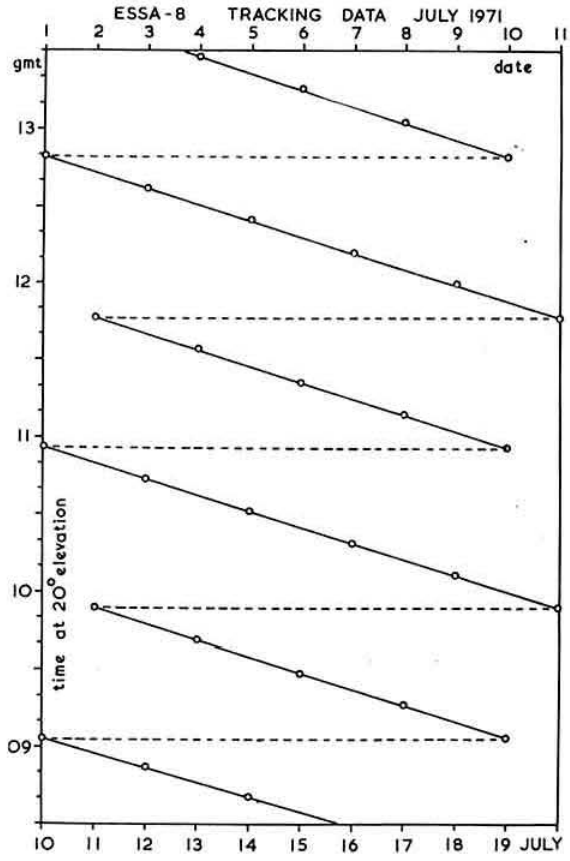


Fig 2. The time of commencement of each of the three main passes is predicted by this graph, and is read off from the plotted points on each sloping line. The nine-day cycle of the dates can be extended indefinitely, making a small correction to the times: add 1½min for every completed nine-day cycle. The graph is intended as a guide, accurate for central southern England, and is to be updated and corrected from a record of actual reception

are essential to determining the position of the satellite when it takes each picture, and also to updating the prediction charts, Figs 2 and 3. As a rule-of-thumb, 5min should be added to the calibration times shown on dotted lines A and F every three months.

Tracking aerial construction

A good site for the tracking aerial is one where the local noise level is low, the feeder run to the receiver is short, and a clear view of the sky is available in all directions above about 10° elevation. The site at G3BGL is 370ft asl, well away from traffic and is surrounded by playing fields and farm land. But it is only about 30ft from an 11kV power line junction where a huge pole-mounted transformer has insulators that sizzle in damp and frosty weather. Substantial buildings obscure a southerly sector of about 40° up to 20° elevation, and the fairly close proximity of a large shed with a corrugated iron roof interferes with low-angle aerial performance over another 70° sector to the west. On the whole, however, an excellent site.

A picture of the aerial appears on the front cover of this issue. The structure is pivoted about 8ft above the ground, so the helix is just above head height when moored horizontally. Counterbalanced by heavy wood blocks, the aerial is steered manually from the ground, or from the top of the old water tank which serves as a mounting base. The azimuth scale is painted on the top of the tank, and the elevation scale is attached to the counterbalance weights.

A ground plane 6ft square, of ½in mesh galvanized wire netting, is stretched on strips of wood. The 10-turn clockwise helix uses about 70ft of 14swg copper wire mounted on polythene insulators (2in lengths from old coaxial cable, ⅜in diameter) which are supported around a square lattice framework. This was very cheaply made in the school workshop from 200ft of 1½in by ⅜in "doorstop" and a gross of screws. The helix circumference is one wavelength at 137MHz; its length is 16ft from the ground plane. The wide bandwidth of the helix may lend itself to radio astronomy or 2m band experiments in the future. The aerial must accept circular polarization to avoid severe fading at certain positions of the spacecraft, but a crossed-Yagi array would be a simple alternative. Heavy-duty low-loss 75Ω coaxial cable runs 75ft from the helix to the converter. As yet this feeder is unmatched but the swr should be less than 2:1.

A 6-turn or 8-turn helix might well be adequate, but the extra length probably gives a worth-while improvement in signal/noise ratio, and better accuracy in determining satellite positions. A disadvantage of the wide bandwidth is the acceptance of signals from the business radio, 2m amateur, and aircraft bands, which may introduce cross-modulation or strong second channel interference. The angular scales are calibrated every 10°, and the aerial can be directed with a mechanical accuracy of ±2°, but the polar diagram maximum cannot be gauged this accurately, particularly at low elevation angles. Any simple, but not sloppy, bearings will suffice for the mounting pivots.

VHF converter

Two metre band receiver techniques are quite suitable for the satellite band around 137MHz. Typically, a crystal-controlled converter is fed into a tunable superhet receiver. Favourite frequencies for APT transmissions are 137·62MHz (ESSA-8 and NOAA-1) and 137·5MHz (ITOS-1). These satellites also radiate a tracking signal on 136·77MHz and 135·77MHz respectively, but for amateur purposes it is more economic to use the APT signal itself for tracking. The bandwidth required of the converter is, therefore, quite small, and the circuits can be peaked up for the APT end of the band. The vhf carrier is frequency modulated up to ±7·5kHz deviation by the APT video sub-carrier of 2,400 Hz. The video data (dc to 1,800Hz) amplitude modulates the sub-carrier. The rf bandwidth is about 28kHz. The tunable superhet must, therefore, have a fairly high i.f. suitable for this bandwith. A choice of about 25MHz for the converter output frequency seems to avoid most of the image interference that might arise from aircraft, amateurs, business radio, and fm broadcasting, if the crystal oscillator chain has an output around 160MHz. Many other possible arrangements will suggest themselves, based on crystals already available.

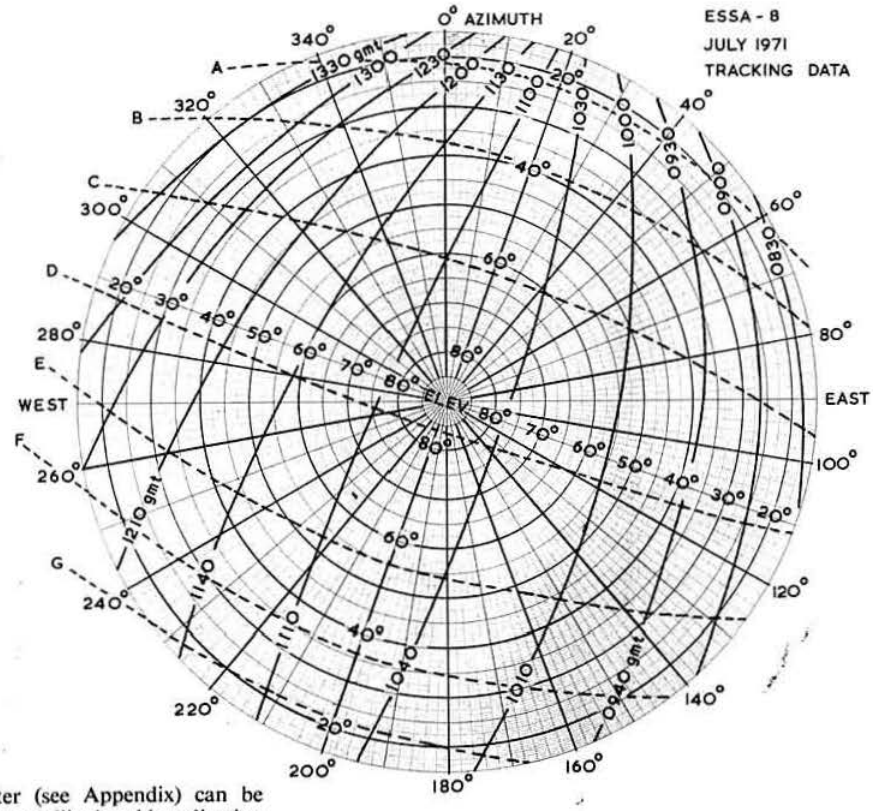


Fig 3. The azimuth and elevation angles for directing the aerial throughout a pass are read off from one of the curves according to the time of day at which it begins. This time is marked along dotted line A. The sequence of dotted lines B to G shows the progress of the satellite in 2min intervals. Add 5min to the times marked on A and F every three months. The centre of the chart is 90° elevation, ie vertically overhead. The chart is intended only as a guide, accurate for central southern England, as precise steering of the aerial is determined by a peak S-meter reading

The RSGB nuvistor converter (see Appendix) can be readily adapted for service in the satellite band by adjusting the various coils. If the oscillator chain comes out considerably above the signal frequency, the performance of the converter is much improved by increasing the oscillator injection voltage to the mixer: eg the link can be series tuned, or the final doubler output circuit modified to itself form the link. This converter can be recommended as a sure-fire design, capable of good performance with little trouble.

An overall improvement in sensitivity and signal/noise ratio can be obtained by adding a preamplifier stage. This stage was found essential to satisfactory reception of ESSA-8, whereas the stronger signal from NOAA-1 was received sufficiently well without it. Some may favour a transistorized "head-amplifier" at the aerial itself, but another nuvistor preamplifer was ready to hand in a duplicate converter and required less time than a new unit to get working. The whole receiver arrangement is shown in block form in Fig 4. Common surplus type valves are deliberately used to show what can be done without great expense.

A grid dip meter is almost essential test gear for converter and receiver construction, particularly when it is desired to adapt equipment designed for a different frequency, and when coil winding data is not available.

FM receiver

As indicated on Fig 4, only two operational controls are necessary in the main receiver: TUNE—a fine tuning of the local oscillator to cover the satellite band, and AF GAIN—to set the output level at a suitable value for the monitor speaker and the tape recorder input. Preset controls are included in the metering circuits to adjust meter sensitivity and zero. The i.f. amplifier and limiter stages are coupled by four standard 10·7MHz i.f. transformers, and a standard 10·7MHz Foster-Seeley discriminator transformer concludes the i.f. chain. These transformers are undamped as the bandwidth required is less than that of fm broadcasting. The audio stages, which are quite conventional, have only to handle an amplitude modulated audio carrier of 2,400Hz, and this presents no problem. An example of a typical output waveform is given in Fig 5. The peak white amplitude must be handled without distortion, and the audio bandwidth must be adequate to preserve the sharp edges of the sync pulse and other transients without rounding off. Although no special precautions are required, the temptation to improve the signal/noise ratio by audio filtering at 2,400Hz must be resisted.

Full limiting action and noise quieting must be produced by about 0·3μV at the aerial socket of the converter if good pictures are to be printed. The peak signal from an overhead pass of ESSA-8 reaches only about 1 to 2μV, so the margin between success and failure is quite small. Automatic frequency control of the local oscillator is an unnecessary refinement as the bandwidth of the receiver is sufficient for good detection even when somewhat off tune, but a centre reading tuning meter (or equivalent indicator) is a worthwhile

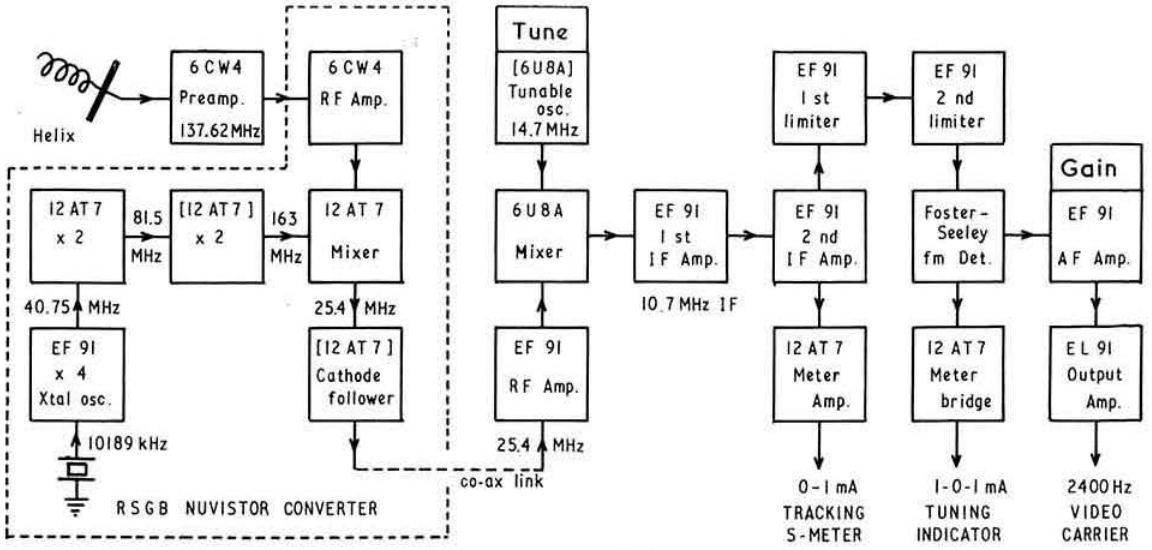


Fig 4. A block diagram of the complete receiver which was used for all the APT pictures in this article. Every stage is shown separately, but where two stages are covered by one dual valve, the valve type is shown once in brackets

accessory as it may be used also when aligning the discriminator instead of more elaborate test gear. Doppler shift due to the satellite's velocity is a maximum of about 2kHz, and so the receiver does not really need retuning during a pass.

Besides its operational use as a tracking aid (on a long extension lead), the S-meter is an invaluable aid to alignment of the converter and the early stages of the main receiver. It must be connected at the grid input of the first limiter, and may be a valve voltmeter type of circuit driven from a diode detector. The i.f. voltage at this point is not large, and the circuit may need to include a dc amplifier stage. School laboratory type galvanometers or dc voltmeters are convenient instruments to jack into the meter circuits.

Anti-hum precautions are essential throughout the receiver and picture system. The standard techniques, including ht stabilizers for the oscillators, should prove adequate.

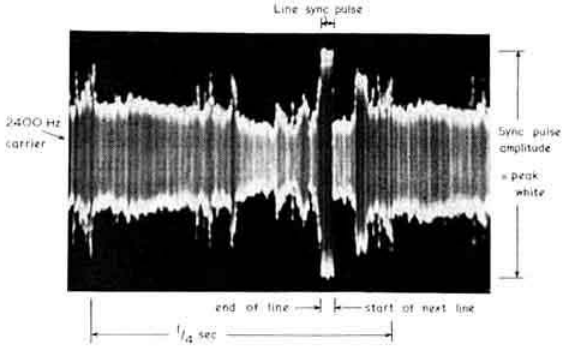


Fig 5. An example of the APT video signal at the output of the receiver. The CRO time base was adjusted to 2Hz to display two successive lines, the photograph being taken with ¼s nominal exposure

The APT sequence

When the APT signal is monitored on a loudspeaker, a puzzling succession of methodical sounds is heard. As a guide to interpretation, the sequence transmitted by the infra-red satellites is illustrated in Fig 6. As time progresses, upwards in the diagram, the infra-red "picture" (a slow "lubb—dupp" repetitive sound) is interrupted by a 3s burst of 300Hz tone which is the cue for the start of an APT picture. This is followed immediately by 5s of peak white

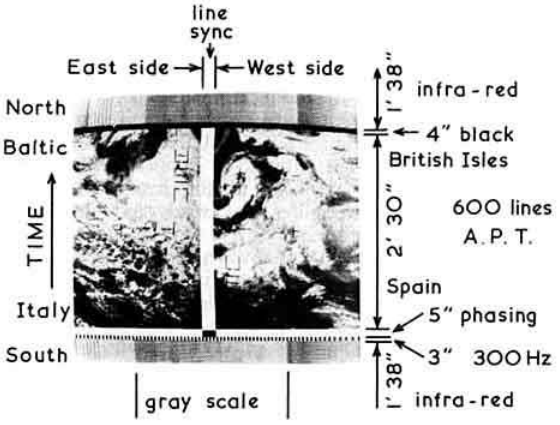


Fig 6. An illustration of the sequence of signals transmitted by the infra-red satellites. In the picture, a depression (white spiral cloud) is approaching Britain which is already under cloud. The coverage of the picture includes Spain, Italy and the Baltic

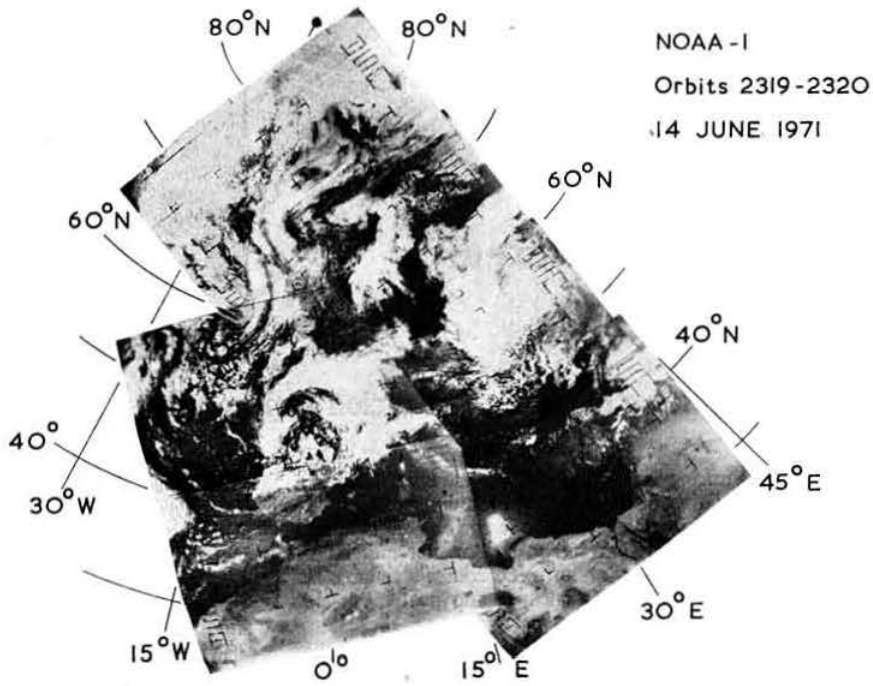


Fig 7. An example of the end-product obtainable from an APT satellite passing south–north. There is clear sky over the whole Mediterranean except the south of France. A depression (central white spiral feature) covers France and southern England. Just above this, Ireland and Scotland are visible amidst broken cloud; Greenland is at the top of the picture

(steady 2,400Hz tone) in which brief pulses are made at 4Hz to give a black-level gap which indicates where the edge of the picture will occur in the line scan that is about to commence. These gaps are known as the phasing pulses, and this period is given to the operator (or machine) to adjust the edge of the picture ready for printing. Then follows the picture: 600 lines with a characteristic "flip flip flip" noise which is due to the peak-white line sync pulse occurring every $\frac{1}{4}$s. During the picture, noises like train wheels rattling over points indicate the sending of the letters USA and the fiducial marks (L, T and + marks). At the end of the picture, silence for 4s precedes the resumption of the infra-red scan for 1min 38s after which the APT cycle recommences. The picture in Fig 6 is reproduced unphased, ie the edge of the picture not at the edge of the print, to show the line sync pulse clearly.

The infra-red "picture" is not a transmission of a snapshot as is the APT, but is a side to side scan of the thermal radiation as measured at the satellite while it proceeds. The line scan rate is then 0·8Hz, ie $\frac{1}{5}$ of the APT scan rate, so the infra-red prints in synchronism with the APT, but as a confused blurr through which only two features appear recognizable—the "lubb" and the "dupp" respectively: a grey scale of seven steps, and a series of contrast bars. The latter are seven alternate black and white bars closely spaced, and they are visible in Fig 6 near the left hand side. These two features occur as test signals once in each infra-red line, hence only once in every fifth line in Fig 6.

When the APT pictures are successfully printed and assembled, they can be overlapped to form a mosaic picture like Fig 7. Pinpointing the holiday resort with the best sunshine record is now a definite possibility. Excellent pictures of the Mediterranean are sent by a satellite on a south–north pass as the range shortens after the picture is taken. The coverage of the polar regions is better provided by a north–south pass. An example of an ESSA-8 mosaic will be given in Part 2, together with an explanation of its sequence, and the full details of the picture printing system.

Appendix

Further information about the various stages shown in the block diagram, Fig 4, may be found in the *Radio Communication Handbook* as follows:

6CW4 vhf preamp: page 5.17, Fig 5.23. The first stage, V1, only, with L4 connected to a coaxial output socket, and the remainder of the circuit omitted. The filtering of ht and heaters is retained.

RSGB nuvistor converter: page 5.17, Fig 5.23, complete, with coils adjusted to tune to the appropriate frequencies shown in the block diagram. Construction as on page 5.14, Fig 5.20.

Power supply for above: page 5.19, Fig 5.24, a common supply for preamp and converter.

FM receiver

EF 91 rf stage: page 4.7, Fig 4.8; Aladdin coil formers in screening cans, fixed tuning.

Mixer/Osc, 6U8 (ECF 82): page 4.9, Fig 4.13. The oscillator tuning uses a fixed capacitor in parallel with a small bandspread trimmer. The Aladdin coil in screening can is core tuned for band setting. Use stabilized ht for the oscillator.

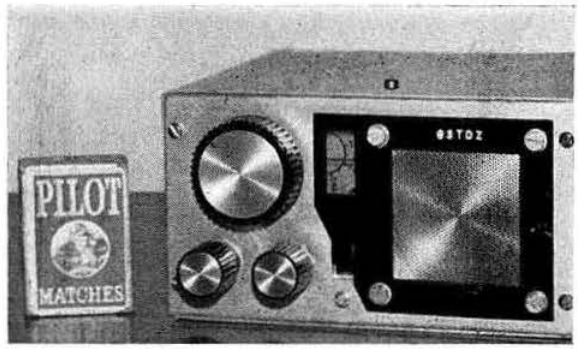
I.F. amplifier stages: page 4.7, Fig 4.8, with 10·7MHz i.f. transformers for the tuned circuits. Use clean layout and ample decoupling for stability.

Limiters and fm detector: page 4.44, Fig 4.71, stages V1, V2 and V3, but germanium diodes. Decoupling to suit 10·7MHz, 0·01μF discs.

(To be concluded)

So you can't afford a receiver?

by J. R. HEY, MSERT, G3TDZ*



A straight forward single-conversion 2m receiver using an old fm tuner head

WHEN venturing on to vhf for the first time, there is a choice of either building or buying a converter for the desired band, but buying a general coverage or amateur band communication receiver just to run a converter into seems an expensive way of going about it. Of course a tunable i.f. unit specially made would be cheaper and neater but still made up of bits tagged together.

For some time, therefore, the use of a ready-made tunable Band 2 front-end at 2m had been considered, but it was not until a suitable unit became available that something practical was done; fired by a desire to have a more serious attempt at 2m, an i.f. and detector unit was designed and built.

The i.f. section

At first a commercial fm i.f. unit was tried, the discriminator being replaced by a simple diode detector. Results were very encouraging but the lack of selectivity, some 200kHz, made life difficult whenever a local station came close to the working frequency. Obviously a little more gain was required and a lot more selectivity, with effective agc.

It is one thing to hot-up selectivity, but the big question was "Will a SEO conversion oscillator working at vhf be anywhere near sufficiently stable?" As a front-end was to hand, it was decided to make an attempt rather than plough through pages of technical information to determine the risk in advance.

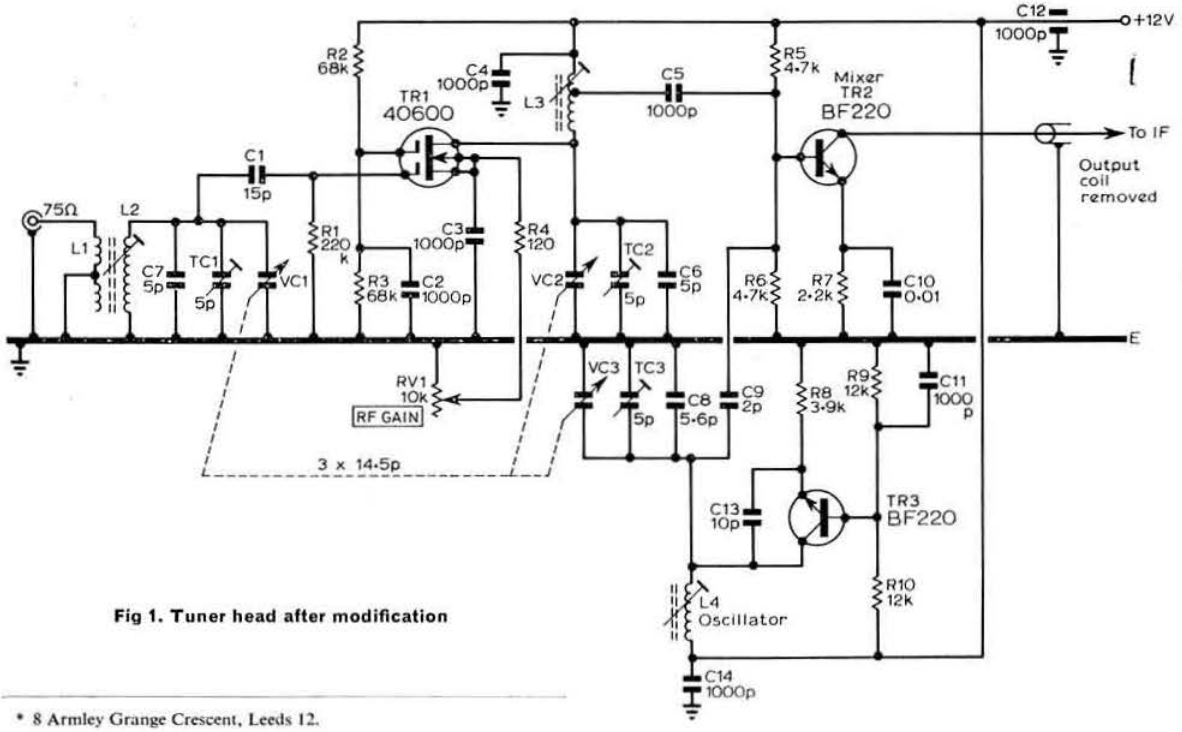


Fig 1. Tuner head after modification

* 8 Armley Grange Crescent, Leeds 12.

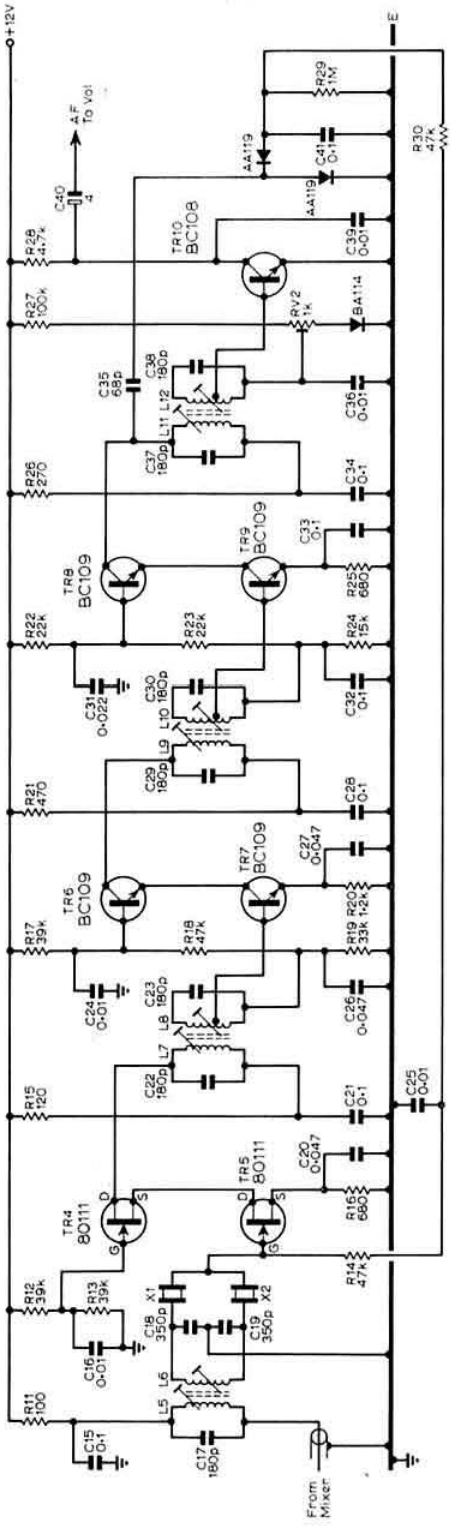


Fig 2. IF and detector section

Crystals at 10·712MHz and 10·715MHz were obtained at a very reasonable price and a simple half-lattice filter constructed and tried. Because crystals of suitable frequency spacing may prove difficult to obtain, a single crystal filter with phasing capacitor was tried. Although much sharper than the half-lattice, a.m. stations could be resolved reasonably comfortably: a slight ping being considered a disadvantage, a damping resistor across the crystal proved most satisfactory.

While clever circuits have been devised to give fair agc operation using bipolar transistors, there is nothing quite like a fet to give the silky agc we all know with vari-mu pentodes. The first i.f. stage therefore uses two FETS in cascode. This cascode configuration used in all three stages is the result of experience at these frequencies where high gain amplifiers are hard to hold down.

A selection of FETS (2N3819, MPF102, UC734, 80111) has been tried with hardly any noticeable difference in performance. The following two bipolar stages use common planar types intended for audio work, BC109 or BC108 being handy. In place of the diode detector, a Class B transistor BC108 detector was tried, its "turn on" point being carefully adjusted by a pre-set potentiometer. The detector output now amplified means a lower gain af amplifier can be designed. The diode stabilizes the working point against supply variations.

Using a battery and potentiometer as a variable supply, the agc characteristic was plotted by feeding a negative potential to the gate of TR5 while a signal generator fed a strong input into the i.f. unit. The signal could be almost cut off at −2V but it was found that a simple agc diode circuit gave just over −1V; a voltage doubling detector using two diodes giving much superior results.

The i.f. transformers are Weyrad 10·7MHz T41/3K: but for those who wish to wind their own, both primary and secondary have 16 turns resonated by a 180pF capacitor; the base tap is about three turns up from the cold end.

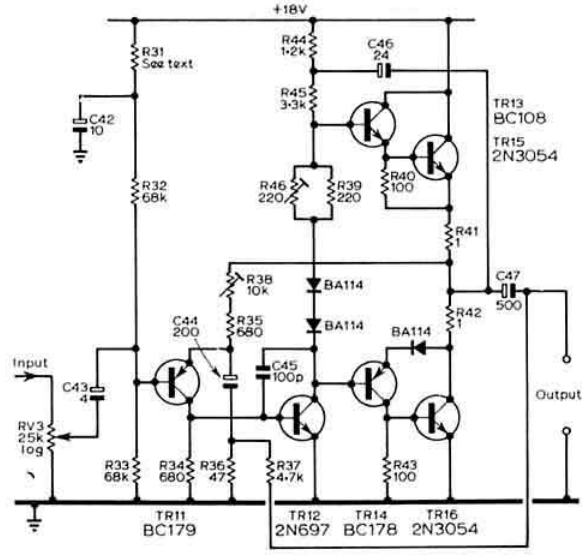


Fig 3. Audio amplifier

For the filter secondary, a capacitive centre tap is achieved by removing the 180pF capacitor and fitting two 350pF capacitors in series externally on the rear of the printed board. A layout of the printed board is given for those who wish to make a copy.

The tuner head

There is a wide selection of transistor vhf tuner heads, the worst of which use self-oscillating mixers and untuned rf stages. For this receiver a quite superior unit made by Dormer & Wadsworth of London was found. It uses a dual gate fet in the rf and a three gang variable capacitor tuning rf, mixer and separate oscillator. As it was designed for the vhf broadcast band of 87·5–108·5MHz, with the oscillator on the high side, it seemed possible very little work would have to be done to put its tuning range on to 2m. The highest oscillator frequency before realignment was almost 120MHz which meant it only had to be pushed another 15MHz to inject on the low side of 2m.

Withdrawing the slug about four turns did the trick. The dust cores were taken out of the rf and mixer coils and brass slugs fitted. Without any further modifications the unit could be trimmed right into the band. Unfortunately the coverage extended from 130–150MHz so a little dentistry was performed on the capacitor vanes until only one moving vane per section remained, the stator sections being left untouched. A little trimming and the coverage was now 143·5 to 146·5MHz.

The generator was set to 145MHz, backed off over 70dB and left. This was now tuned in without difficulty and was found to be still almost dead on tune 45 minutes later with only a slight drift after this. That seemed to answer the question about an SEO on 2m.

A double tuned i.f. transformer was removed from the tuner head, as, for some reason, this caused instability; the first transformer in the i.f. acting as mixer load.

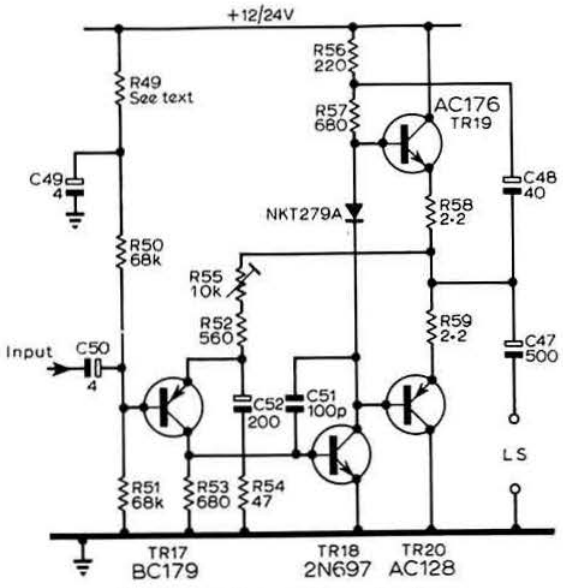


Fig 4. Alternative receiver audio stage

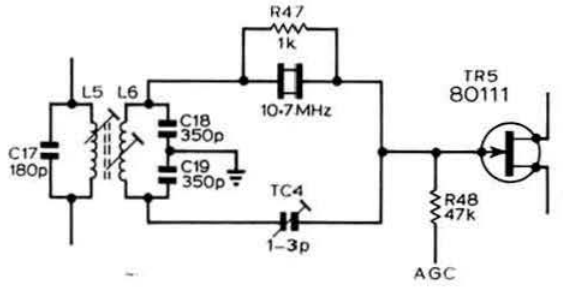


Fig 5. Simple filter

Unfortunately the tuner head was originally made for positive chassis with negative supply rail. As the cold ends of the coils were soldered to the chassis, when the supply polarity was changed these ends had to be cut, a tiny bypass capacitor fitted and ht feed applied. No trouble arose from this change around as only three resistors and two coils, L3 and L4, were involved.

The final arrangement is shown in Fig 1. A varicap diode originally used for afc was also removed from the oscillator circuit.

The af section

A circuit familiar to the hi-fi fraternity may at first sight seem a little too ambitious for a receiver audio stage. The extra power capability of this amplifier is deliberate because of the intention to use the whole circuit as part of a transmitter/receiver, where the af stage will double as a modulator.

Although the circuit was designed for an 18V rail, it works excellently on 12V and is powerful enough to drive the internal 8Ω loudspeaker. The 220Ω pre-set potentiometer adjusts the quiescent current to a level where cross-over distortion just disappears; while the 10kΩ pre-set potentiometer sets the centre line to half the ht value. The diode in TR14 emitter may happily be omitted with no noticeable difference in sound.

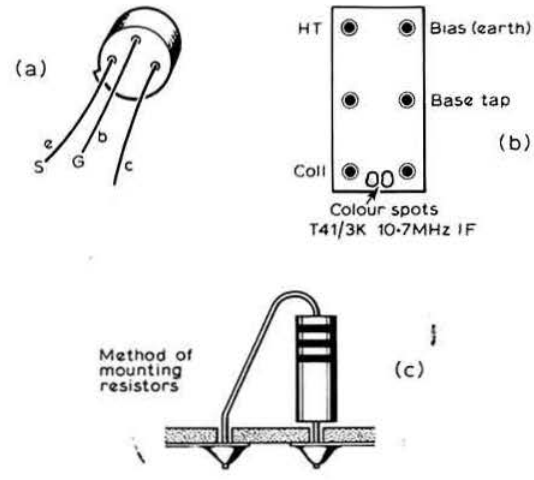


Fig 6. Constructional details

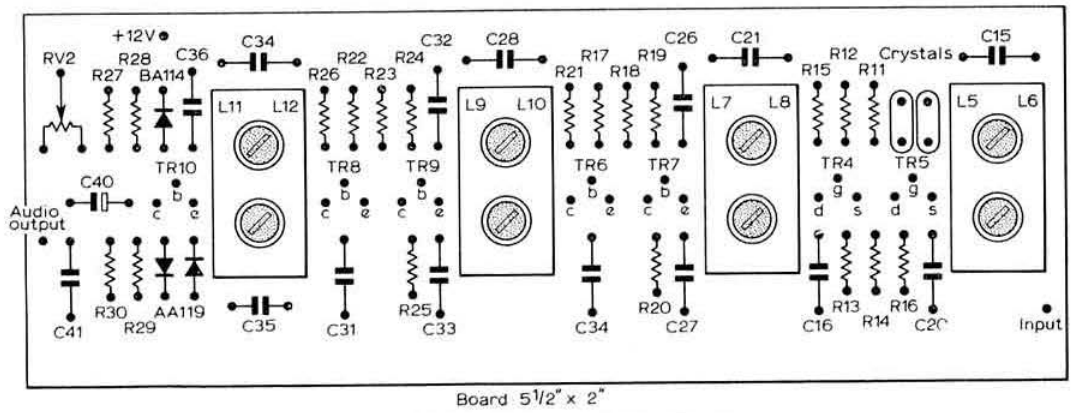


Fig 7. Printed board component positions

An alternative simpler af stage is also shown using germanium output transistors, but this runs at a slightly higher current of around 15mA and is therefore not advised for portable work. In both cases the unmarked resistor should be 68kΩ unless this point is used to feed a microphone preamplifier when a new value would have to be calculated. Regarded as essential is a 100pF capacitor connected between B and C of the 2N697 to prevent hf instability, Fig 4.

Construction

Only the i.f. stage layout is given, as this could be difficult for a beginner, and has been found to be a most satisfactory design. Since the drawings were prepared, three units have been constructed and tested. One which seemed slightly unstable was cured by soldering a tiny 0·01μF ceramic between the agc conductor and earth under the board. Any further unwanted "liveliness" could be tamed by damping one of the windings, say T2 primary, by a 5·6kΩ resistor. Another component not provided for on the board layout is the 0·01μF af bypass between TR10 collector and earth; this should be soldered on the underside of the board and may be a small ceramic disc type.

All other bypass capacitors are of the Mullard miniature foil type and fit on 0·4in hole spacing in the board. The resistors and diodes are stood up, their top wire being bent round to fit into the 0·3in spacing, as shown. Component holes are drilled with a No 60 drill, the pre-set with a No 55 drill, and the i.f. can pins with $\frac{1}{10}$in drill.

A chassis layout is not shown, as this would depend upon the front end chosen, and most constructors have their own ideas about such things. The front-end alignment was described earlier but this will also depend upon the type used.

Alignment is simple, the i.f. obviously coming first. The crystal frequency becomes clear as the generator is swung across the frequency; this must be set to crystal response centre point, all coils then being peaked for maximum output, starting from the back and working forward. Remembering that agc will operate, the generator output must be backed off as each coil comes into alignment.

It is hoped that these ideas will prove useful to would-be constructors wishing to get on to 2m easily without the need for elaborate and necessarily expensive receivers. Results with this design have been most satisfactory, and as it can be made fairly small it is ideal for mobile or portable operation.

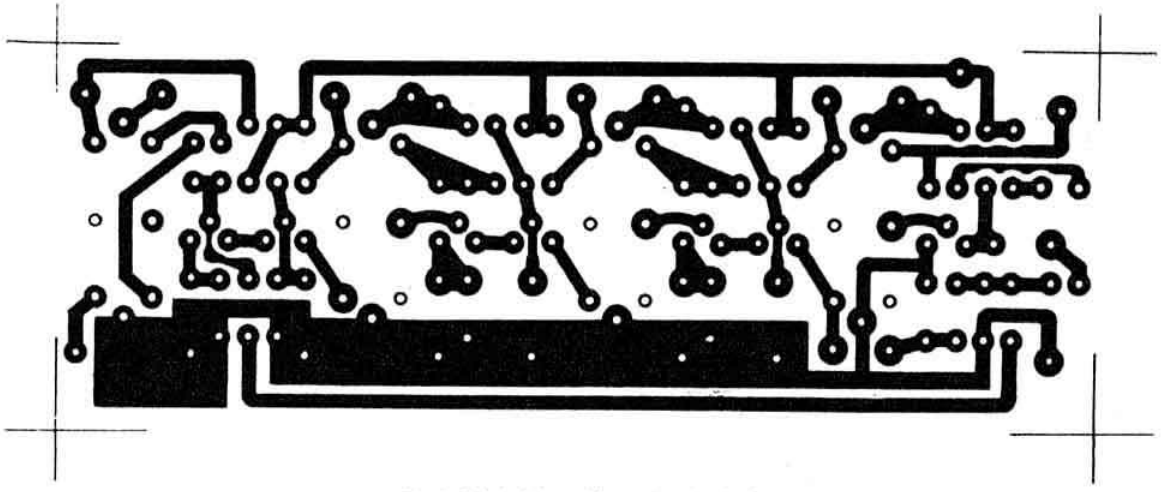


Fig 8. Printed board layout, actual size

Components list

R1	220kΩ	R22	22kΩ	R43	100Ω	C1	15pF ceramic
R2	68kΩ	R23	22kΩ	R44	1·2kΩ	C2	1000pF LT
R3	68kΩ	R24	15kΩ	R45	3·3kΩ	C3	1000pF LT
R4	120Ω	R25	680Ω	R46	220Ω pre-set	C4	1000pF LT
R5	4·7kΩ	R26	270Ω	R47	1kΩ	C5	1000pF disc
R6	4·7kΩ	R27	100kΩ	R48	47kΩ	C6	5pF SM
R7	2·2kΩ	R28	4·7kΩ	R49	68kΩ (see text)	C7	5pF SM
R8	3·9KΩ	R29	1MΩ	R50	68kΩ	C8	5·6pF SM
R9	12kΩ	R30	47kΩ	R51	68kΩ	C9	2pF SM
R10	12kΩ	R31	68kΩ (see text)	R52	560Ω	C10	0·01μF ceramic
R11	100Ω	R32	68kΩ	R53	680Ω	C11	1000pF LT
R12	39kΩ	R33	68kΩ	R54	47Ω	C12	1000pF LT
R13	39kΩ	R34	680Ω	R55	10kΩ pre-set	C13	10pF SM
R14	47kΩ	R35	680Ω	R56	220Ω	C14	1000pF LT
R15	120Ω	R36	47Ω	R57	680Ω	C15	0·1μF min foil
R16	680Ω	R37	4·7kΩ	R58	2·2Ω	C16	0·01μF min foil
R17	39kΩ	R38	10kΩ pre-set	R59	2·2Ω	C17	180pF polystyrene
R18	47kΩ	R39	220Ω			C18	350pF polystyrene
R19	33kΩ	R40	100Ω	RV1	10kΩ lin pot	C19	350pF polystyrene
R20	1·2KΩ	R41	1Ω	RV2	1kΩ pre-set	C20	0·047μF min foil
R21	470Ω	R42	1Ω	RV3	25kΩ log	C21	0·1μF min foil
						C22	180pF polystyrene
TR1	40600	TR8	BC109	TR15	2N3054	C23	180pF polystyrene
TR2	BF220	TR9	BC109	TR16	2N3054	C24	0·01μF min foil
TR3	BF220	TR10	BC108	TR17	BC179	C25	0·01μF ceramic
TR4	80111	TR11	BC179	TR18	2N697	C26	0·047μF min foil
TR5	80111	TR12	2N697	TR19	AC176	C27	0·047μF min foil
TR6	BC109	TR13	BC108	TR20	AC128	C28	0·1μF min foil
TR7	BC109	TR14	BC178				

C29	180pF polystyrene		
C30	180pF polystyrene		
C31	0·022μF min foil		
C32	0·1μF min foil		
C33	0·1μF min foil		
C34	0·1μF min foil		
C35	68pF ceramic		
C36	0·01μF min foil		
C37	180pF polystyrene		
C38	180pF polystyrene		
C39	0·01μF disc		
C40	4μF 10V electrolytic		
C41	0·1μF min foil		
C42	10μF 16V electrolytic		
C43	4μF 10V electrolytic		
C44	200μF 10V electrolytic		
C45	100pF ceramic		
C46	24μF 16V electrolytic		
C47	500μF 16V electrolytic		
C48	40μF 16V electrolytic		
C49	4μF 16V electrolytic		
C50	4μF 10V electrolytic		
C51	100pF ceramic		
C52	200μF 10V electrolytic		
VC1-2-3	3-gang 14·5pF		
TC1-2-3	5pF tube trimmers		
TC4	1 to 3pF trimmer		

Catalogues received

Western Electronics (UK) Ltd.
The latest edition of the 1971 catalogue provides full details of a complete range of masts, towers, rotators and aerials, Aerial supports range from a 20ft Telomast to a 101ft Teletower. Both fixed masts and wind-up, tilt-over towers are available. Aerials described include mobile whips for 144MHz, hf band, mobile units, quads, verticals and beams suitable for all hf bands. The Bantex 5/8 mobile aerial for 144MHz, when used with the magnetic mount, offers an easy solution to those who wish to operate /M on 2m without drilling holes in an expensive motor vehicle.

A complete range of rotators is available, including the well-known CDR types, the newer Hy-Gain and other imported units. An aerial accessory useful to both listener and transmitting amateur is the CCJ2 assembly which comprises the centre insulator/plug unit together with all the strain insulators and other hardware necessary for the successful erection of wire aerials, Separate leaflets are provided on the range of Yaesu-Musen equipment, for which Western Electronics is a main distributor and spares stockist, together with other imported units of modern design including the *Digital-500* manufactured by Frontier Electric Co.

The catalogue may be obtained for 15p from Western Electronics, Osborne Road, Totton, Southampton, SO4 4DN.

Henry's Radio Ltd
The latest, 10th edition, catalogue comprises 352 pages and contains details of more than 10,000 stock lines. It is not possible to list even a selection of the types of items held in stock by the company, but the three retail shops form an electronic supermarket. At a time when it is becoming difficult to obtain small quantities of specialized components, the mail order buyer will be heartened by the large range of items available. The catalogue is a valuable addition to the library of any radio amateur and can be obtained for 55p post paid. The cost to callers at 303, 309, 354/6 Edgware Road, London W2 is 40p. The catalogue contains five 10p vouchers for use with retail and mail order purchases.

Catalogues are supplied without charge to industry and educational establishments, and application should be made on official heading to Henry's Radio Ltd, 303 Edgware Road, London W2. Other orders should be accompanied by cheque or postal order for 55p and should be sent to Henry's Radio Ltd (RC), 3 Albermarle Way, London EC1.

The RSGB News Bulletin Service

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

SCHEDULE

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

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

MICROWAVES–1,000MHz and up

by Dr D. S. EVANS, G3RPE*

The microwave contests

The 1971 microwave contest season (all two contests) is now over. Perhaps the more important point is that the contests have actually established themselves reasonably well, all things considered. Taking a little further the point made by the VHF Contests Committee in its report on the June contest (*Radio Communication* September 1971), operators are particularly asked to submit logs, even if contacts are not made. These give useful information with regard to the number of stations actually operational on the day and where they are, and because there is often just as much interest in contacts which have not been effected in giving a picture of the potential of each of the bands.

It is, of course, too early to give a general picture of the October contest. Personal reactions were that the weather was a big improvement over that in June—the cloudburst at least waited until the station was being dismantled and the equipment was spread over half a field. Being utterly prejudiced, the writer was disappointed that conditions were so good on 70cm: most people seemed to be much more interested in working the Continent than attempting contacts on the proper microwave bands, a most unreasonable attitude.

I would be pleased to receive any ideas on how next year's microwave calendar should be planned. Several people said that there should be more organized microwave activity, either as additional contests or test periods. There is even some demand for a mid-summer contest for 3cm only. The return of the microwave bands to VHF NFD is strongly urged by several people, mainly on the grounds that at that time there are more people better organized on good sites than at any other time. One other point is that realistic rules must be developed with regard to the use of A2, F2 and pulse modulation. At this stage in the development of the microwave bands, some advance notice of operating sites of microwave stations would be of great help to those wishing to test new equipment.

Please let me have your comments, in writing if possible, on these points and they will be passed on.

3cm in Australia

It was thought that the current 3cm bug had spread to the Antipodes when a letter was received from VK5CU describing his current efforts with VK5ZMW. However, at the end VK5CU better identified himself as Des Clift, formerly G3BAK. Des has been active on the band for many years, and therefore possibly is in a better position to export 3cm to us than vice-versa.

Their equipment at present is similar to that used widely in this country; that is, small klystrons such as 2K25 in transceiver configurations using directional couplers or circulators, and 30MHz i.f. amplifiers 5MHz wide. VK5CU emphasizes the need to filter carefully the klystron reflector supply if clean audio is required: he uses an LC filter followed by four stages of RC filtering to achieve this. Using one fixed station and one portable station, they have so far done 15 miles. The next test is at 50 miles.

Bending the K308 (CV2282) klystron

The main body of VK5CU's letter was a detailed description of how to modify the tuning range of the K308 klystron from 8·8 to 8·9GHz to within the 10GHz amateur band. (Nothing is sacred on microwaves!) In outline the procedure is as follows:

(a) Check that the unmodified klystron functions correctly, by applying 6·3V between the cathode/heater connection (pin 7) and pin 2, 300–350V at 25–30mA to the resonator (pin 5), and about —180V to the reflector (top cap). About 40mW at 8·8GHz should emerge.

(b) Remove as much solder as possible from the top cap, and free the reflector lead by filing away the edge of the reflector cap.

(c) Bolt the klystron by its WG16 flange to a heavy plate clamped in a vice, and undo the lower locking nut holding the tuning cavity with a spanner carefully made from $\frac{1}{16}$in mild steel, using a sharp blow with a mallet if necessary. Dismantle the cavity and remove all traces of solder and filings.

(d) Reassemble with the locknut lightly touching the cavity with the tuner one or two turns out from its original position. Reconnect power supplies, being especially careful to connect the reflector volts to the reflector lead, not the top cap. Adjust position of cavity, micrometer and reflector volts to give maximum power and the tuning range required.

(e) Clamp the locking ring and remake the top cap by soldering upside down.

The klystron is subsequently tuned by varying the position of the micrometer and the reflector volts in the normal way. VK5CU has successfully modified several klystrons in this way and obtained up to 80mW at 10GHz. To the uninitiated, that is quite a respectable amount of rf on 3cm.

Crystal-controlled 3cm

For the first time we have some information on crystal-controlled equipment for 3cm. Firstly, G3BNL recently worked G3EEZ over a 45-mile path using a varactor tripler driven by a 9cm transmitter. The signal was 5 and 9 plus.

Secondly G5FK can now put out about 1W on 10,044 MHz. This equipment uses a crystal-controlled oscillator/multiplier chain to 2,500MHz, a mixer diode quadrupler, followed by a small travelling-wave tube. The intention at this stage is to operate this as a wide-band transmitter of known frequency. G5FK is now trying to design a readily-made omni-directional, horizontally-polarized aerial having some gain. Any help would be appreciated.

Gunn diode oscillators

There appears to be much interest in Gunn diodes as oscillators on 3cm. The writer will be pleased to hear of peoples experiences, especially success stories, and particularly when "surplus" devices have been used.

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

Frequency checking on 3cm

Last month's topic on checking frequency on 3cm ended rather cryptically with the suggestion that an i.f. in the region of 150MHz had particular advantages. Following this up, it appears that these advantages were not so obvious. The essential point is best made by an example. Consider a receiver using a fixed i.f. of 150MHz. If the first local oscillator is made tunable over the range 10,150 to 10,250, the receiver will detect signals both in the range 10,000 to 10,100MHz and also 10,300 to 10,400MHz. Markers produced either as the 9th harmonic of a 1,152MHz driver, the 8th harmonic of any 1,296 to 1,298MHz transmitter, or the 24th harmonic of a 70cm transmitter in the range 432 to 433·3MHz, will produce calibration points between 10,368 and 10,400MHz, which automatically calibrates the receiver in the range 10,000 to 10,100MHz.

An alternative technique is to make the first local oscillator fixed, for example at 10,200MHz, and to make the first i.f. tunable over the range 100 to 200MHz. The writer has had an attempt at this, actually using a 130 to 180MHz tunable i.f. and it appears to work well, especially as it avoids the need to tune the first local oscillator reliably.

Using the SL640 and SL641 double-balanced modulators

by J. M. BRYANT,
linear applications engineer,
Plessey Semiconductors

A modulator is a device whose output is the product of its two inputs. They are extensively used in electronics as frequency changers, phase detectors and in many other applications. If two frequencies, F1 and F2, are applied to the inputs, the output consists of the frequencies (F1 + F2) and (F1 − F2).

Many types of modulator are known, rather fewer are in common use. The most common is probably the diode ring—this has the advantage of good signal and carrier rejection and simple structure. It also has several drawbacks: it must be set up carefully, it needs two or three tuned transformers, its gain is less than unity and it needs a high level signal to one of its inputs.

The transistor double-balanced modulator, of which the Plessey SL640C and SL641C are examples, is less well known than the diode ring, despite several advantages. This is because, until the advent of integrated circuits, it was too complex and expensive a procedure to accomplish the matching necessary to make a double-balanced modulator with transistors. Transistors in integrated circuits, however, are intrinsically well-matched so that, if a double-balanced modulator is made as an integrated circuit, little, if any, external balancing is necessary. Furthermore, and in contrast to a diode ring, such a modulator needs little setting up, no transformers or tuned components, and only low-level inputs. Its gain may be greater than unity.

A simple double-balanced modulator is shown in Fig 1. It is evident that the sum of the two output currents equals the tail current and that, from considerations of symmetry, if either V1 = V2 or V3 = V4 then I1 = I2. Also if $R \gg Re$ the collector currents of TR1 and TR2 will differ by an amount proportional to the difference between V1 and V2. If, therefore, a small input at frequency f_1 is applied between V1 and V2 and a large signal at f_2 is applied between V3 and V4, sufficient to turn the transistors TR3, TR3′, TR4 and TR4′ fully on and off, it is evident that switching modulation, similar to that of a diode ring, will occur and frequencies $(f_1 \pm f_2)$ will occur at the outputs as will sums and differences of f_1 and the odd harmonics of f_2, ie $(f_1 \pm 3f_2)$, $(f_1 \pm 5f_2)$ etc. True modulation occurs at low carrier levels, however, so large carrier inputs are not needed and harmonic products are not present. This is one of the most important differences between the diode ring modulator and the transistor double-balanced modulator.

The circuit diagrams of the SL640C and the SL641C are shown in Fig 2. The circuits are very similar but have different signal input and output configurations.

The circuits require a single, well decoupled positive supply of between 6 and 9V and consume about 12mA. Pin 2, an internal bias point, must also be decoupled by a low leakage (< 100nA) capacitor having a low reactance at the lowest signal or carrier input frequency.

Pin 1, which is connected to the can, should be earthed to prevent hf pickup.

The input and carrier signals, which should not exceed 200mV rms, are applied to pins 7 and 3 respectively. Both

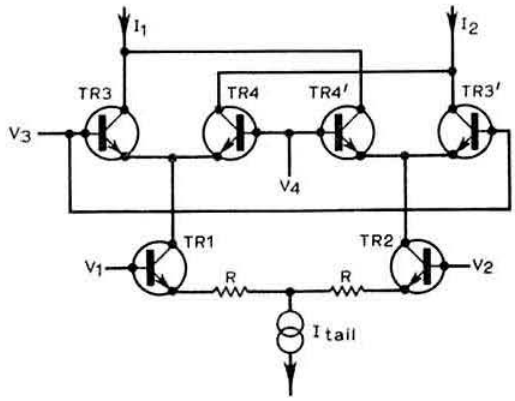


Fig 1. A transistor double-balanced modulator

the SL640C and the SL641C have a carrier input impedance of 1kΩ and 4pF, and the SL641C has a similar signal input impedance. The signal input impedance of the SL640 is 500Ω and 5pF. The input coupling capacitors should have a leakage of less than 100nA and an impedance of less than 100Ω at the lowest frequency they will carry. This should be reduced to <10Ω above 10MHz.

The output of the SL641C is intended as a current drive to a tuned circuit. If both sidebands are developed across this load its dynamic impedance must be less than 800Ω, if only one is significant this may be raised to 1,600Ω and it may be further raised if the maximum input swing of 200mV rms is not used. The dc resistance of the load should not exceed 800Ω unless the circuit is connected to a +6V supply and the load resistor to +9V when it may be as high as 1·8KΩ. This, of course, increases the gain of the circuit.

There are two outputs to the SL640C, one is a voltage

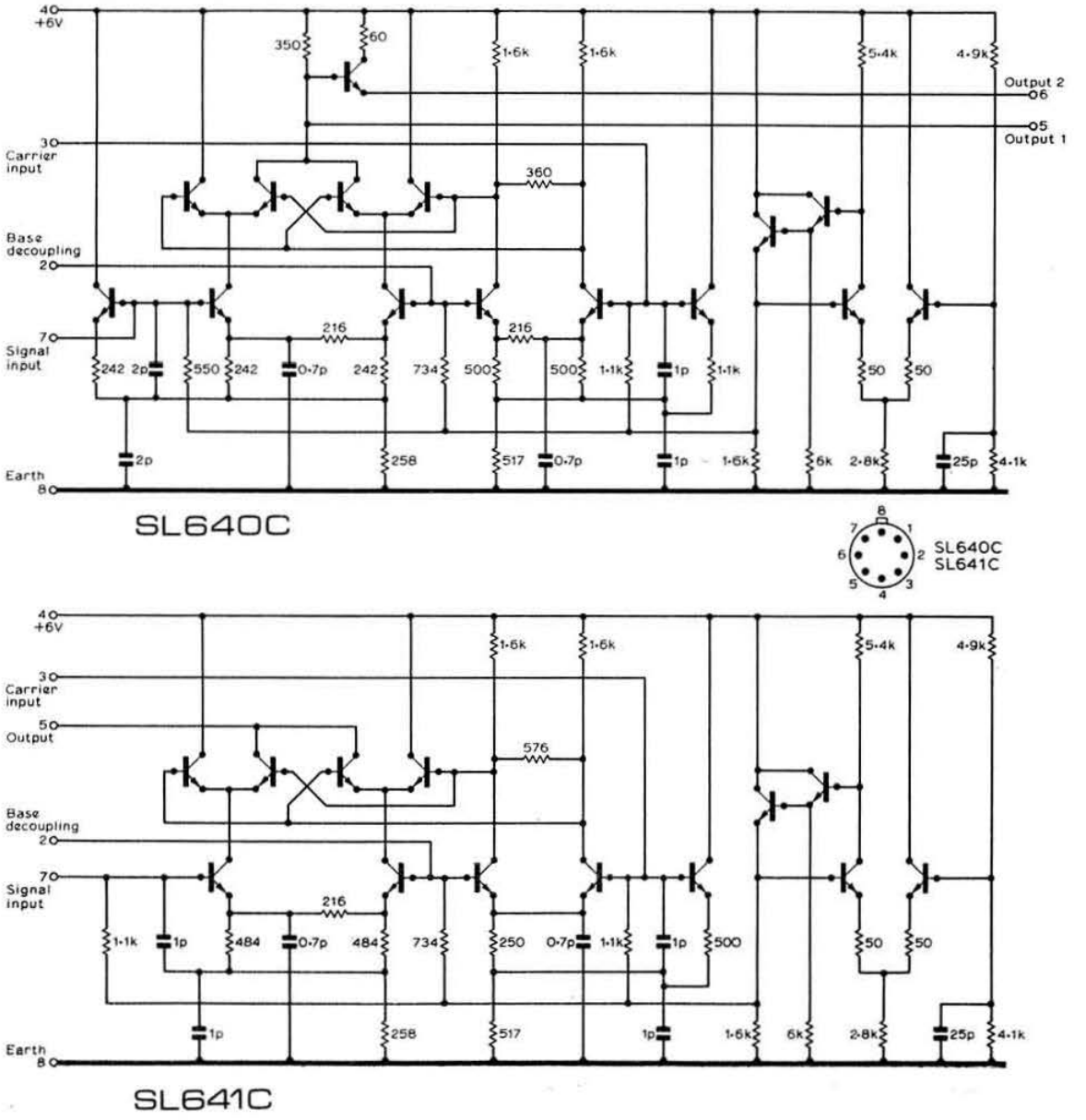


Fig 2. SL640C and SL641C circuit diagrams

source of output impedance 350Ω and 8pF and the other is the emitter of an emitter follower connected to the first output, which requires a discrete load resistor of not less than 500Ω. The emitter follower output should not be used to drive capacitive loads as emitter followers act as detectors under such circumstances with resulting distortion and harmonic generation. Frequency shaping components may be connected to the voltage output and shaped signal taken from the emitter follower.

The circuits will work with input frequencies between 1Hz and 70MHz with approximately the performance given in Table 1, and will operate at frequencies up to about 120MHz with reduced performance. To use them at frequencies below 100Hz, precautions must be taken up to prevent leakage in the input coupling capacitor from altering the device bias.

Signal and carrier leak may be reduced by altering the bias on the carrier and signal input pins. A 10kΩ preset potentiometer is connected between +6V and earth and a 330kΩ resistor is connected from the wiper to the signal input. With carrier but no signal input the potentiometer is adjusted for minimum carrier leak. Similarly another such network is connected to the carrier input and, with signal but no carrier, signal leak is minimized.

Some applications of the SL640C and the SL641C are shown in Figs 3 and 4. Power, decoupling and earth connections are not shown.

TABLE 1

Electrical characteristics, SL640C and SL641C

Test conditions: Supply voltage = 6V. Temperature = +25°C.

Characteristic	Circuit	Min.	Typ.	Max.	Units.	Test conditions
Conversion gain	SL640C	−2	0	+2	dB	
Signal leak	SL640C		−40	−20	dB	
[Signal output / Desired sideband output]						Signal: 70mVrms, 1·75MHz; Carrier: 100mVrms, 28·25MHz; Output: 30MHz
Carrier leak	SL640C		−40	−20	dB	
[Carrier output / Desired sideband output]						
Intermodulation products	SL640C		−45	−30	dB	Signal 1: 42·5mVrms, 1·75MHz; Signal 2: 42·5mVrms, 2MHz; Carrier: 100mVrms, 28·25MHz; Output: 29·75MHz
Conversion transconductance	SL641C	2·2	2·5	3·5	mmho	Signal: 70mVrms, 30MHz; Carrier: 100mVrms, 28·25MHz; Output: 1·75MHz
Signal leak	SL641C		−18	−12	dB	
Carrier leak	SL641C		−25	−12	dB	
Intermodulation products	SL641C		−45	−30	dB	Signal 1: 42·5mVrms, 30MHz; Signal 2: 42·5mVrms, 31MHz; Carrier: 100mVrms, 28·25MHz; Output: 3·75MHz

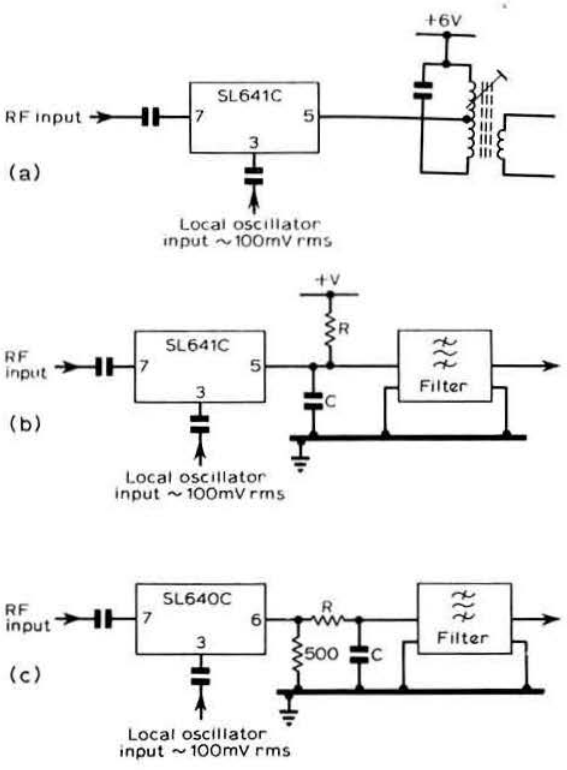


Fig 3. (a) SL641C used as a receiver mixer with wound i.f. filter. (b) SL641C used as a receiver mixer with a crystal filter. (c) SL640C used as a receiver mixer with a crystal filter

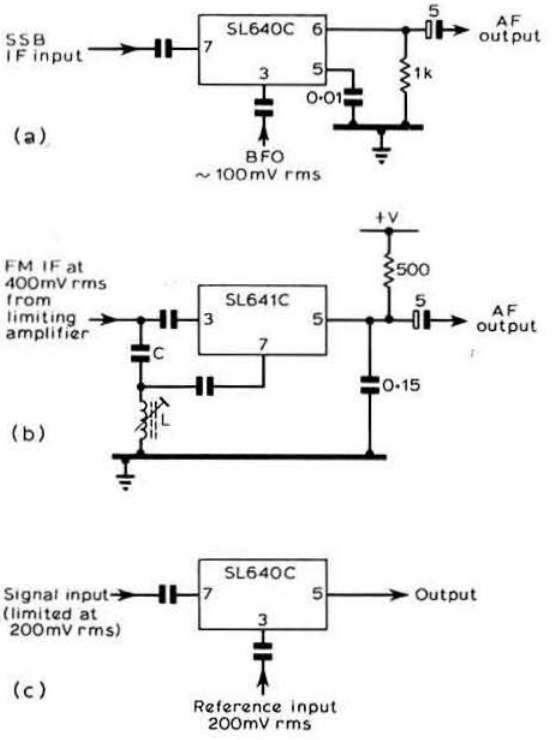


Fig 4. (SL640C as a product detector. (b) SL641C as an fm detector. (c) SL640C as a phase comparator

Fig 3 (a) shows the SL641C used as a receiver mixer driving a wound i.f. coil and Fig 3 (b) shows it driving a crystal filter. R and C must be the correct values to match the filter. If R is less than 800Ω it may be connected to the +6V line powering the rest of the SL641, if it is between 800Ω and 1·8kΩ it should be connected to +9V (and the SL641 supply must remain at +6V) and if it is over 1·8kΩ the circuit in Fig 3 (b) is unsuitable and the SL640C circuit illustrated in Fig 3 (c) should be used.

Fig 4 (a) shows the SL640C used as an ssb detector. The capacitor connected to output pin 5 decouples the sum frequency (F1 + F2) and the audio difference frequency (F1 − F2) is taken from pin 6. An fm detector is shown in Fig 4 (b) but the function is better performed by the SL432 or the SAA570, both of which contain their own limiting amplifiers. The phase comparator in Fig 4 (c) is more useful—it may be used as a detector for phase modulated signals or as a comparator in phase locking systems such as frequency synthesizers.

Fig 5 (a) shows a sideband generator. Both sidebands are produced and if a single sideband is required it must be obtained by subsequent filtering of the signal. In the circuit shown in Fig 5(b) a single sideband only is produced. It is important that both the audio and carrier reference and quadrature signals should be accurately 90° out of phase. The amplitude of one phase of carrier should be adjusted to obtain maximum second sideband rejection.

Fig 6 shows frequency multiplier and divider circuits. This particular application of double-balanced modulators is not practicable with diode ring modulators where high carrier powers are needed but only low power outputs are produced. The circuit shown gives examples—many other more complex configurations are possible. It is advisable to tune the outputs to remove unwanted sidebands.

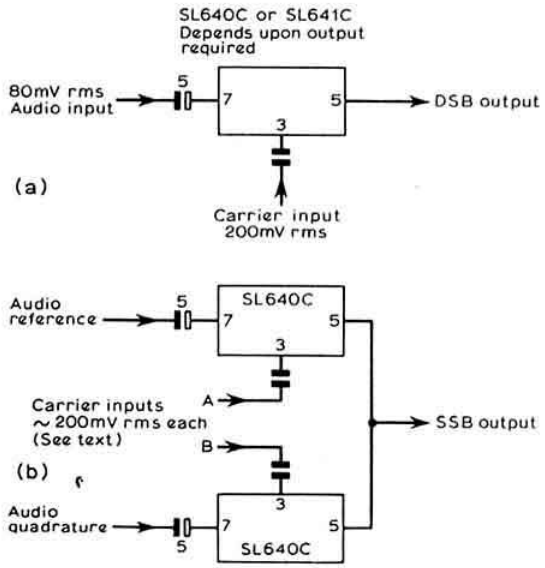
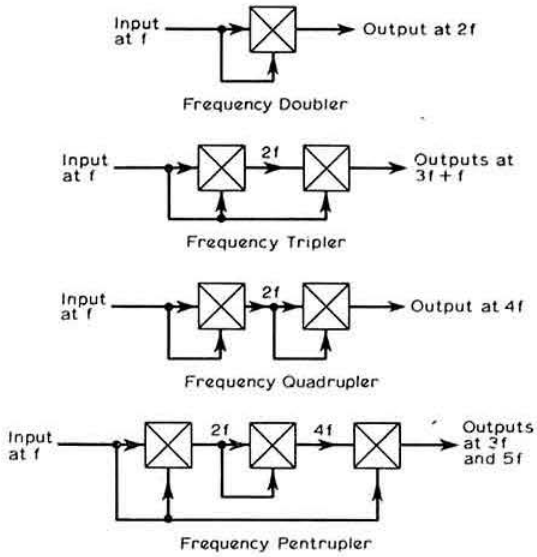
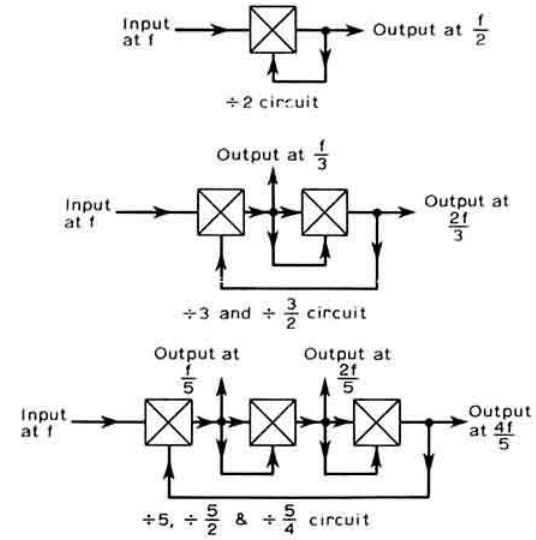


Fig 5. (a) Sideband generator. (b) SSB generator. If carrier ref goes to input A and quad to input B, lsb output. If carrier quad to input A and ref to input B, usb output

Many other applications of the SL640C and the SL641C are possible, such as speech scramblers, and electronic music generators. The devices may, in fact, be used wherever multiplication, phase sensitive detection or frequency changing are required.



(a) Frequency Multipliers



(b) Frequency Dividers

The final outputs should be tuned so that harmonics are not fed back

Fig 6. Frequency multiplier and divider circuits. NB: system diagrams only are given. Choice of devices and discrete components depends on exact application Each crossed square represents one balanced modulator. Inputs are on left and underside, output is on right

TECHNICAL TOPICS

A monthly feature by PAT HAWKER, G3VA

THIS month we launch what is virtually a mini-symposium on effective speech clipping for ssb transmitters—a blockbusting technique if ever there was one. At the other end of the scale are included two sets of ideas for milliwatt transmitters. We have also dug out of the professional literature a new dc amplifier provocatively called the "mixed double"; and for good measure a number of aerial topics, including some novel ideas about Yagi and loop arrays, not to mention simple loaded aerials. Other perhaps than presenting a free soldering iron with every issue of *Radio Communication* (and I cannot see the Hon Treasurer agreeing to that one) what more can one do to stir up activity on the technical front?

Speech processing for ssb

The brief outline in the September *TT* of the low-distortion speech-clipping technique used for a.m. broadcasting by "Radio Liberty" has indirectly raised a number of very important questions concerning effective speech clipping for ssb transmitters. This is a subject about which there appear to be a number of common misconceptions, and one has to be very careful to avoid adding still further to the confusion. And, as is not infrequent in radio communications, there tend to be significant differences between pure theory and what can be done in practice.

But first let us get down to cases. Geoffrey Ward, G3BOB, comments on the "Radio Liberty" clipper as follows:

"The block outline for this broadcast-type clipper is identical with that of the communications-type Comdel Model CSP-11 speech processor, and the principle of rf clipping is as outlined in 'New techniques for radio amateurs' (G3BOB, *Radio Communication* September 1969)."

G3BOB believes it needs stressing once again that this type of translation technique is the only way to obtain audio limiting capable of providing real signal gain with ssb transmitters. He notes that the use of conventional af diode audio clippers can at best give only a few decibels of improvement—and often result in a distorted signal whose average power may be less than without any clipping at all (but see G3FRB's remarks later).

G3BOB considers that too few amateurs realize that with rf clipping techniques some 10dB of distortionless gain can be obtained for much less than the price of a linear.

Comdel CSP-11 speech processor

It thus seems worth having a brief look at the CSP-11, recalling that the block outline (but not the translation frequencies) is identical with the diagram given for the "Radio Liberty" unit. It is an auxiliary "add-on" processor unit with internal batteries intended to go between microphone and the ssb or a.m. transmitter, and claimed to be capable, by increasing mean-to-peak ratio of the speech waveform, of providing a power gain of more than 10dB. The USA price is about $240, which may seem a lot to pay just for a clipper unless one thinks of it either as a substitute for a "linear" or alternatively as one means of legally running the equivalent of quite a few kilowatts of "pep" (but see the later item on micropower and the Radio Regulations!). British agents for Comdel are: Interface International, 29 Market Street, Crewkerne, Somerset; the parent firm is Comdel Inc, Beverly Airport, Beverly, Mass 01915, USA.

And if there is anyone who doubts the potential benefit of speech clipping we would refer them to Fig 6 in *TT* (July 1970) which showed for how little of the time do the instantaneous amplitudes in normal speech exceed a few per cent of peak level.

The various arguments against attempting to use conventional audio speech clipping for ssb have been set out in some detail by Walter Schreuer, K1YZW/G3DCU, (*Ham Radio* February 1971) who, I believe, was concerned with the development of the CSP-11 unit. He shows the phasing problems that arise, at least theroretically, when trapezoidal waveforms are fed to ssb transmitters. While he admits that a small gain is possible provided that the low-frequency response is restricted, he comments: "I do not believe that any gain realized through speech clipping in this manner is any greater than can be obtained with a properly designed automatic level control (alc) system or volume compression system."

He indicates that alc with a long recovery time constant, while often resulting in no gain in average power, nevertheless offers considerable benefits since the operator does not have to worry about overdriving the output stage—resulting in appreciable *psychological gain*. With a short recovery time-constant, between 3 and 6dB average power gain can be achieved. K1YZW regrets that although some factory ssb rigs have excellent alc performance, in others the performance leaves much to be desired.

He then discusses rf clipping techniques, noting that "cost is rather high, and 'retrofitting' older equipment is likely to be difficult". He observes that although with rf clipping the important harmonic problem does not arise (for the reasons noted in the September *TT*), intermodulation (im) products may still need to be taken into account. In this respect he admits that an "add-on" speech processor of the "Radio Liberty" or CSP-11 type, in which the output is returned back to af, slightly higher im distortion is to be expected compared with straight rf clipping. But he reports that an audio consultant, after listening to the unit without a radio link, would hardly believe that a clipping system was being used. Tests—again confined to audio links— suggested that with a CSP-11 15dB of clipping produces 10dB intelligibility gain without apparent distortion.

But one point which K1YZW did not mention was the effect of the processed speech on some transmitters—particularly those using sweep tubes in the power amplifier or those with a power supply designed for use only with a very low duty cycle.

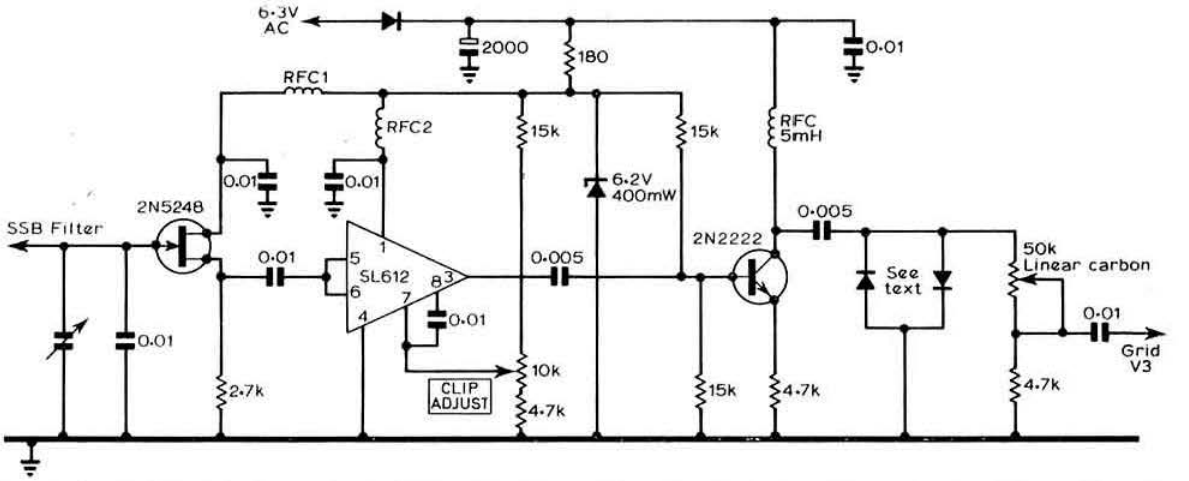


Fig 1. The K6JYO rf clipper designed for use with Collins S-line transmitter but adaptable to other ssb transmitters. Clipper diodes are HP2800 hot-carrier types but other germanium and silicon types are suitable. The ic is Plessey SL612, RFC1 seven turns No 28 on 0·060in diameter former, RFC2 Ferroxcube 3K2A ferrite core

K6JYO rf clipper

The possibility of fitting a straightforward rf clipper to an existing ssb transmitter is explored in an article by Bruce Clark, K6JYO, in *Ham Radio* (August 1971). He points out that for such "retrofitting" (to use the jargon), the Collins S-line is one of the best for such modification. His reasons for this view provide a useful clue to what to consider if you are thinking of adapting an existing rig.

(1) Beefy power supply, capable of high average current;

(2) Use of 6146 tubes (as opposed to sweep tubes) coupled with effective alc (rf compression loop) and negative feedback to reduce im products;

(3) Stable, effective balanced modulator (carrier suppression over 50dB for long periods).

K6JYO's clipper (Fig 1) is quite simple, but in fitting it to a 32S1 he also incorporates an additional 455kHz mechanical filter (see Fig 2) and he describes adjustments in detail in his article. He also took certain other precautions which would be applicable to any type of severe clipping to overcome the additional strain on the final amplifier and driver due to the large increase in average input power; the resultant higher temperatures can have a detrimental effect on valve and component life in the final amplifier compartment. He substituted 7212/6146W valves; and he added a fan on top of the transmitter cabinet to blow cooling air downwards through the box.

He concludes that "rf clipping is a must for optimum ssb talk-power in any transmitter with sufficient reserve power supply capability".

Some comments on clipping

A British amateur who has been doing a good deal of work on rf clipping is Phil Horwood, G3FRB; he is hoping to provide a full-length article on the subject before long. In the meantime he provides a useful commentary on some of the points raised earlier.

First, he notes that the best reference on the subject of clipping is to be found in the book by Pappenfus *et al*, *SSB Principles and Circuits* (McGraw Hill, 1964). The clever types, he considers, keep insisting that if a sine wave is clipped until it is square, and such a wave, continuing an odd harmonic series to infinity, is used to drive an ssb exciter, then when the wave switches all the harmonics add to a theoretically infinite amplitude.

But, as G3FRB comments, this assumes infinite bandwidth both in the audio stages and at rf. In practice, with deliberately limited af bandwidth, you cannot have a square wave—and you certainly cannot have infinite bandwidth in the rf stages of an exciter. Pappenfus indicates that it is thus possible to obtain some advantage from af clipping, and up to about 5dB or so can be used.

G3FRB suggests that if rather inferior diodes are used for af clipping, rather than diodes capable of switching in a few nanoseconds, sufficient advantage could be obtained to make it worth accepting the limitations of audio harmonics. One amateur, at least, uses copper-oxide rectifiers apparently effectively.

In the case of rf clipping, G3FRB believes that the filter following the clipper should be a good band-pass filter,

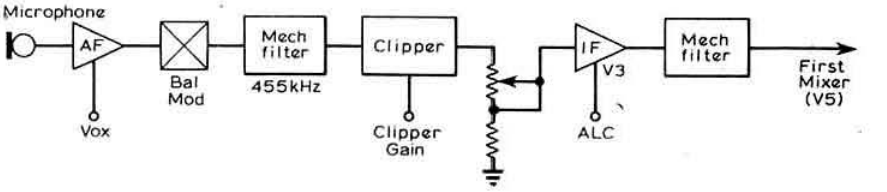


Fig 2. How the K6JYO filter connects into the Collins transmitter

rather than the low-pass type indicated in the "Radio Liberty" and CSP-11 outlines, in order to remove all im products except those truly in the audio band which cannot be eliminated. The extent to which such im products are generated depends on the amount of clipping and thus the relative amplitudes of the harmonics generated, even though these harmonics are later filtered out. G3FRB has made some measurements using a Hewlett-Packard spectrum analyser:

Clipping (dB)	Worst ip level (dB) 3rd order
0	60
10	25
15	20 below either tone
20	13
30	10

Even with 10dB intermodulation products, speech quality is fully acceptable—and such products are at least all in-band and not splattering over the spectrum. Pappenfus states that 10dB clipping can provide a power gain of 4dB; 20dB clipping, 8dB gain, and so forth.

G3FRB notes that advertising literature for speech processors tends to gloss over the problems (already mentioned) arising from the extra dissipation caused by the higher mean power, and he suspects that sweep-tube linears would have short valve life with 10dB or more clipping. In his own case, if he uses all the available clipping, the pa anode current meter flips up to 220mA at 3·5kV and stays there all the time!

He also points out that in a true rf clipper fitted after the first balanced mixer (as in the K6JYO unit) the extra gain introduced below the clipping threshold will bring up the unwanted signals, such as sideband hum and noise, carrier, etc by the same amount. To reduce some of these (but not hum or noise) the second bandpass ssb filter needs to be at least as good as the first filter.

It is hoped that these various notes will help to put the subject of ssb speech clipping into some sort of perspective—or at least prove an appetizer for the article promised by G3FRB!

The mixed double—and a dc millivoltmeter

This mixed double has nothing to do with tennis. But it is a promising new circuit technique stemming from Australia and described recently by R.H.S. Riordan of CSIRO in *Electronics Letters* (August 12 1971). It is a new form of balanced input stage which it is claimed overcomes the disadvantages of the long-tail pair, as used in dc amplifiers. In the long-tail pair, the input is not at earth potential unless a split supply is used; futhermore the gain is only half that of an equivalent single transistor stage. The basic arrangement of the new mixed double is shown in Fig 3 (a); it will be seen that this uses one pnp and one npn transistor. A practical application of this circuit to a simple dc millivoltmeter is shown in Fig 3 (b). This gives a sensitive voltmeter operating from a single 2·7V battery providing full scale deflection from about 10mV input. The dc amplifier has a loop gain of about 25dB, an input impedance of about 100 MΩ and an input offset current of about 5nA, with linearity better than 99 per cent of full scale deflection.

TR1 operates as a common collector stage with TR2 as a common emitter stage. The voltage gain of TR1 is slightly less than unity, but it should have high current gain to minimize the input offset current. The current gain of TR2 is not important, but its high-frequency current gain determines the

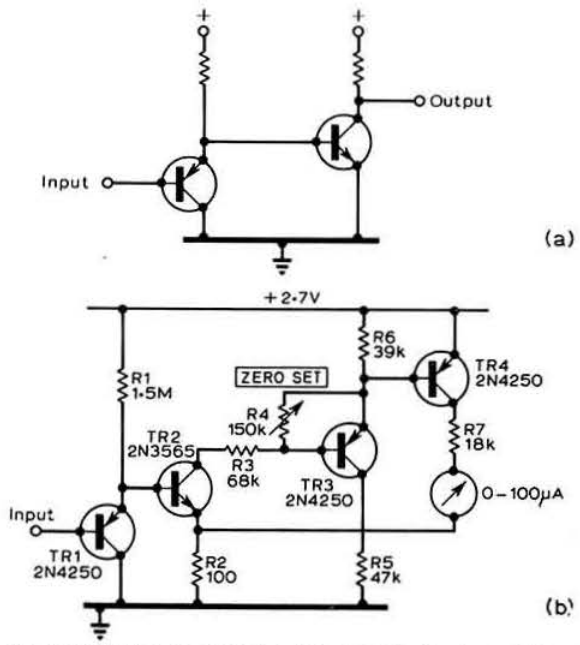


Fig 3. (a) Basic arrangement of the mixed double dc amplifier; (b) a practical use of the mixed double circuit in a sensitive dc millivoltmeter

overall frequency response. Optimum temperature compensation is said to be obtained when the base-emitter voltages of the two transistors are equal. With types 2N4250 and 2N3565, temperature coefficients of 70–100μV/°C were obtained; this is worse than a conventional input stage using matched transistors, but is adequate for many purposes; much better results might be obtained if transistors were designed for this application. Temperature coefficient of the millivoltmeter shown is put at about 200μV/°C, due mainly to the uncompensated second stage.

One possible application for a sensitive millivoltmeter of this type might well be as the heart of a transistorized harmonic detector for tvi work—other uses are likely to occur to readers.

Micropower transmitters

In discussing such techniques as speech clipping for ssb, one always feels there is a danger that it may appear that one is advocating only high-power operation. In practice, we are constantly being impressed by the effectiveness achieved by stations running well under 25W. It is perhaps worth pointing out that one of the international radio regulations states that excessive power should not be used. (*All stations shall radiate only as much power as is necessary to ensure a satisfactory service.* Radio Regulations, Article 14, paragraph 2.) There are many applications where low-power and flea-power transmitters can do a really useful job, particularly for local working. So to redress the balance this month, we are including notes on two micropower techniques—one for a.m. and the other for dsb suppressed carrier.

Several years ago (see *ART*) a Royal Radar Establishment circuit (developed with thin-film techniques in mind) was

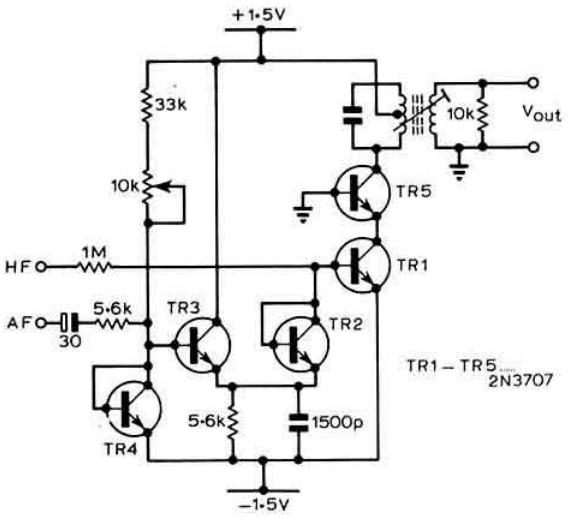


Fig 4. Amplitude modulation of micropower transistors for communications or instrumentation applications

given for a miniature 30MHz micropower transmitter featuring an unusual approach to the problem of amplitude modulating transistors. Now another rather similar arrangement turns up in *Proc IEEE*, July 1971, as a result of work at the Indian Institute of Science. This provides a circuit technique intended for miniature communications or instrumentation systems claimed to be free of the usual distortion found when modulating small signal transistors; it also features Class A operation and the prevention of overmodulation. The details given suggest that very clean micropower a.m. can be produced. Fig 4 reproduces one of the circuits described in the *Proc IEEE* letter, this one intended for use at 500kHz but which could probably be adapted for use at amateur frequencies.

A note from Roy Stevens, G2BVN, draws attention to a small 28MHz dsb transmitter. The circuit (Fig 5) came from the 28MHz *QUAX* newsletter produced by G3DME, and the transmitter is credited to K4EPI. The diagram is pretty nearly self-explanatory, and it will be noted that all transistors are small signal types so that the output will be restricted to the lower milliwatt level—but still capable on 28MHz with its low noise level and available bandwidth of giving good results. The tuning procedure is: Cb to minimum; Rb fully clockwise or counter clockwise; peak L1C1, L2C2, L3C3 for maximum S-meter reading; adjust Cb and Rb for minimum S-meter reading. Adjust L1C1 for minimum S-meter reading while keeping TR1 in oscillation; set microphone gain at midway position.

Shortened dipoles

It is always interesting to note how often the same idea seems to occur to several people at roughly the same time. One example of this is an inverted V-dipole with the size drastically reduced by inductive loading. A 3·5MHz design of this type was presented by Juergen Berger, DL7LJ, in *DL-QTC* (No 5, 1971); another has come along from A. J. Russell, BRS32857, who uses a rather similar arrangement for dx reception on 1·8, 3·5 and 7MHz, each requiring the use of only a short garden.

DL7LJ uses a coaxial balun between the coaxial feeder and the dipole, and his loading coils are wound on a 22mm former about 350mm long wound with 145 turns of aluminium wire 1·5mm in diameter. The swr curves indicate that resonance is fairly sharp, although the aerial should be satisfactory over at least 100kHz of the 3·5MHz band; one possible technique for lowering resonant frequency mentioned by DL7LJ is the use of two capacitance hats in the high-voltage sections using about eight radial wires.

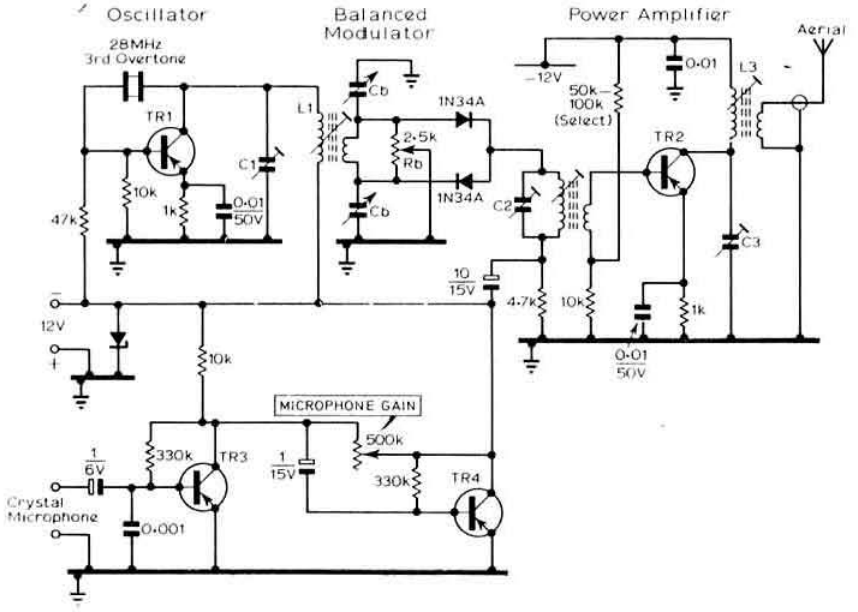


Fig 5. K4EPI 28MHz low-power double-sideband suppressed carrier transmitter. TR1, TR2 pnp rf transistors; TR3, TR4 pnp general-purpose audio transistors; C1, C2, C3 30pF trimmers; Cb 30pF variable; Rb 2·5Ω variable; L1, L2, L3 20 turns, No 24 enamel close wound on ¼in, slug-tuned, formers, 3-turn link winding

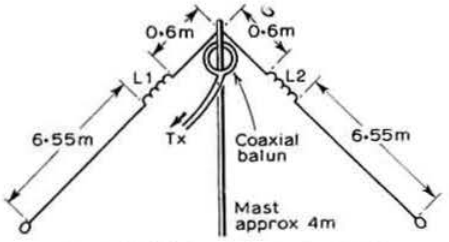


Fig 6. DL7LJ short dipole for 3·5MHz

A. J. Russell, BRS32857, has a roughly similar system except that his loading consists of two helically wound sections each 10ft long. He winds 56ft of 16swg wire on pvc tubing 10ft by 1¼in, with wood plugs at each end. He uses the aerial as a dipole on 3·5 and 7MHz and as a T on 1·8MHz. He would be interested to hear from anyone using the aerial for transmitting: his address is 90 Portland Road, Street, Somerset.

During the past few months we have had several contacts on 3·5MHz with "Spenny", G6NA, who is using a small 4W transistor transmitter. His aerial is, in effect, half of one of these loaded dipoles—about 30ft of wire running up and then along only about 9ft above ground and inductively loaded at the far end with some 5in of closewound 20swg on a 1¼in diameter former, the other end of the coil being connected to 3ft of ¼in copper tubing to provide a simple capacitance hat. He often works North America with this set-up, though he experiences considerable variations in feed point impedance which he is still investigating.

There is, of course, a touch of the Joystick about all these short loaded aerials used as fixed-site systems, and we do not intend to enter into that particular controversy—although we should in fairness mention that we seem to work quite a few reasonable signals which turn out to be coming from Joysticks.

A further variation of the helically wound form of loading turns up in the October *SWM* in the form of a 1·8MHz vertical aerial comprising 250ft wire helically wound on a 15–20ft pole and fed from coaxial cable via a variable loading coil. Despite the use of about 1λ of wire, the aerial, it is said, appears to function more as a quarter-wave vertical.

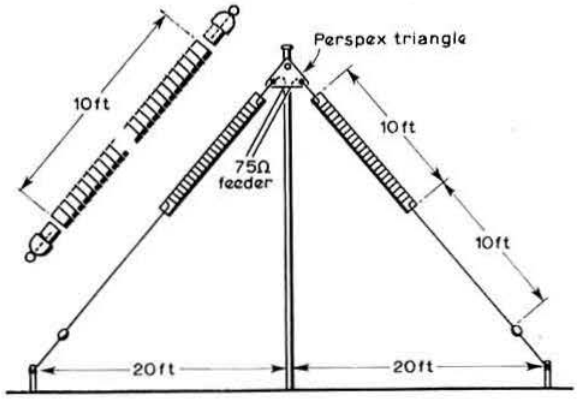


Fig 7. The BRS32857 version of the short dipole

Matching a beam to 300Ω feeder

D. Boucheron, F2AI, in *Radio-REF* (No 7, 1971) describes a 14MHz two-element Yagi beam with a rather novel (at least to me) way of matching a feed point impedance of about 33Ω to 300Ω tubular feeder. He uses the well-known quarter-wave matching transformer, calling for a matching section of roughly 100Ω ($\sqrt{33 \times 300}$): Fig 8). The novelty is his use of two sections of RG8U 52Ω coaxial cable with the outer cables electrically wired together at the top and bottom, on the principle that this then forms a balanced 100Ω section. The use of two coaxial sections in parallel is fairly well-known, but I cannot recall seeing the series idea used before.

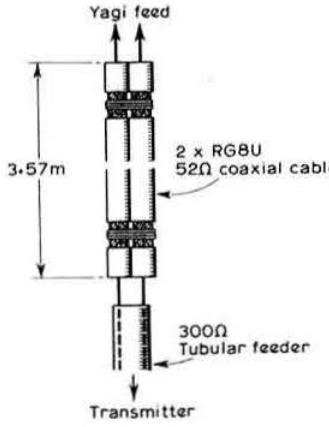


Fig 8. F2AI's method of feeding a 14MHz two-element beam using quarter-wave transformer of two coaxial cables. The length, 3·57m, is for 14,200kHz resonance

1·8MHz U-type Marconi aerial

A practical realization of the U-type 1·8MHz Marconi aerial recommended in the HF Aerials chapter of *Radio Communication Handbook* is warmly endorsed in a letter from Dr Michael Eccles, G3PPE/W6. He points out that this type of aerial provides the cross-polarization mentioned several times earlier this year in *TT*. Before he went to California, the aerial shown in Fig 9 plus a genuine 8W gave excellent results both on dx (W, OE, 9M4, 9V1 etc) and local stations. On dx he noticed far less fading than with either a horizontal wire or a loaded vertical while

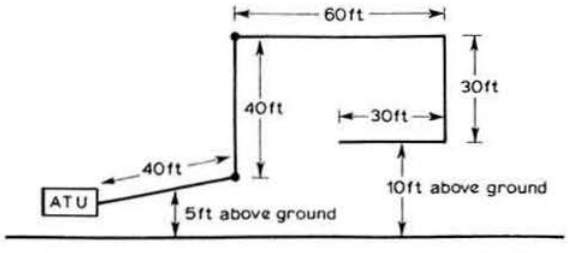


Fig 9. G3PPE's U-type 1·8MHz Marconi aerial

operating from a location in a valley having very good earthing characteristics (G3TKN on a sandstone hill less than a quarter of a mile away generally had reports from North America about 10dB down). Clearly this is a useful configuration for the low-frequency bands, especially if you are fortunate enough to have ground of good conductivity below you.

Maximum gain of Yagi aerials

Although the Yagi-Uda aerial was first described over 40 years ago, there is still quite a bit of hit and miss in designing one—at least when compared with driven element arrays. In recent years there has emerged, for example, the Ehrenspeck backfire systems (see *ART*) though these have not been widely taken up by amateurs; this seems a pity as some time ago we heard about work on this system by one of the television receiving aerials firms which confirmed that useful extra gain can be achieved in this way, although it did not appear practicable to obtain the wide bandwidth needed for British four-channel uhf television.

Some recent work at the Danish Technical University at Lyngby (*Electronics Letters*, 9 September 1971) seems to open up further possibilities, though—to be frank—I find it difficult to fathom out exactly what the writers have in mind. What does emerge is that their work indicates that there is a further useful form of reflection-type Yagi, apart from the backfire. To quote the letter: "It appears that this reflection type Yagi-Uda antenna has, asymptotically, twice the gain of a conventional travelling-wave type or, expressed differently, for the same gain it needs half the length. This is somewhat similar to the backfire antenna which, however, requires a much larger extent traverse to the antenna axis."

As far as I can judge, they are proposing an array with maximized unequal spacing capable of giving an extra 3dB (double the power) of gain. The letter provides information on element lengths and spacing for 4, 5 and 6 element arrays, based on computer analyses; however, it is indicated that the results have been confirmed experimentally. What is needed is for someone to translate the graphs given in the letter into practical designs for amateur vhf operation.

On this question of achieving maximum gain with vhf parasitic arrays, it may be worth drawing attention to another recent item: an article on circular loop aerial arrays (*IEEE Trans. Ant. & Prop.* July 1971). While this is largely a theoretical study, the Japanese authors note that arrays using a driven loop in conjunction with parasitic loops can provide about 1·8dB more gain than a comparable conventional Yagi. Apparently this technique is used quite widely in a number of Japanese television receiving aerials. The following loop dimensions are suggested: a loop 1·1λ in circumference is said to work well as a reflector; 0·95λ a good director with 0·1λ~0·2λ spacing; it was found (and this seems an unexpected figure) that a driven element of 1·2λ ~ 1·3λ in circumference is desirable for high-gain and bandwidth.

A related form of aerial is the multi-element vhf quad; we recently noted in the Italian *Radio Rivista* (No 8, 1971) an 11-element quad for 144MHz with a claimed gain of 18–19dB! The elements are spaced along a 4·10m boom so that it is by no means an impossible size.

VFO for integrated-circuit receivers

The Plessey SL600 series of integrated circuits continue to turn up in designs published overseas. For example, in *DL-QTC* (No 4, 1971), Hans Schlueter, DJ7IC, describes an ssb receiver using the SL610, SL641, XF9B, SL612, SL641, SL621 and SL630 line up. It is generally desirable to use discrete FETs for the vfo which in this case covers 4·95 to 5·55MHz. While there is nothing particularly unusual about DL7IC's vfo arrangement (Fig 10) it is felt that with so much interest these days in this type of receiver, readers may well be looking for a circuit to use with the SL641 double-balanced mixer. (See "Using the SL640 and SL641 double-balanced modulators", p 760—*Ed*).

The DL7IC receiver is for 3·5 and 14MHz only. The vfo tuning coil is wound on a 10mm diameter ceramic former.

More comments and feedback

Some other useful feedback—this time referring to items in the September *TT*. Barry Priestley, G3JGO, mentions that aperiodic crystal filters can suffer from changes in input impedance with frequency and are likely to work better when fed from a 50Ω or heavily swamped source. He also feels that GM4QK is unlikely to find frequency-doubling converter front-ends satisfactory due to the problem of intermodulation products and other spurii.

J. E. Cronk, G3MEO, has tried the NASA audio filter but finds it has a very large insertion loss—it is possible that something may be wrong with one or more of the component or impedance values, although the circuit as given is the same as that published in *Radio-REF*.

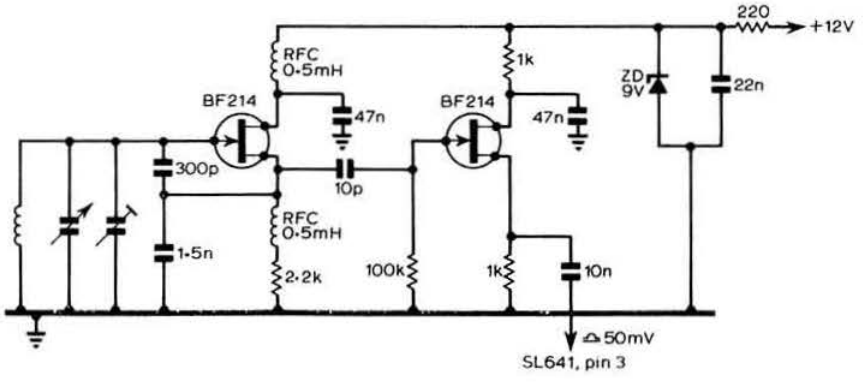


Fig 10. The 4·95 to 5·55MHz vfo used by DL7IC in his integrated circuit ssb receiver

FOUR METRES AND DOWN

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

Repeater beacons

A repeater is a device which accepts signals on one frequency and re-radiates them on another, and may be likened to a beacon that operates only on request from an appropriate trigger signal. The up frequency may be in the low end of the 2m band and the down frequency in the high end, as with the American Oscar artificial satellites five years ago, or the up frequency can be on one band and the down channel on another.

There is nothing new in all this. Well before the last war a highly developed IFF (Identification of Friend and Foe) system carried in aircraft returned characteristic signals to ground radar stations to denote non-hostile status. In more recent years the application of the technique to vhf amateur radio has been explored in many countries, and in some of them the licensing authorities have allowed its use.

In the USA vhf men now look upon repeaters as an accepted and useful part of the metre-wave scene. In Germany about 20 are operative, all accepting fm tone calls in the low end of 2m and re-radiating them in the high end. In Switzerland two mountain repeaters have been established in the 70cm band. Their value in rough terrain where direct communication on vhf/uhf is difficult or impossible is obvious.

Both Australia and New Zealand have repeaters, one of the most successful being that run by the Christchurch branch of the NZART. This operates in the 2m band and gives regular 100-mile-plus mobile to mobile service.

In the UK there are plenty of areas where repeaters would galvanize the use of the metre-wave allocations. South Wales with a high density of licensed amateurs and poor prospects of good vhf communication is a case in point. The situation is similar in Scotland or in any area remote from a large local vhf population.

Repeaters being active transmitting devices attract the interest of the licensing authority, which naturally would expect a convincing case to be put to it before their deployment could be considered. It was with this in mind that the RSGB recently convened a meeting at which the VHF Committee and a group of members interested in the technical and operational possibilities of vhf repeaters embarked on an intensive session of exploratory work on the subject. There may have to be others. In due time it may be possible for Council to submit to the licensing authority a convincing case for permitting the installation and use of a repeater or repeater system in this country. Members will be kept informed of progress.

Contest commentary

Unlike the windswept June event, October's IARU contest on the uhf/shf bands enjoyed almost ideal outdoor conditions that had begun to develop over the preceding few days with the barometer up to 30·3 in many parts. On the Friday evening before, the 70cm band, always busy on the last working day of the week, opened up impressively (EI6AS made the believed first EI-to-PA on 70cm by working PA0VD on cw). The lift was maintained into the morning of Sunday 3 October, and serial numbers well into the fifties were being exchanged by then on 432, and there was much transference of activity on to 1,296. By the time he got his lunch call that Sunday G8BBB registering 64 worked was neck-and-necking with several others, but on 23cm he looked like being away ahead with 15 worked, including 3½ Netherlanders, with his 2C39 tripler delivering 13W at the base of the 10-over-10 slot.

It was fortunate that GI8AYZ/P made an appearance on the Saturday leg of the contest, for things were not so good on the Sunday. He penetrated well down into East Anglia on 433·16MHz and gave many seventy centimentalists their first contacts with Northern Ireland. And the presence of many PA0 plus a few Belgians helped garnish the contest with a welcome IARU flavour.

* * *

A month earlier, VHF NFD itself, enjoying comparable conditions, brought a continual trickle of letters to FMD over many weeks after the event from members expressing the pleasure they derived from it. "Have never written to *FMD* before but after VHF NFD could not resist it," said GC3YIZ; Jim Martin from his sea-level QTH on Guernsey notched the believed-first Guernsey-to-IOM contact on 2m when GD2HDZ came back. It was certainly the first that 'HDZ had made with GC.

The high occupancy and extended ranges enjoyed over VHF NFD weekend pushed up country-and-county scores, eg G2WS/P was able to claim his sixth Four Metres and Down Award as the 70cm cards rolled in after the "National". Bill Scarr's single-operator status that weekend embraced 4m and 2m as well as 70cm at a 1,575ft site on Exmoor (eight countries on 2m, Westmorland best on 70cm — and that is *some* haul even at 1,575ft and on NFD).

If you worked EI2VET/P (Terry Cotton is G8BCP when at home in Staffordshire) you will be interested to know that his 1,000ft Wicklow site brought him over 250 VHF NFD contacts at an average of 13pts each. He stayed in Ireland until 11 September to book in about 500 stations in nine countries out as far as OZ9DJ/A. To his regret the G3BA LX-pedition was a gotaway. Special QSL cards will have reached most destinations by now. If one is wanted direct, sae to G8CGB.

DX tv identities

Is there, asked GM3VTB on this page a couple of months back, any list of European television test cards currently in use?

We now have it from G4AR of *Practical Wireless* that that journal's companion magazine *Television* has begun a

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new series showing dx tv identity cards, based on information gleaned from writing to every television broadcasting authority in Europe and the Near East.

Something else in *Television* that will interest RSGB members who, like 'VTB, watch propagation on the video channels is a monthly feature by Roger Bunney which that journal publishes specifically on the subject of dx tv.

By-product of bandhopping

In the course of the discussion on the pros and cons of vfo operation on 2m, a factor which has been somewhat neglected is that of achieving sensibly constant rf output over the whole of the 2MHz spectrum. Using broadband capacitive coupling between stages is an SCR522 technique that is 30 years old and not conducive to keeping unwanted products out of next door's television set. Double tuned circuits take up a bit more room mechanically but a lot less frequency space electrically. But their inherent selectivity—and that is what they are put in for—means that a transmitter peaked up for, say, 145·8MHz gives poor output when the owner pops in a low-end crystal (or whisks the vfo down that way) to catch a station known to be tuning low to high.

Giving some thought to this problem, G4AGQ of Barnsley points to the possibility that unwanted products will not only be detectable in nearby tv sets but may drop into professional bands where they would be decidedly unwelcome. Example: "If I attempt to use a transmitter over a range of more than about 500kHz on 2m without retuning *every* multiplier stage, I get considerable output on other frequencies, eg 136 and 152MHz with an 8MHz oscillator. This has been so with solid state and valve transmitters," says 'AGQ.

This implies, he adds, having two transmitters if one wishes to operate cw at the low end and phone elsewhere, or a more complicated design of vfo/mixer and high-Q breaks on all stages operating on 2m.

Comments would be welcomed from 2m operators who have achieved a compromise between the opposing requirements of adequate transmitter selectivity and constant across-the-band output.

Experiments with pulse

"This is G8AVX to the east of Birmingham", well known to users of 70cm throughout the Midlands, may well be translated to a much higher frequency and a very different mode if experiments which Bill Williams has just embarked upon come to fruition. He wishes to determine whether pulse telephony using a prf well above audio—say 20kHz—could become a viable proposition under amateur conditions on the lowest frequency band, 13cm, where pulse is allowed by the licence, to a level of 2·5kW peak.

He and G8ARY, who is collaborating with him, feel that for a transmitter of given size operating under pulse conditions instead of the customary a.m., a resolvable signal should be available in a distant receiver working barely above the noise.

Pulse width modulation is preferred to pulse amplitude modulation (both are covered by the licence). It can be resolved by a conventional a.m. receiver, the latter to be equipped with a trigger circuit adjusted to trip just above the receiver noise level to re-generate the incoming pulse signal at large amplitude. In the words of 'AVX:

"If we use pulse repetition frequency modulation the incoming pulse can trigger a monostable to produce much longer pulses and so improve the one per cent or less duty cycle at the transmitter to near 50 per cent in the receiver."

In mulling over experimental set-ups, G8AVX offers the following thoughts:

Transmitter: Start with an seo at low prf (a 2C43 in a re-entrant cavity) feeding a 3ft parabola in order to set up the signal path. Raise prf and adjust modulator and receiver accordingly. The core from an old television line output transformer may be pressed into service as a pulse transformer. And television line output valves have possibilities as hard valve pulse modulators.

Mode and frequency: To quote G8AVX: "Can I suggest 2,350 to 2,360MHz, pulsewidth modulation, prf near 20kHz, mean pulsewidth selected to make the best use of the available peak power input with due regard to licence limitations?"

These proposals may well promote more interest in a mode which gives promise of a high return in terms of signal for a modest layout in terms of cash for equipment. Already the pulse mode has been effectively demonstrated in the series of tests between G3EEZ and G3BNL in the 2·3, 3·4 and 10GHz bands. From July 1968 onwards, these two using PID telegraphy achieved increasing ranges, until on 11 May 1969 they touched the magic 100-mile mark with a contact on 2·3GHz from Clee Hill to a site eight miles south of Aylesbury.

Other microwave records established by 'EEZ-'BNL are printed in our new VHF/UHF Distance Records table.

From XO11A (Part 1)

To investigate further the one-way stretch effect, when vhf/uhf signals emerge from markedly localized areas, or exhibit GO-NOGO characteristics, GI8AYZ/P has just completed a programme of operations from his mountain top near Larne, now famous as XO11A, that took him out for 15 Mondays between May and September. In addition, random outings plus contest work brought his total sorties to 27.

Although the conclusions from this consistent effort call for longer term analysis, what may be stated now is that it has demonstrated the steady increase in metre-wave activity which is a marked feature of the UK amateur radio scene. Perhaps conditions were "up" a little in 1971 compared with 1970; even so, Ian Kyle doubled his number of 2m contacts for an increase of only 25 per cent in operating time, 322 in 1971, 164 in 1970.

On 432MHz the rise in activity is even more marked: 35 hours on the air produced 84 contacts (10 hours for nine contacts in 1970). Of these, 22 were logged during last month's IARU UHF Contest.

Some significance may be read into the remarkably greater ranges achieved on 70cm in 1971. Best dx was Suffolk at 509km; last year North Wales at 220km. Better conditions, more activity, better equipment among 70 centimentalists generally? Probably a combination of all three. Compare with 2m: last year's best dx was Sussex at 591km, this year Cornwall at 570km (both during VHF NFD).

All this was achieved by single-handed operation and straightforward equipment, as follows:

Transmitters: for 2m, the *Radio Communication Handbook* 15W set with modulation applied to the screen of the

driver as well as plate and screen pa for extra talk power; on 70cm, a tripler until VHF NFD, when a pa was added.
Receiving: Heathkit "Mohican" tuning 28–30MHz, both 70cm converter (G3JXK type) and 2m home-built fet built in.
Aerials: for 2m, 6-el J-Beam, for 70cm 18-el Parabeam.
Mast: three lengths of 2in aluminium joined with split sleeves of aluminium, notched into a Y-shaped crookstick secured to the roof rack of the "Viva" with bunji-clips. Total height 20ft ". . . which is adequate on top of the 1,125ft asl of the site".

And the conclusions, from the propagation angle? Says 'AYZ: "The season produced no solidly identifiable cases of one-way stretch, although 16 August gave all indications of a patch just declining, during a limited opening to the Midlands. Against this, the /P outings have not coincided with the leading edge of an Icelandic 'high' as happened last year. More study next year will be necessary."

Operating tactics? With 406 contacts booked in from XO11A during 1971, Ian Kyle has formed a clutch of conclusions under this heading. See Part 2 next month.

At the other end of the opening

In the great opening of Wednesday 6 October, when so many UK stations worked Scandinavia that dx was no longer newsworthy, a former G man was sitting in his 15-storey block of flats in Malmo hearing it all happening from the giving end. He is John Attlee, G8DOS retired, as he puts it, now permanently resident in SM.

During the slightly less great opening of 7 September the UK men once again were heard pounding in, notably from South Yorkshire, with heavy competition from Germans and Dutch, who are a lot nearer.

For a year John Attlee has been negotiating with the SM licensing authorities to obtain a ticket. With the 8-over-8 at 150ft he is ready to go on 2m when the green light shines. Meanwhile, friends can write to him at Strandgatan 50B, 216 12, Malmo.

As for the opening itself, over now for a brief survey to . . .

Tropo round up

One characteristic of the 6 October opening was the great strength of the OZ7IGY beacon at the top end of 2m, sufficient for Ron Ham, BRS15744, to play it over the telephone to those who had not heard it.

For newer licensees the opening helped lift many countries-worked scores, even though a patient wait in the queue was called for, eg G8FAY in Sussex first heard OZ9OR at midnight, worked him at 4.30am.

Many members report once again the fallacy of the statement, "If you can hear them you can work them," which is not applicable on vhf, where big local signals are not removed by skip as they are on hf. The heavy overlay of QRM prevented many UK operators from working the super-dx of OK, OE and SM that was coming through. But G2UN in Worcestershire, showing what could be done by skilful use of cw, selected DM and SM as two localities he needed from the prevailing super abundance, and worked them *with 2½ W to a BLY33.*

Bexley's Bob Holmes, G6RH, was one of those who collected OE and OK on the key, plus nine Swedishmen, but noting some of the wildcat operating tactics he warns: "I still feel strongly that vfos should only be used within the 2m zones, otherwise we are going to find ourselves in a similar position to the hf bands, the dx station being blotted out by the hordes calling him all round his frequency, most overmodulating in the excitement of the moment, and further blocking a portion of the band. Let's keep vfo vxo for (*a*) the cw section 144·0 to 144·15 and (*b*) your own zone to get out of the QRM."

We would add that some of the Continentals could set an example by spreading out a bit: F5NS was an admirable instance, parked right at the top end of 2m during the tropo lift.

Many observers commented on the shift in the axis of propagation over the 6–7 October phenomenon, eg G6RH found it all-Scandinavian and Central Europe on the 6th, none on the 7th, all central France by then, with a vast signal from F5SE of Reims. This station, reports G2UJ, is said to have 1·2kW *output* (or is this erp?) and Bert Allen wonders if any of our French members could tell us what the legal limit is on 2m in France. Certainly in Sweden they go up to half a kilowatt and more.

Down at Weston-super-Mare G2WS found plenty of evidence of skip or critical distance effects as the tropo began to influence 432MHz. At times Continentals were heard in the west when they were inaudible to stations like G8BBB in the east (another manifestation of the GI8AYZ one-way-stretch phenomenon?). As for 23cm, any evidence that the tropo opening extended that high would be welcome: G2WS heard G8BBB on 1,296MHz at a range of 160 miles but could not force his low-power 23cm reply quite that far east to make a two-way of it. So the question is: How high does tropo go, frequency-wise?

Reference to skip effects on 2m brings us to . . .

Check your log for 24 May

On 24 May some remarkable Sporadic-E contacts were made on 144MHz, exemplified by long hauls from south and west France into Austria, Yugoslavia, East Germany and Hungary, *but none from east France.*

As a member of the REF Scientific Council in charge of investigations into long distance vhf phenomena, F8SH is making a detailed study of the events of 24 May, and would specially welcome reports from UK stations with extracts from their logs of any dx worked that day. It seems, he says, that the Sporadic-E area responsible for the propagation of 24 May occurred near the Briesach ionosphere sounding station. He is hoping to receive some ionograms from it to assist the research. He is also trying to connect the "E" with a low pressure area which gathered over Western Europe at the same time.

Write direct to S. Canivenc, F8SH, 6, Rue de Pont-Hélé, 22 Perros-Guirec, France. If you have not worked him on 2m you will know of him in a related context: he is beacon keeper for F3THF.

The 'AZU sorties (more to come)

When foul weather teemed down outside and conditions were all too normal, many 70cm men have been heartened by the appearance on the band of G8AZU/P. An idea of the extent of Brian Coleman's activities may be had from the following list of places visited since the middle of last winter: Huntingdonshire, five times; Oxfordshire, 10

times; Merioneth and Devon, three visits each; Bedfordshire, 20; Berks, five; Worcestershire and Hampshire, one each.

"These trips were not intended just to feed county chasers but to help towards generating regular activity on 70cm," says 'AZU. He adds the welcome news that the /P activity will continue throughout the present winter, generally on Sunday mornings from 9am to noon. Those involved will be G8AZU, G8APZ, G8CIT, G8DKH, with assistance from G8AMG and G3YCQ.

The group is prepared to travel several hundred miles to put a station on the 70cm air, and will pop up unannounced from some counties rich and rare. This way, the members feel, the man who comes on to 70cm frequently stands the best chance of making contact with the team.

Back on board

After a spot of shore leave, Richard Constantine has rejoined mv *Esso Inverness* on the Fawley-Scotland run, and has reactivated G3UGF/MM on 2m. Many people looked out for him after our previous reference to his activities, and in his first month of operation he managed 80 contacts, even though most of them, as he says, were into the back of other people's beams, until the value of turning them seawards became evident.

Sometimes G3UGF/MM finds that he is beaming into a cliff coastline, but ". . . even if I am in a poor location I only have to wait about half an hour to find that I have 'removed', as it were."

Skedspot

Since acquiring G4AGQ, Pat Billingham of Barnsley, one time G8AAC, has extended operations to 4m. He seeks schedules, A1 or A3, on 4m (two channels available), 2m (vxo anywhere in the band) and 70cm (433·62MHz). Write to him at 2, St Andrew's Way, Ardsley, Barnsley, Yorks.

Five times a week G3HCW in South Yorkshire and G4CG in North Devon keep a 2m telegraphy schedule over a difficult 220-mile path that gives fairly constant low signal communication in normal conditions but curiously seems unaffected by "lifts". By contrast, even the longer G3HCW to G3IUD (The Lizard) schedule does require a "lift" for success. The HCW-CG link-up is 7 and 10pm clocktime Monday, 10 pm Wednesday, Sunday, 1030am Saturday, low end of 2m.

Look at the top end of 2m any weekend (unless weather really does not permit) for GM8BRM/P or mobile, in Aberdeenshire. For many across the border he has been "first GM to be worked", often as a result of his consistent /P sorties to high places. From home on 6–7 October he was "first GM ever" to a large batch of Eu-men (he worked 10 Danes and 20 Dutchmen, that opening).

Cut the waffle

Enough ridicule has been poured upon the use of the royal plural on 2m phone to drown the practice completely. Yet it persists, as does long-winded waffle.

More conciseness does not necessarily imply that amateurs should base their radio speech processes on those to be heard from the professionals, exemplary though these undoubtedly are. It *does* imply that there is a need for constant care to be exercised in phraseology used over the air, and a realization that banal clichés develop from force of habit, fostered by poor example. Newcomers to 2m hearing fatuities over the air mistakenly assume that these are the common coin of communication and should be emulated.

Certificates issued

On the agenda for the October meeting of the VHF Committee was an unusually varied group of claims for RSGB Four Metres and Down Certificates, including the third ever 2m Mobile Award to G3ISX/M, who collects Certificate No 226, and *two* 432MHz Portables, No 77 to G8CKX/P, George Elks of Derbyshire, and No 78 to G2WS/P, Bill Scarr of Somerset, both well known for galvanizing life into the band outside of contest times when things might be expected to be quiet. And Colin Westwood appeared twice in a portable context: as EI2VDE/P he receives 70MHz Certificate No 86 and as G(GW) 3VFD/P he acquires one of the rare and coveted 70MHz Seniors. His is only No 9.

Equally rare is the issue of a 70MHz Listener's Award. Consistent work on 4m and the friendly co-operation of ready QSLers brought to BRS24450, Wilf Hodkinson, Certificate No 4 in this class.

Other ratifications were: 70*MHz Transmitting*, No 87, G3VFD; 144*MHz Transmitting*, No 220 G8CJO, No 221 G8DML, No 222 G8DAW, No 223 G8DKF, No 224 G8EGS (Paul Brown, of Kettering, is now G4AJE), No 225 G8CKV, No 227 G8EBI, No 228 G8ENL, No 229 G3SRX, No 230 GW8AZU/P.

The cards submitted by GW8AZU/P covered one 24-hour period of the May contest by a four-operator station at 2,720 ft near Bala using 4W to a 2N3632.

In addition to making the above ratifications, the VHF Committee had before it at the October meeting a claim which may fairly be said to establish another piece of amateur radio history . . .

First Microwave Award

The first application for an RSGB Microwave Operating Award under the rules published here last May was received from Dr Dain Evans, who, when operating as GW3RPE/P in the Prescelly Mountains on 25 September, worked G3ZGO/P on Dartmoor over a QRB of 154km in the 3cm band.

In addition, G3ZGO, Robert Skegg of Acton in West London, will be entitled to claim a similar award if his contact with GW3RPE/P was the first he had made on 3cm beyond the 150km range. And so will G8APP, M. J. Aylward of Harrow, who on the same day also worked GW3RPE/P on 3cm beyond 150km, again from Dartmoor.

VHF/UHF Distance Records

Band	QRB	Date	Participants
2·3GHz	100m	11 May 1969	G3EEZ/P, G3BNL/P
3·4GHz	54m	11 Sep 1969	G3EEZ/P, G3BNL/P
10GHz	95½m	25 Sep 1971	GW3RPE, G8APP/P
70MHz	1,090m	9 June 1968	G3HBG, ZB2BO

Claims for distance records established on all bands from 70MHz upwards are invited and will be included in this table until bettered.

The five Microwave Operating Awards may be claimed for:

The first contact to be made on 13cm over 500km;
The first contact to be made on 9cm over 400km;
The first contact to be made on 6cm over 300km;
The first contact to be made on 3cm over 150km; and
The first contact to be made on 15mm over 150km.

Claims, supported by QSL cards on which the QRB should be stated, should be sent to G5UM.

Tech Corner

From G4AGQ (Pat Billingham of Ardsley, Barnsley)
Two small tech-points bearing upon recent comments in FMD:

1. Modified commercial transmitters: I feel that many of the poor signals on the 2m band are not due to operating in a different frequency area from the one the rig was designed for, but to misguided attempts to improve the performance. I have operated a number of Rangers and have had favourable comments on the modulation. "How have you altered it?" has often been the question. The answer is: "I haven't."

On the other hand, if the device was originally a 20W transmitter I do not attempt to make it a 30W transmitter: I still run it at 20W. Mullard recommend 20W in to a QQVO3/20A at 300V with 11W to the load. This is what I get.

2. Crystal frequencies: I should like to emphasize a point which has been made before about checking one's own frequency by measurement rather than relying on what is stamped on the crystal. I have three crystals for 4m, all of which in their fundamental mode produce signals at the nominal frequency. The transmitter uses them in their third overtone. The results are: 7.806 FT243 delivers 70·268 MHz, 7.810 FT241 delivers 70·158MHz, 7.840 FT243 delivers 70·560MHz. The middle one should come out in theory at 70·32MHz. I hear a number of stations quoting their frequencies anything up to 100kHz away from their radiated frequencies on 2m.

From GI8AYZ (Ian Kyle, of Ballymena)
In preparing equipment for 70cm expeditions, some work has been done with dielectric tuning for output circuits of 432MHz transmitters. Initially a 3/20A tripler was used, delivering 4W output. Later, a pa was added to deliver 7W, design as RSGB *Radio Communications Handbook*, but dielectric tuning modified as follows:

Best results with dielectric tuning were obtained by inserting the dielectric between the anode pins, or as close to them as possible. Lines should be quarter-wavelength, adjustable. At normal power levels ordinary polythene is quite satisfactory as a dielectric at 432MHz. The increase in output obtained by substituting ptfe at about 12 times the price is not worth having, in my case only a 5 per cent increase, unnoticeable in a distant QSO.

I have, on the suggestion of G3LTF via G3VPK, tried glass. It certainly provides more frequency swing than polythene but is more awkward to handle.

I get my polythene from a textile accessories agent, who carries "picking pieces" for Northrop looms in hard white poly. A slice off the broad flat side of one of these is what is required.

25 YEARS BACK

"It was reported that the GPO had again been pressed to release frequencies between 60 and 500 Mc/s but to date no decisions had been reached". —*RSGB Bulletin*, November 1946, reporting the October Council Meeting.

Here and there

Only 16 copies of the VERON callbook giving PA0 callsigns now remain to be sold. Price 50p including postage from G5UM.

* * *

Who makes nylon nuts and bolts? We have been given the name of R. A. Marsh, 29 Shelbourne Road, Stratford on Avon, Warwickshire, who can supply in 2, 4 and 6BA sizes, as well as brass nuts and bolts and some other hard-to-get bits and pieces, says BRS31892, of Greenock.

* * *

More family affairs: G8AIF (father) and G3XEB and G8ERW (sons) share the same QTH at Brookmans Park in Herts. From Bournemouth Dr Robert Scott, G6TS, keeps a 2m sked with his son G3LYP at Marlow. At Ely in Cambridgeshire G8EBI, who put in for his FMD Two Metre Award after just a year's operation, now shares the radio room with daughter G8FDE, who, he says," . . is rapidly making contacts local and dx, and she should make the necessary five plus 30 quicker than me."

* * *

Regarding claims for FMD Awards, send your applications, or your application for application forms, direct to G5UM. Not to RSGB HQ.

* * *

One thing leads to another . . . G8FDE on the air takes care to announce her location, appreciating that nobody will know it until it appears in the RSGB *Call Book*. Portables and /A operators should do the same, to help listeners align beams on signals of an otherwise unknown source. Clause 9 (4) of the licence requires this to be done every time a QSO is set up, or every 15 minutes, whichever is oftener.

* * *

"Mention in *FMD* of openings, Sporadic-E and tropo, makes our collective mouths water here in Cumberland, where we six on the coast are screened by the mountains behind us. One of the local 2m enthusiasts says there was one 4 to 5 years ago in West Cumberland! However, we enjoy our /P operating regardless of the weather"—G8DML.

* * *

A small stock of QRA Locator maps for France is now held at RSGB HQ and may be had for 47p each, in tube post paid.

* * *

"What some non-RSGB members must spend on direct QSLing would pay their subs easily. Saying 'The sub's too high for what you get' and spending as much or more on postage seems to me to be cockeyed logic as well as cockeyed economics, but some folk are dead odd anyway"—GI8AYZ.

* * *

"Pye telecoms van bristling with aerials and carrying an FMD registration . . ." said an item here last month.

Actually, Pye tells us, its vehicles are permitted to carry only *one* aerial. Sorry, friends. But it *was* a nice number-plate!

* * *

"During the LX trip we found our 144·2 frequency tripped a German fm repeater near that channel that didn't object to a.m. So there we were, talking to low-power Aachen amateurs who heard us repeated on 145·8!"—G3BHT.

* * *

"I would like through *FMD* to prick once more the consciences of the many so-called *nb* fm operators with signals as wide as barn doors who continue to obliterate large sections of the 2m band for their semi-local neighbours" . . .G3WZT.

A simple tunnel diode tester

by M. Centore III, WN2MQY*

UNLIKE most ordinary diodes, the condition of a tunnel diode cannot be checked with an ohmmeter. And with the ever increasing number of projects employing these devices, the need for a simple tunnel diode tester frequently arises.

The circuit diagram for such a tester is shown in Fig 1. With it, it is possible to test, compare, and even identify any of the common "experimenter" type tunnel diodes as well as most other types

To test a tunnel diode with this circuit, first set the variable resistor (bias control) to its maximum-resistance position. (This means that its wiper will be set towards the extreme connecting lug where the positive battery lead is connected.) Then connect the diode observing polarity, as shown. Next, turn up the bias control very slowly while observing the meter. A good tunnel diode will have a conduction characteristic similar to the one shown in Fig 2.

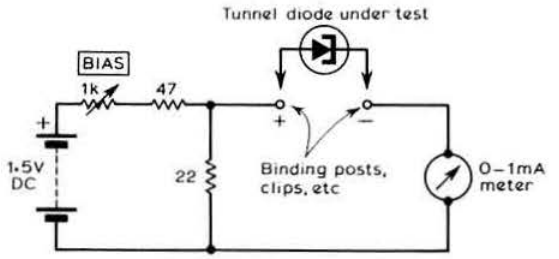


Fig 1. The tunnel diode test circuit. The power source may be a standard 1·5V cell. While it is convenient to build the circuit directly on the variable resistor's connecting lugs, a more permanent version can be built into a small container. In this case, an on-off switch should be wired in series with one lead from the power source

On the graph, the major points of comparison are numbered consecutively, in the order in which they will appear as the bias control is turned up. As shown, first there will be a gradual increase in current (point 1) as bias is increased. Then a peak current point will be reached (point 2). This peak current will drop quite suddenly, however, with only a small increase in bias. This (point 3) is the diode's negative-resistance region. As more bias is applied to the diode, its valley current region (point 4) will be reached. Finally, the tunnel diode will go into full forward conduction and current will increase rather quickly (point 5).

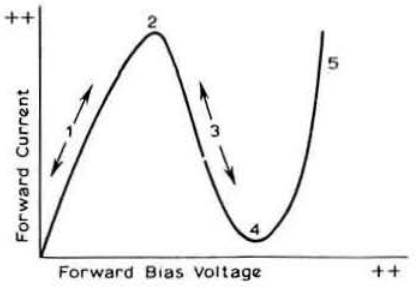


Fig 2. Typical tunnel diode conduction characteristic when forward-biased

The most useful tunnel diodes have a large negative-resistance region. Typically, a diode will have a peak point current of about 0·9mA and a valley current of 0·15mA, but of course this is by no means universal. By noting the peak (point 2) and valley (point 4) current values of various diodes, the best can be determined and sorted by characteristics. By comparing an unmarked diode's current values with manufacturer's specifications, it will be possible to identify the tunnel diode as a particular type. This is also useful when trying to determine the suitability of a junkbox diode for use in some project.

To test some of the more expensive high-current tunnel diodes, substitute a 0–10mA for the one specified (or simply shunt the 0–1mA meter). The author has found it very convenient to use his vom, which has many current ranges, as the indicating device.

You will find that the design of this circuit allows the tunnel diode to be tested with surprising accuracy. The use of low value resistors in the circuit regulates the battery voltage and allows it to be varied slowly, independent of the diode's current. Also, the tunnel diode requires a low-impedance dc source for proper operation in its negative-resistance region. This is provided by the 22Ω resistor.

* 33 Ferris Road, Edison, NJ08817, USA

THE MONTH ON THE AIR

A monthly feature by John Allaway, G3FKM*

THE remarks made in September *MOTA* concerning the apparent lack of interest shown by UK amateurs in contests and international dx activities have not produced any answer to the problem. Most letters received have been from those who dislike contests for one (valid) reason or another. Your scribe's sympathy goes to one correspondent who has decided that contests are no longer for him since he was threatened by a neighbour who was wielding a broken bottle and threatening to use it unless his television picture stopped moving! The tragedy of such events is that they could be largely obviated if only British television manufacturers were required to follow the standards set in the USA in taking reasonable precautions to see that their products were not designed to be so susceptible to unwanted signal reception.

Study of the results of the 1970 TOPS CW contest shows that of the total entry of 199 only five were from the UK; and January 1971 *QST* contains a list of DXCC certificate holders, just over 100 of whom are in the UK and over 300 in Germany. The number of licensees is roughly the same . . .

News from overseas

Peter Eggleton (formerly G3XMQ/MP4BHF) is at present stationed in Cyprus and has been given the call ZC4PE. If all goes well he will have a 5B4 callsign to use from Famagusta early in 1972. Pete's address will be found in *QTH Corner*.

M. B. Tunau, G8FAO, is trying to get his Class A licence before returning to his native Nigeria. He will be stationed in Kaduna or Lagos and hopes to have his 5N2 licence before long so that he can be active on 14MHz.

On The Air reports that there are three "amateur" stations aboard the pirate radio ship which transmits "Radio Nordzee International". These are HB9APU/MM, HB9AVQ/MM and HB9AXP/MM and all are said to send out QSL cards via PO Box 1136, 8047—Zurich, Switzerland.

JX2HK has returned to Jan Mayen and hopes to be very active from October onwards. To date he has had about 4,000 contacts, and he is hoping to reach the 10,000 mark before his departure in June 1972. The equipment he uses consists of a Drake TR4 transceiver (with an R4B for cw working) and an SB200 linear amplifier. His aerial farm includes a tri-band Yagi for 14/21/28MHz and dipoles for 3·5 and 7MHz. Some experimental work is taking place on a vertical trap dipole for the lf bands and Petter later proposes to operate a crystal-controlled transmitter on 3,501 and 7,004 kHz into a 140ft vertical. Other active Jan Mayen amateurs include JX1AK, JX3DH and JX5CI. QSLs are dealt with mostly via the bureau, but a few go by direct surface mail via the Norwegian Embassy, Reykjavik, Iceland. There is no contact with the outside world between December and the end of April. It seems that there have been quite a number of other licensees on the island in the past who have not QSLd and Petter points out that anyone wishing to trace the home QTH of any JX station has only to replace the JX prefix with LA and look up his address in Norway. The club station, JX3P, should be more active soon, and will QSL direct if provided with SAEs and four IRCs—the surplus IRCs will go to the Norwegian Sick and Bedfast Club.

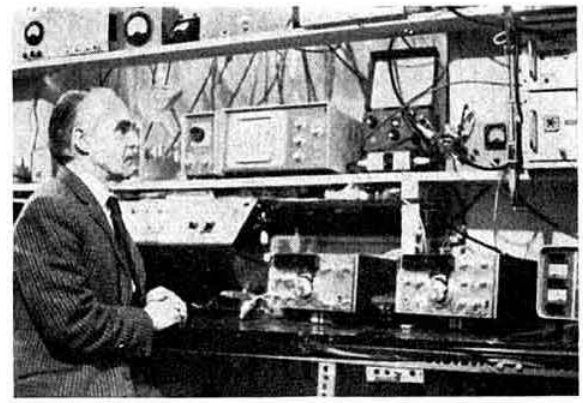
Keith Orchard, G3TTC, who is with the BBC on Ascension Is, has been issued with the callsign ZD8KO. He has a KW2000B transceiver and V3Jr vertical for use on 14, 21 and 28MHz, but is hoping to improve the aerial set up soon and also to try the lf bands. He will be on Ascension for one or two years and will QSL via the bureau or direct to those sending one or two IRCs to the address in *QTH Corner*.

Robin, G3RWN/MP4MAW/MP4BFH, has reappeared on the air from Grand Turk Is as VP5RF. He is active on all bands (except 160m) and favours cw near the low edges of the bands—on 3,503, 7,007, 14,007 and 21,007kHz particularly. Working into Europe tends to be difficult as there is much QRM from the USA, however Robin hopes to have a beam soon which should help in this matter. At the time of writing, VP5RF was the only active VP5, but VP5NV should be on the air by the time this is read.

Slow-scan television

G5ZT has now worked about 50 USA stations, ZL1s DW and AOY, KP4GN, 6Y5PB, HK6DEH, 4X4VB, and a number of Europeans on 14,230kHz. He uses a Robot camera and monitor together with Trio TX599 transmitter and JR599 receiver.

QSOs which are believed to be "firsts" in their respective categories include those with W4TB and FG7XT on 21MHz (on 1 and 15 May respectively) and with KP4GN, KL7DRZ and VK6ES (the first two on 31 May, the last a 40min QSO on 23 June). Pictures have also been received from 9V1PW and YV2BC.



G5ZT, of Plymouth, is using this array of equipment to establish world-wide slow scan tv pictures (see text)

* 10 Knightlow Road, Birmingham B17 8QB.

Top Band news

ARRL Bulletin No 340 says that the frequencies available to Canadian amateurs have been changed to conform with changes in the Loran service. Changes are greatest for the west coast VEs who gain privileges in the lower half of the band including permission (on a case by case basis) to use 200W during darkness and 1KW in daylight in the 1,800—1,825kHz segment.

The October issue of the W1BB *160m DX Bulletin* is looking forward to a winter of exciting conditions on the band. K1PBW is reported to have a new 133ft vertical aerial which has 80 260ft radials! The details of the forthcoming winter's transatlantic tests were given in last month's *MOTA*, but Stew wonders whether these events have now outlived their usefulness as so many improvements have been made in equipment and aerials that transatlantic contacts are nowadays not too difficult. Readers' views and suggestions would be welcomed by W1BB (Stew Perry, 36 Pleasant St, Winthrop, Mass, 02152, USA). The writer's personal opinion is that there are many who have modest equipment and aerials who would still like to work their first 160m dx station and who are helped by organized tests.

DX news

W9SZR and K7CBZ (formerly HS5ABD and HS3DR/HS4ABM respectively) are at present in Vietnam and are using the valuable experience gained when they were in Thailand to try to get amateur licences issued and approved. Both were officers in STAR (the Thai national society) and were instrumental in the return of HS stations to the air and the equally important removal of the ITU ban.

CR8AJ has now become CR5AJ following a short stay in Portugal. He has an Eico transmitter which has 60W input and his aerials are dipoles. At present activity is confined to 14MHz as the transmitter coils for 21 and 28 MHz are damaged, and only two crystal frequencies are available—14,000 and 14,013kHz. Operating times are 1900 to 2400 daily, with occasional sessions from 0600 to 0800.

VK3UV/9, located on Bougainville Is in the Solomon group (although part of the Territory of New Guinea), was due to close down in early October. ZM7AG on Tokelau is expected to QRT about 9 Decoober.

W1YRC reports the receipt of cards for YB0AAO, KF4SJ and 3C0EG but he is not QSL manager for these stations. He is able to QSL for 6O1GB, 9X5AA, 9M8FME, VK9KS, CT2BD and EP2TB.

9K2BQ is active on all bands 3·5 to 28MHz and has a sked with his QSL manager JA1ZZ at 1400 on Tuesdays on 14,175kHz. He is JA1BIN and will be in Kuwait until late 1972.

More peculiar USA prefixes have been heard recently—WD4ARF (National Convention of Christian Churches, Louisville), WE9UCI (Union county, Ind.), WM3ARW (amateur radio week in Pa.), KF2NYS (NY State Fair), and WS1OCF (Orleans County Fair, Vt).

Stations in Czechoslovakia will be using the OM prefix between 1 October and the end of the year to commemorate Army Co-op Union 20th Aniversary.

Official Bulletin No 341 from ARRL announces the addition of Annobon Is to the DXCC Countries list. QSLs for Annobon contacts may be submitted for credit starting 1 October. The QSLs for 3C0AN should have been delivered

Richard, F2QQ, and Tony, Z1IJ, operating ET3ZU/A (see Dxpeditions)

to OH2BH early in October and should be being sent out by now.

It seems that AC5TY's callsign is being pirated. Yonten indicated to one of *West Coast DX Bulletin*'s correspondents that he had no phone equipment, however he is said to have been heard on a.m. and someone using the call has been heard by the writer on ssb.

DF work from Japan suggests that BY3NK and BY3NS are located in the Canton/Kwantung area and the stations have been heard working each other. It is reported that there are unpleasant consequences awaiting anyone in Taiwan found listening to mainland Chinese radio stations and therefore there is reluctance on the part of BV amateurs to use 15 or 40m on account of Radio Peking's frequencies in these two bands. There are now over 200,000 amateur stations in Japan!

It is not known at the time of writing whether the operation of VE7IR/XU from the Khmer Republic was fully authorized by the Khmer authorities. However, some sources say that the latter sent a cable to the USA confirming the fact that this was so. There is a possibility that the ITU have also been notified that XU amateurs may contact the rest of the world. *DX News Sheet* says that VE7IR's equipment may be left

Keith Kahn, G3RTU (4Z4IX), president of the Israel DX Club, took over the controls at the club station 4Z4HF during the 1970 WAE Contest. The equipment shown was the 20m station

behind for use by XU1AA, the Phnom Penh University ARC. XU1VS is a member of the Telecoms Dept, and XU0AL and XU0DR are said to be HS5ABD and K7CBZ respectively.

F0NA has been on the air from the Space Launch Centre at Kourou (French Guyana) and should continue to operate from FY0NA until 10 November. QSLs submitted to the address in *QTH Corner* accompanied by IRCs will be confirmed in an envelope bearing a special stamp celebrating the Europa II F11 satellite launching on 5 November.

The station currently using the callsign TL8GL is a pirate. The genuine owner of the call is now OD5GX and left the Central African Republic in 1969.

CARS Newsletter says that there are now three legal 5B4 callsign holders. These are 5B4ES (the English School ARS, Nicosia), 5B4IS (Ivan Stauning, who is with the Danish UN Force), and 5B4OH (OH3IS, who is with the Finnish UN Force). It seems that the last two should more correctly sign as 5B4UN/IS and /OH respectively.

G3NLY reports the arrival of QSLs from FR7ZU/E after a two and a half year wait. They arrived via F9MS who appears to have the necessary logs.

ZL4JF/A left Campbell Is en route for New Zealand on 28 September. ZL3PO/C has been received well on 14MHz ssb instructing callers to call off his own frequency and proceeding to work only those who call zero beat!

Since last month's *MOTA* appeared, a change in QSL manager for the Kure and Midway Is expeditioneers W7UXP/KM6 and W7UXP/KH6 has been announced. Cards should be sent via KH6BZF (see *QTH Corner*) and not to KH6HCM.

5Z4MO will be active on the LF bands on 13 November as follows: 1900 to 2000 on 7,088kHz (+ or − 2kHz), 2000 to 2100 on 3,795kHz (+ or − 5kHz), and afterwards he will go to 1,815kHz and listen for replies on 1,820kHz. He has a 250ft inverted-V aerial 90ft high at its apex.

Awards

The Sesquicentenario Independencia del Peru Certificate
This is being issued by the RCP to commemorate the 150th anniversary of Peruvian independence and will be awarded to those who contact at least three Peruvian (OB) stations between 1 July and 31 December 1971. Stations in the American continent need 15 QSOs. Applicants should send a certified list of QSLs (by two licensed amateurs or an awards manager of an IARU society) accompanied by 10 IRCs to: Radio Club Peruano, Comision de Concursos y Certificados, PO Box 538, Lima, Peru. Listeners are eligible for the award on a "heard" basis.

The All Capitals Award (ACA)
For contacts with capital cities since 1 January 1968. Classes of the award are as follows: Class 1, 50 capitals in six continents; Class 2, 40 in four; Class 3, 30 in three; and Class 4, 20 capitals. Only the actual capital counts—eg UA, UB, UC etc must be Moscow, all the UK is London. A certified list of QSLs plus seven IRCs should be sent to DL9OT, Hans Kriegl, 38 Schubertstr. 7505 Ettlingen, Germany. There are two-way ssb, cw, and mixed mode, but no band endorsements are available.

The Battle of Carabobo Award
Issued by the Radio Club Venezolano, PO Box 510, Valencia, Venezuela, to commemorate the 150th anniversary of the battle which decided their country's independence. Five contacts with stations in the YV4 area before 31 December are required. YV4 stations will be using the 4M4 prefix and lists of QSO details plus eight IRCs should be sent to the address above. The award is also available to listeners. All applications must be received by 31 January 1972.

The DVQ Award (Diplome de la Ville de Quebec).
For three contacts with stations in Quebec City since 1 January 1948.

The 10 × 10 Award
For 10 QSOs with VE2 stations on 10m since 1 January 1948. Both this and the previous award are issued by the Radio Club de Quebec, PO Box 382, Quebec 4, Que, Canada, the DVQ Award costing three IRCs and the 10 × 10 10 IRCs. Certified lists of QSLs should be submitted with applications.

On 30 November Barbados celebrates its Fifth Independence Day and from 28 November to 4 December a special certificate will be available to all stations working two island stations on all bands. Send the equivalent of $1 or 10 IRCs to 8P6DT or 8P6BIC/5, Box 814E, Bridgetown, Barbados. All Barbados stations will carry the suffix /5 during the six days.

Marconi's 70th Anniversary

The Society of Newfoundland Radio Amateurs is commemmorating the 70th Anniversary of the reception of the first transatlantic wireless message at Signal Hill in St Johns by activating a station with a special callsign—VB1MSA—for the rest of 1971. It will be operated by the society's president, John Tessier, VO1FX, on all bands and special QSL cards have been printed. The Cornish RAC will be operating GB3MSA from Marconi's original transmitting site in Poldhu during the same period. GB3MSA and VB1MSA will operate continuously between 11 and 16 December. SONRA is issuing a special certificate to those who contact both stations during this period. VB1MSA QSLs should be sent to VO1FX, PO Box 1462, St Johns, Nfd, Canada, or via the bureau.

Contests

The Austrian 160m Contest

1800 13 November to 0400 14 November.

CW only. Stations exchange RST plus three number serial (starting from 001), and *this must be repeated by both parties in the contact*. Contacts count one point and multipliers are two for each OE prefix worked, and one for each other different prefix. Stations may only be worked once. Frequencies permitted to Austrian amateurs are: 1,823—1,838kHz, 1,854—1,873kHz and 1,879—1,900kHz. Logs should show date, time, frequency, callsign of station worked, number given, number received, if multiplier, points. Logs should be accompanied by a description of the equipment used and a declaration that all conditions were fulfilled. Top scorers in each country receive a pennant and a diploma. The contest is open to listeners who may only log the same station for three consecutive QSOs after which five other contacts must be logged before it appears again. Logs go to Contest Committee of OVSV, c/o OE6CM, Pestalozzistr. 5, A-8605 Kapfenberg, Austria, before 13 December. A number of rule sheets are available from your scribe.

1971 Countries Table

	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total
G3YHB	—	15	32	115	107	35	304
G8VG	1	17	40	41	61	28	188
G3YWX	—	14	19	86	26	—	145
BRS27263	—	90	77	206	143	95	611
BRS25429	—	119	102	168	124	73	586
BRS27880	6	41	43	98	99	50	337
A7082	8	28	48	94	100	17	295
BRS30694	5	9	17	69	60	35	195
A7681	5	28	14	67	45	—	159
A7511	2	36	14	28	6	—	86

The URE Contest

2000 11 December to 2000 12 December.

CW only. All bands 3·5 to 28MHz. Stations exchange RST plus serial QSO number (starting from 001). Object is to work as many Spanish stations as possible, each QSO being worth one point. The multiplier is the number of different Spanish districts worked on each band totalled together. Contestants call "CQ EA". Logs should be set out in the usual way and be accompanied by full details of equipment and signed declaration that all rules have been obeyed and that the decision of the URE Contest Committee will be accepted. They must be posted to reach URE, Concurso International CW—1971, PO Box 220, Madrid, within one month of the contest.

The TOPS CW Contest

1800 4 December to 1800 5 December.

CW only, all bands 3·5 to 28MHz. Call "CQ TAC" or "CQ QMF". Contacts with own country count one point, with other countries in same continent two points, and with all others three points. Each call area in the USA, Canada, Australia and the USSR counts as a country. Total score is total QSO points multiplied by the number of *prefixes* worked. There are single or multi-operator categories. Logs should be sent to: Peter Lumb, G3IRM, 22 Hervey Rd, Bury St Edmunds, Suffolk, before 11 January. The 1970 event attracted 119 entries in the single operator category—the overall winner was **OK2BHX** (47,846 points) and top UK station (world third) **G3KMA** (38,626 points). Other UK entrants were G3ESF (10,945), G3IRM (1,825), G3JFF (704) and G3BGH (506).

Dxpeditions

Rumour has it that Aldo, ET3ZU, is considering an expedition to the Kamaran Is (formerly VS9K) early in 1972. The second ET3ZU/A trip made over 7,000 contacts and appeared from the UK to have been a highly successful event.

There is a possibility that Garth, 5H3LV, may operate from Zanzibar again in late December.

W2BBK and W9IGW will be in the Caribbean area during November. Their itinerary anticipates starting on 3 November from French St Martin as FG0GD/FS7, then a few days from Anguilla as VP2EF and VP2ES, followed by a spell from Sint Maarten as PJ8AA until about 12 November. They use cw and ssb and favour frequencies 30kHz above the band edges.

The African expedition by DJ6QT should be under way by the time this reaches readers. Walter should be in Dahomey (TY) on 5 November, Ivory Coast (TU) on 8 November, and Mauritania (5T5) on 10 November. He will then go to Madeira until 27 November. Favoured frequencies are 3,795, 7,085, 14,185, 21,285 and 28,585 kHz. All QSLs should go to DJ6QT with sae and two IRCs.

QTH Corner

CR5AJ	H. G. Torres, PO Box 68, Sao Thome.
DJ6QT	W. Skudlarek, 6471 Hirzenhain, An der Klostermauer 3, W Germany.
F0RT/M	via W2GHK, Box 7388, Newark, NJ, 07107, USA.
FM0NA, **FY0NA**	Edgar Dombrowski, BP 107, Kourou, French Guiana.
G3BID/LX, **HB9XHR/M**, **HB9HXR/M**	via W2GHK (see F0RT/M).
HS0UDN	STAR, Box 2008, Bangkok, Thailand.
JY6AAM	Box 2353, Amman, Jordan.
KB6DA	(see VR1W).
KG6SW	via W7YBX, R. Linkous, 5632 47th Av SW, Seattle, Wash, 98116, USA.
KS4DX	via INDXA, PO Box 125, Simpsonville, Md, 21150, USA.
KW6HB	Box 96, Wake Is, 96930.
TJ1AW	now via K4MPE, P Coley, 3208 Yanceyville St, Greensboro, NC, 27405, USA.
VK9JV	via JA2KLT, Y. Maruyama, Shinozuka, Kozakai, Houigun, Aichi, Japan.
VP1BH	via VE2AKZ, 101 Livingston, Pointe Claire, Que, Canada.
VP5RF	via G3RWU or c/o Cable & Wireless Ltd, PO Box 78, Grand Turk, Turks & Caicos Is, BWI.
VE7IR/XU	via VE7BWG, 488 East 4th St, North Vancouver, BC, Canada.
VR1W	via W6CUF, James Maxwell, Box 473, Redwood Estates, Calif, 95044, USA.
W7UXP/KH6, **W7UXP/KM6**	via KH6BZF, 45-601 Luluku Road, Kaneohe, Hawaii, 96744, USA.
XU1VS	via JA1KSO, Nobuyasu Itoh, PO Box 7, Aobadai, Yokohama 227, Japan.
ZC4PE	Cpl P. R. Eggleton, 33 SU, RAF Ayios Nicholaos, BFPO 53.
ZD8KO	K. M. Orchard, c/o BBC, Ascension Is, S Atlantic.
3D6AX	via WA5IEV, 5642 Marcia Av, New Orleans, La, 70124, USA.
5V4JS	via 5N2AAJ, J. Browne, PO Box 794, Lagos, Nigeria.
7Q7LA	via K4CDZ, F. W. Ashworth, RFD 2-Box 353, Lewisville, NC, 27023, USA.
8R1U	via VE3GMT, J. Reed, 82 Acton Av, Downsville, Ont, Canada.
9K2BQ	JA1ZZ, Iwao Yamashita,, 21-5 Hiyoshi 1-chome, Kokubunji Toyko, Japan.
9K2YG	PO Box 341, Kuwait.

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

Jim, W6BHY, (formerly ZD8Z/9Y4AA) hopes to be on the air from the British Phoenix Is as VR1W in late October and early November. He is said to be intending to operate as KB6DA as well from the same QTH, but as the deciding factor as to whether operators on Canton Is use a VR1 or KB6 prefix appears to be the nationality of the operator it is difficult to see how he can use both! He could of course use KB6 on Canton Is and VR1 on other islands in the Phoenix group. Frequencies to be used are as follows: 3,505, 7,005, 14,035, 21,035 and 28,035kHz (cw) and 3,780, 7,080, 14,180, 21,280 and 28,580 (ssb).

PJ7VL, W2BBK and W9IGW, will activate FG0GD/FS7 for a few days starting 4 November. They will move on to VP2EF/VP2ES from Anguilla. Look for them 30kHz inside lower edges of bands.

Here and there

GM3OQY advises that, thanks to the co-operation of the MPT, he has been able to take over the callsign GM3UA which has been relinquished by his father.

G4AAN, the station of Nailsworth and District Radio Club, reports that following a contact with ZS6AWU a letter was received expressing interest in the club and offering a small sum each year towards its activities. ZS6-AWU has been made a "long-distance member" and G3MGF thinks that this may be unique.

It is noted that Australia, Canada and Trinidad have discontinued preferential postage rates to other Commonwealth countries. This means that in future it will be necessary to send IRCs (not CRCs) to these countries in order to pay for postage on a return letter. It is interesting to note that an airmail letter from Australia to the UK now costs

35c—the equivalent of four IRCs, this is twice as much as the cost of sending a letter from the UK to Australia!

G6PV wishes to point out that he is **not** a pirate! He is ex-G5LT and has held his present call since 1946; at present he lives in Sheffield.

Band reports

In spite of falling sunspot count and lengthening hours of darkness a satisfactory amount of dx has been reported on 14 and 21MHz, and even 28MHz has had occasional bursts of activity. Very good signals from New Zealand have been received around dawn on 3·5MHz and USA stations are now in evidence around the same time.

Many thanks to all correspondents and especially to the following: G2BJY, G2CDT, G3HB, GM4QK, G5JL, G6GH, G8VG, G3KWK, G3NLY, G3UKH, G3YHB, G3YWX, BRS2098, BRS17567, BRS25429, BRS27880, BRS30805, BRS32012, BRS32457, BRS32799, A7056, A7082 and A7681. Stations listed in italics were on cw, the rest on ssb.

3·5MHz. 0000 C31BY, UL7GW. **0100** JY8BI. **0300** FP0BG, 9E3USA. **0500** ZL3FZ, ZL4IE, ZL4JF/A. **0600** VE8RX, XE1IIJ. **0700** *K4BZH/VP7*, *YN1CW*, **2000** *OX3AU*. **2100** G3UML/4X4. **2200** EQ2FB, JY1, VOs. **2300** UA9BE.

7MHz. 0100 XE1IIJ (QSL via W2GHK). **0500** HI7JM (QSL via K3EST), PYs, TI, VK, *VP2LAM* (QSL via W7VRO), *ZL2LA*, *ZPs*, *ZS2RM*, *8P6DM* (QSL via W7VRO), *9Y4VU*. **0600** EA9AZ, *FM0IX*, FP0BG, *KL7HEE*, TG9GF, WA5KPL/HR1 (QSL to W5 bureau), *W7LK*, *UK0KAA*, *VP2GB*, *ZS1A*. **0700** *CT3AS*, ZL4JF/A (S9). **1900** 5Z4JJ. **2200** CR6TP, OY5NS, UI8LM, 7X2OM.

14MHz. 0600 FB8XX, *JT1AD*, KL7HCN. **0700** KS6DY, **0800** *VK9LV*, ZL3PO/C. **0900** *FY7AE*, *JW2IK*. **1100** KX6IQ, VR4CG, VS6DO, *9V1QA*. **1200** ZL1HA. **1300** KC6WS, KG6SW. **1400** AC5TY, HS0UDN, JY9EAC (QSL to SM5EAC), *UA0YAE*, VK3UV/9, 5B4OH. **1500** JT1AG, MP4MBM (Box 14, Muscat), VK9HB, VX9XK (Christmas Is), *VQ9SM*, 9N1JK. **1600** VK9JV (Papua). **1700** *TI9AA* (information needed), 4S7SW (PO Box 907, Colombo). **1800** KH6DQ, VE7IR/XU, YA2AG. **1900** *FB8ZZ*, KC4USV, 3W8D, *WB5EJH/9Y4*. **2000** 7P8AZ. **2100** *FM7WF*, M1I, VP8MM. **2200** TI8LH, ZD8AY (arranging 160m skeds). **2300** 5VZYH.

21MHz. 0800 *UA0YT* (Zone 23). **0900** *3B8DD*. **1000** AP2KS, DU1FH, HM1AQ, *KX6DC*. **1100** JY8BI, *KR8AE*, VK9s VJ, VM. **1200** *VP2AAA* (QSL to W4DQS). **1300** *CT3AS*, KG6JAR, VK9GM, VS6AM, XW8AL, YB2AY. **1400** FL8LM, KC6YL, VK9XK, 9M2BQ. **1500** CR3ND, HS1ABU, VS9MT, *SV0WXX*. **1600** A2CAB, KP4BCL/KS4, VQ9WES (QSL via WA3OTV), 4W1AF, 5V4JS. **1700** FH8CY, VP2ME, ZD8D, 9G1DY. **1800** KL7HDM/VE8, VP2AAA, VQ9MC, WA4OVP/8R1. **1900** KC4USP, *TG9RJ* (QSL via DJ9ZB), XX6FL (Luanda International Fair operator CR6FL), 5VZYH. **2000** CR4BV, FY7YG, TA1XY, W6/W7. **2200** VP2AA, 8R1J.

28MHz. 1200 *KR8CF*. **1300** 9J2s, 9Q5IA. **1800** CE2TB, KV4AD.

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

Please send all items for the **December** issue **to reach G3FKM not later than 15 November,** and for the **January** issue not later than **5 December.**

Propagation Predictions

At the beginning of November the F2 MUFs reach their maximum value in the northern hemisphere. This implies good conditions on both 28MHz and 21MHz.

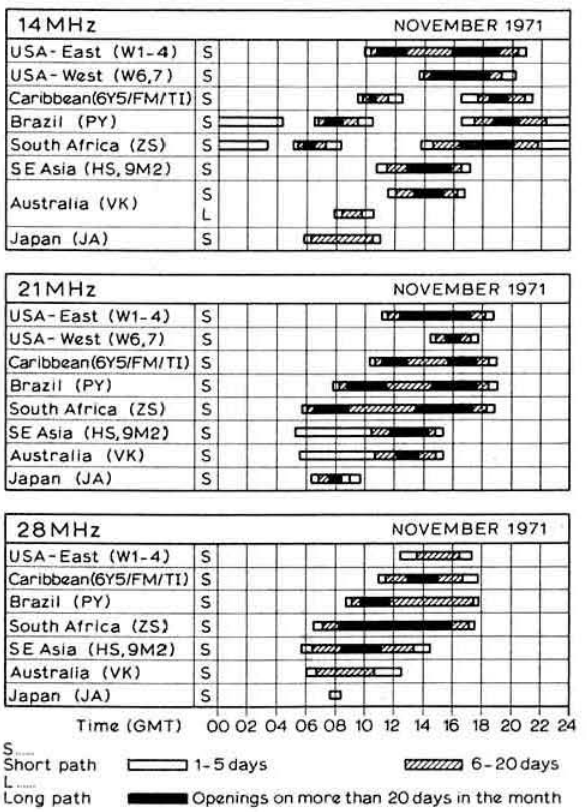
The present level of sunspot activity should ensure contact with the east coast of North America on **28MHz** for a few hours daily. The west coast will only be heard under exceptional conditions. Communication with Central and South America, South Africa, South and South East Asia should certainly be possible. Because of the winter season, 28MHz will close between 1700 and 1830gmt and reopen in the morning between 0600 and 0700gmt.

All continents will be workable on **21MHz** with certainty (except on disturbed days), including the west coast of the USA and Australia. On this band the mid-winter months will give opportunity to work dx via the long path in stable conditions, in contrast to the months of March and September. Towards the end of the month 21MHz should close around 2000 gmt.

On **14MHz**, dx traffic will be heaviest from afternoon till about midnight. In the latter half of the night usually only South America and Africa will be workable.

On **7** and **3·5MHz**, conditions will change little from those of the previous month. On 3·5MHz, local traffic may be interrupted by the dead zone in the early morning.

The provisional sunspot number for September 1971 was 47·5 with activity evenly distributed throughout the month. The predicted smoothed sunspot numbers from the Swiss Federal Observatory for January, February and March 1972 are 48, 47, and 45 respectively.



The Intruder Watch

by C. J. Thomas, G3PSM*

IT has been obvious for some time that more publicity is necessary to assist the average amateur in understanding the function of the RSGB Intruder Watch. The article in the April 1970 *Radio Communication* set out briefly the reporting technique used by the organization, but it is felt that more current information regarding the "intruders" themselves may be of interest, especially to those amateurs who are active on the bands concerned.

For the past 18 months a "Summary of intruders" covering separately the first and second six months of the year has been produced and distributed to watchkeepers and other interested parties. These summaries list the intruders heard in ITU Region 1 on more than two occasions during the specified period, and the current edition covering the first six months of 1971 is shown in condensed form. Should sufficient interest be shown in these summaries it is intended that they be published in *Radio Communication* at six-monthly intervals.

Space does not permit a full analysis of the current summary, but a brief rundown shows the state of the bands. The state of 40m speaks for itself, being always full of broadcast stations. 20m shows a healthy improvement on previous periods, but the position of 15m has become more serious with various diplomatic services finding wide open spaces for their use. This band also suffers badly from harmonic and spurious emissions. The current situation regarding 10m has meant that very little has been heard at all, the one item being a second harmonic of a Soviet fixed service station on 20m.

Comments and queries regarding these summaries are invited, as are enquiries from persons interested in assisting the work of the Intruder Watch. Remember, these are your bands. Help us to protect them.

* 65 Charlton Drive, High Green, Sheffield, S30 4PA.

Summary of Intruders — Region 1
1/1/71 — 30/6/71

Freq	Emm	Date	Calls	Country of origin	Comments
7,004	F1	0271	—	USSR	A
		0371	—	USSR	Printer
7,010	A3	XX71	Radio Peking	China	AB
7,020	A3	0371	Radio Iran	Iran	A
7,020	F1	0271	—	USSR	A
		0371	—	USSR	Printer
7,028M	A3	XX71	Radio Peking	China	B
7,035	A3	XX71	Radio Peking	China	AB
7,050	A3	XX71	Radio Cairo	Egypt	AB
7,057M	A3	XX71	Radio Peking	China	AB
7,063	A3	XX71	Radio Tirana	Albania	AB
7,065	A3	XX71	Radio Iran	Iran	
7,075	A3	XX71	Voice of the Arabs	Egypt	B
7,075	A3	XX71	Radio Peking	China	A
7,080	A3	XX71	Radio Peking	China	B
7,090	A3	XX71	Radio Tirana	Albania	AB
7,095	A3	XX71	Radio Peking	China	AB
14,010	A1, F1	XX71	QRA DE DBZ2/3	DDR	AB. Spurious of 13,950 or 14,410kHz
14,010	F1	XX71	0DS90 DE XVX13B	S. Vietnam	Spurious of 13,997·5kHz
14,030	F6	XX71	RBU54 DE RB130	USSR	A
14,048	A1	0371	CQ DE RGT77	USSR	
		0471			
14,050	A1	0171	7BD2, 7BD4	Indonesia	B
		0471			
		0571			
14,064	F1	0171	UTS DE UQR3	USSR	Printer & morse
		0471			
14,074	F1	XX71	—	USSR	Printer
14,075	A1	XX71	(Change daily)	USSR	Four-character callsigns
14,101	F1	0571	CWY DE TCX	Turkey	A
14,104	F1	0471	—	USSR	AB Printer
14,178	A1	0371	(Change daily)	USSR	B. Four-character
		0471			
14,188	F1	0471	—	USSR	AB
		0571			Printer
		0671			
14,196	A1	0171	CQ DE RGT77	USSR	B
		0271			
14,204	A1	0571	CQ DE RGT77	USSR	AB
		0671			
14,216	F1	XX71	—	USSR	AB Printer
14,216	A1	0471	6BA88 DE UPS31	USSR	A
14,225	F1	0371	—	USSR	AB. Printer
		0471			
14,232	F1	0571	—	USSR	B
		0671	(Change daily)		Printer
14,275	A1	0471	—	USSR	AB. Four-character
		0671			
14,299	A1	0471	(Change daily)	USSR	A. Four-character
		0671			
14,336	F1	XX71	DE BZP54	China	Printer
21,002	A1	0471	DE 7A1 (or 1A7)	Czechoslovakia	Diplomatic
21,004	A1	XX71	OMZ DE 3K5	Czechoslovakia	Diplomatic
21,015M	A1	XX71	ARB ARQ	Pakistan	B.ICAO
21,015	F1	0471	PNCNA	China	Printer
21,015M	A1	XX71	HGX21 DE HGX38	Hungary	
21,018	A1	0471			
		0671	DE RCI	USSR	
21,020	F1	0471	DE ODS96	Lebanon	Spurious
		0571			from
		0671			20,962kHz
21,030M	A1	XX71	CQ DE LVO	—	Diplomatic
21,095	A1	XX71	K21	—	Diplomatic
21,100	A1	XX71	PZF	—	Diplomatic
21,100	A1	0471	CQ DE URD	USSR	B
		0671			
21,100	A1	XX71	MIY (or ZTW, ZNA)	—	Diplomatic
21,103	A1	0571	VGU	—	Diplomatic
		0671			
21,105	A1	XX71	ZGA	—	Diplomatic
21,110	A1	0171	DE K38L	USSR	B
21,110	A1	XX71	C4S	—	Diplomatic
21,110	A1	XX71	XDE	—	Diplomatic
21,110	A1	0371	JOT	—	Diplomatic
		0571			
21,122	A1	0471	CQ DE ROO70	USSR	
	A4	0571	RSZ20/RND79		
21,123	A1	XX71	(Change periodically)	USSR	B
21,128	A1	0571	(Change periodically)		Three-character calls
21,128	F1	0171	RLS DE RWV78	USSR	B.4f
		0271			of
		0371			5,282kHz
21,142M	A1	XX71	RZL, UCMW, UGQB	USSR	
21,142	A1	0171	4KB DE URD	USSR	Spurious
		0271			B
21,160	A1	0271	RAN73 DE RMJ2	USSR	
		0371			
21,170	F1	XX71	DE FTK58	France	B2f of 10,585kHz
21,170	F1	0171	UAT DE ULV	USSR	B
		0271			Spurious
		0371			
21,194	A1	XX71	DE J3R	Italy	AB
21,195	A1	0171	(Changed daily)	USSR	B
21,200	A1	XX71	K22		
21,233	A1	0571	CQ DE CUL22/24	Portugal	Spurious
		0671			
21,359·5	A1	0171	DE KRH50	USA	—
28,560	A1	0271	(Changed daily)	USSR	2f of 14,285kHz

Note: Radio Regulation 218 permits the use of 14,250-14,350kHz by the fixed service within the USSR

Comments: A — indicates intruder heard during the same period in 1970
B — indicates intruder heard during the second half of 1970
M — suffix to frequency indicates the mean frequency.
XX under date column indicates intruder active throughout the complete six-month period.

Council's Annual Report on the Society's Activities

The Council submits the following report on some of the activities which took place during the 12 months beginning July 1970.

President
Mr F. C. Ward, G2CVV, of Derby, was installed as the 37th President of the Society at a meeting at the Bonnington Hotel, London WC1, on Friday 15 January 1971.

Meetings
An Extra-ordinary General Meeting of the Society was held on 19 August 1970 for the purpose of considering an amendment to the Society's Articles of Association.

Lectures
An RSGB Lecture at the IEE was held on 21 January 1971 when Mr. J. Pink of Hewlett Packard Ltd lectured on Modern Transmitter Testing.

World Administrative Radio Conference for Space Telecommunication (Space Conference)
The Space Conference was held in Geneva during June and July 1971. Council Member Mr R. F. Stevens, who is also Secretary of IARU Region 1 Division, was invited to join the delegation from the United Kingdom to advise on amateur matters. (A full report of the amateur radio aspects of the conference appear in the September and October issues of *Radio Communication*).

Committees of Council
Again the Council has to record its thanks to the large number of volunteers who served on the committees of Council during the period under review. Brief details of the work of these committees are set out below.

HF Contests (Chairman, Mr J. C. Graham). This committee spent many hours considering rules, adjudicating the hf contests held during the period, and subsequently preparing the tabulations of results and reports for publication in *Radio Communication*.

VHF Contests (Chairman, Mr C. Sharpe). The VHF Contests Committee was engaged during the year in checking entries for the various vhf uhf contests and in formulating revisions to the contest rules.

Education (Chairman, Mr R. J. Hughes). Various aspects of the Radio Amateurs' Examination, licensing conditions and publications for newcomers to amateur radio were considered by this committee.

Exhibition (Chairman, Mr E. W. Yeomanson/Mr L. E. Newnham). The Exhibition Committee assisted Mr P. A. Thorogood, G4KD, with the organization of the Annual Exhibition in August 1970. The exhibition was opened by Major General J. E. Anderson, CBE, Assistant Chief of Defence Staff (Signals), Ministry of Defence. (After consideration of many factors, Council decided that the Society would not participate in an exhibition in 1971.)

Finance and Staff (Chairman, Mr J. W. Swinnerton/Mr R. J. Hughes). This committee continued to deal with all matters concerning the finances of the Society and recruitment of staff. During 1970 the committee carried out a critical review of the Society's finances and it was decided to increase, as from 1 January 1971, the subscription to be paid by corporate and associate members to £4.00 and £2.00 respectively.

MPT Liaison & TVI (Chairman Mr R. F. Stevens). The MPT Liaison & TVI Committee considered a number of matters connected with licensing, applications for planning permission and liaison with the MPT. In May 1971, following careful consideration of the terms of the Amateur TV Licence, a meeting was held when representatives of the MPT, the British Amateur Television Group and the Society were present. In January 1971 the tvi work of the committee was passed to a separate committee.

Membership and Representation (Chairman, Mr J. R. Petty). This committee has been actively engaged in considering means of increasing the membership of the Society and ensuring that members are adequately represented at all times.

Mobile (Chairman, Mr Norman Miller). The rally at Woburn Abbey in August 1970 was organized by this committee. An increased attendance was reported.

Raynet (formerly RAEN) (Chairman, Mr P. Balestrini). The Raynet Committee continued to consider ways of extending the Raynet network, organized exercises and gave advice and instructions to its groups.

Scientific Studies (Chairman, Mr G. M. C. Stone) This Committee organized experimental stations for studying modes of propagation. An experimental station is being organized by the Canadian Division of ARRL to operate in Northern Canada. Authority has been obtained to re-establish a beacon station at Lerwick.

Technical (Chairman, Mr R. F. Stevens). All technical articles for inclusion in *Radio Communication* are considered by this committee. The number of articles submitted continues to increase and the work of the committee is increasing accordingly.

In addition, technical reviews of equipment are carried out, reports prepared and articles on technical developments are sponsored. The committee was responsible for the technical publications programme of the Society.

VHF (Chairman, Mr G. M. C. Stone). During the year, consideration was given to the maintenance and extension of beacon facilities; VHF/UHF Band Plans; microwave operation; repeater operating and various other vhf activities. The VHF/UHF Convention at Whitton on 17 April 1971 was organized by this committee and was very successful.

IARU Working Group (Chairman, Mr R. F. Stevens). The IARU Working Group dealt with matters that affect the Society as a member society of IARU Region 1. These include reciprocal licensing, IARU conferences, international aspects of amateur matters, preparatory work for amateur representation at the Space Conference and future policy for the amateur service.

TVI (Chairman, Mr J. W. Swinnerton). This committee was formed to take over the tvi aspects of the MPT & TVI Committee.

Diamond Jubilee (ad hoc) Committee (Chairman, Mr L. E. Newnham). The Diamond Jubilee of the Society occurs in 1973 and a committee was formed to advise Council on what form the celebrations should take.

RSGB Certificates—HF
Applications for the Society's hf operating certificates continue to be dealt with by Mr C. R. Emary. During the 12 months under review, more that 890 awards claims were processed by Mr Emary, involving several thousand QSL cards. Awards were sent to 56 countries in all continents.

RSGB Certificates—VHF
Mr J. Hum assumed responsibility for the issuing of the VHF/UHF/SHF (Four metres and down) Awards during the year.

QSL Bureau
The QSL Bureau under the control of Mr A. O. Milne, assisted by Mrs Milne and 17 sub-managers, continues to deal with some 35,000 cards per week. Every effort has been made to maintain the service at a high level, but postal arrangements have made this impossible in some cases.

RSGB Slow Morse Transmissions
Mr M. A. C. MacBrayne continues to organize the slow morse transmissions. At the end of June 1971 there were more than 100 listed transmissions each week.

RSGB Tape Library
Mr A. O. Milne has continued to act as curator of the RSGB Tape Library.

RSGB Intruder Watch
Mr Colin Thomas, organizer of the Intruder Watch, continues to submit reports, prepared with the help of his monitoring stations, to the MPT. Close liaison with the Ministry is maintained and the details of monitoring submitted to it have resulted in action being taken to request intruders to move out of the exclusive amateur bands.

Trophies Manager
During the year Council accepted the offer of Mr P. Carey to act as Honorary Trophies Manager.

Representation on external bodies
The Society is represented on the committees of various external bodies including the CCIR UK General Purposes Committee, CCIR UK Study Group 5, BSI committees, Frequency Advisory Committee of the MPT and the City and Guilds Radio Amateurs' Examination Advisory Board.

The Society sponsored examinations for radio amateurs (City & Guilds Subject 55), which were held at the University of London in December 1970 and May 1971. It is thought that the number of entrants for the May examination was severely affected by the postal strike.

Licences
The number of amateur licences current at the end of July 1971 was:

Amateur (Sound) A	13,848
Amateur (Sound) B	2,736
Amateur (Sound Mobile) A	2,666
Amateur (Sound Mobile) B	455
Amateur Television	208

Membership
At the end of June 1971 the membership of the Society was:

		Comparative figures for 1970
Corporate Members	12,910	13,299
Associate Members	1,427	1,528
Overseas Members	2,156	1,707
	16,493	16,534

Affiliated Societies
At the end of June 1971 331 societies were in paid-up affiliation with RSGB.

Publications
During the period there was a reprint of the 4th edition of the *Radio Communication Handbook*; a further edition of the *VHF/UHF Manual* was published; the third edition of *Amateur Radio Techniques* was published; the 1971 *RSGB Amateur Radio Call Book* was published; the text of the *Radio Amateurs' Examination Manual* was completely revised and Notes for the RAE were compiled; and preparatory work on several new publications was put in hand.

Headquarters
At the end of November 1970, Mr R. G. B. Vaughan resigned from the position of General Manager. On 1 January 1971, Mr D. A. Findlay took over the duties of General Manager.

During the 12 months under review, the work at headquarters suffered severely because of the many staff changes which took place. The postal strike adversely affected both the sales of publications and the collection of subscriptions.

COUNCIL PROCEEDINGS

A brief report of the Council meeting held at Society HQ on 7 September 1971

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

Apologies for absence were received from Dr A. J. Saxton, Messrs B. D. A. Armstrong, J. O. Brown and G. R. Jessop.

Correspondence
Mr Brian Croker, secretary of the City and County of Bristol RSGB Group, had written to advise that the City and County of Bristol was celebrating in 1973 the 600th Anniversary of the granting of a Royal Charter.

It was suggested that it would be appropriate for Bristol to be one of the venues at which functions would be held in connection with the Society's Diamond Jubilee

It was agreed that the Society would support a function, possibly a West of England or National Convention, and the general manager was instructed to obtain further details of the proposal from Mr Croker.

VERON Meeting—Arnhem, 7 November 1971
The President reported that he had received an invitation to attend the Annual Meeting of VERON, the Netherlands national society, at Arnhem on Sunday 7 November 1971, and it was agreed that this invitation should be accepted.

Accounts
The details of receipts and payments for July 1971 and accounts were considered and the Honorary Treasurer commented on the figures.

Membership and Affiliation
It was resolved:

(i) to elect 138 corporate members and 32 associates;
(ii) to waive the subscriptions of seven members on the grounds of blindness or other disability;
(iii) to accept one reduced subscription;
(iv) to grant affiliation to the White Rose Radio Society, Leeds: and the Bangor and District Radio Club.

IARU membership
Council agreed to support the application for membership of IARU of the Singapore Amateur Radio Transmitting Society (SARTS), and the Society of Thai Amateur Radio (STAR).

IARU Region 1 Conference 1972
It was noted that the IARU Region 1 Conference 1972 would be held in Scheveningen, Holland, between 15 and 19 May.

It was agreed that the President-designate (Mr R. J. Hughes) should head a delegation and that the VHF Manager should be a member.

It was decided that the delegation should consist of four members and that the remaining two places be filled by Mr D. A. Findlay, general manager, and Mr L. E. Newnham.

Licensing
It was reported that the MPT Liaison Committee has given consideration to the proposal that a licence be available, the terms of which would give encouragement to young people.

Events Diary
Mr Yeomanson reported that insufficient information was being received to warrant the continuation of the Events Diary and he proposed that it be discontinued after giving due notice in *Radio Communication*. This action was agreed by Council.

Scottish NFD Trophy
It was reported that the original Scottish NFD Trophy had been returned to headquarters and that the new Trophy, donated by Mr L. E. Newnham, was now available.

Council agreed that Mr A. W. Smith be asked to present this trophy to the winners at a function to be held in Scotland later this year.

BARTG AGM
The Council agreed to a request that the AGM of the British Amateur Radio Teleprinter Group should be held at Society headquarters.

VHF repeaters
The VHF Manager, Mr G. M. C. Stone, reported on developments in this matter. A meeting of interested parties had been arranged to take place on 16 October at Society headquarters.

OBITUARIES

Mr M. Bessette
Maurice Bessette of East Molesey, Surrey, died on 5 September. He was an enthusiastic short wave listener.

Mr G. A. Chapman, G2IC
Tony Chapman of Westgate, Kent, was a pioneer vhf worker and was responsible for the first contact with France on 5m. As well as being president of the Thanet Radio Society he was also a founder member of RAOTA and was active on both dx and vhf bands.

Mr D. Fellows G3WYE
Don Fellows of Lichfield died at the age of 44. He was a keen member of Lichfield ARS and worked the hf bands as well as taking an active interest in mobile operation on 160m.

Mr G. Knott, G3VOP
Gorden Knott of Pitsea, Essex died on 11 September at the age of

52. He was a founder member and former committee member of Vange ARS and took a special interest in df hunting, field days and special event stations.

Mr G. Leicester, G3IKC
Graham Leicester died on 10th January. He was an active member and former treasurer of Thames Valley ARTS; and was connected with Acton & Chiswick RSGB Group.

Mr J. Watts, G2DSW
Jack Watts died on 20 September at the age of 61. He was chairman of the Southampton RSGB Group, and for many years he supplied material for, edited, printed and distributed *QUA*, over a large area of the south. He was regularly heard on phone and cw, in recent years mainly on vhf.

Mr T. S. White, ex G4DS
Stan White of Sutton-in-Ashfield, Notts, died in August. He was very active before the war but gave up his call 15 years ago owing to illness.

We have also been notified of the deaths of:

Mr F. G. Flounders of Victoria, Australia, on 18 September.

Mr Rodger F. Jackson, W6UKE, who died in Arizona.

Mr A. Taylor, G5CT, of Portsmouth, on 25 August.

YOUR OPINION

The Editor
Radio Communication
Sir—Your correspondent P. Woode (August issue) can cheer up so far as transmitters are concerned. A low-power, say, 10 to 20W, cw transmitter can be built fairly easily. A.M. phone can be added via screen grid modulation using only one double triode valve or a simple 1W transistor audio amplifier.

Later on, this outfit can be converted into a double side band suppressed carrier transmitter, and still later a mechanical or crystal filter added to arrive at an ssb transmitter. If higher power is required a separate linear and psu can be added for a complete station, transmitter-wise.

If the new licensee proceeds thus he will then have covered a lot of ground and gained knowledge not otherwise acquired if plunging in at the deep end by buying an expensive commercial rig. This can come later once knowledge of what is desirable has been gained, with the advantage that the knowledge gained enables one to maintain the equipment in first-class order.

Yours faithfully,
A. G. Thorburn, G3WBT

The Editor
Radio Communication
Sir—At a recent meeting of our local radio club the subject of GB2RS broadcasts was raised due to the lack of local items sent in, and I gather from other sources that this is the general picture throughout the UK. It seems as though the people who wish to publicize events and give general information, find GB2RS unsuitable due to lack of a suitable audience, as many amateurs miss the Sunday morning broadcast because of religious activity or the after-effects of a late Saturday night.

I feel the GB2RS news service should be moved to a more convenient time—or duplicated—to attract a greater audience.

Another point which arose concerned amateurs operating while on holiday with a new prefix /A, which have left most QSL sub-Managers with piles of unclaimed cards. Could the QSL sub-Managers give a list of calls they hold cards for, but not envelopes, over GB2RS say once a month or so. That would be a grand service to provide on our only broadcasting station.

Yours faithfully,
A. F. Gartshore, GM3UMW

The Editor
Radio Communication
Sir—I have had my licence since 1929 and every now and then I wonder whether it is worth while keeping it up, what with tvi, the ill-mannered rat-race for dx, the cacklings and burblings on ssb, the astronomical cost of new equipment, and the increased subscription and licence charges, to mention just a few off-putting factors.

However, each month I read *Radio Communication* (literally from cover to cover) and become temporarily charged with enthusiasm for the many projects I could still try. I think the general standard of this journal is kept very high, in contrast to the journals of bodies such as the IEE and IEEE (in which the only parts I can now understand are the biographies of the contributors), the technical content of *Radio Communication* is maintained at a much more readable level (without lapsing into "popular" technical press quality).

So, although I still have a good way to go to be the UK's oldest licensed amateur, perhaps I will press on and continue to draw inspiration from the excellent efforts of the RSGB in keeping the Amateur Spirit alive and well!

Yours faithfully,
C. G. Phillips, GM5PJ

RADIO AMATEURS' EMERGENCY NETWORK

by S. W. LAW, G3PAZ*

The symbolism of the devices on our RAEN emblem will be evident to our experienced members. For the benefit of those who may have given no thought to the matter, let us simply say that the lightning above and the floods below on a red background denote the suddenness with which disaster, with its consequent danger to life, may strike. The lightning may also be said to symbolize both our speed in providing emergency communications and our skill in harnessing the power of electricity to the art of radio for this purpose.

As to the floods, rarely does a month pass without news of disasters of various magnitude in some part of the world, but fortunately the UK is reasonably free from catastrophic risk. The high tide alert in early October this year in the London area was fortunately no more than that, but so far as we are aware no official request was made to Raynet for a "stand-by".

We make no apology for harping on the subject of energetic effort towards liaison with authority; to be wise after the event is worse than useless. So please ensure that wherever you are, Raynet is known to be available if and whenever called upon.

Youthful enthusiasm
Frequent requests are received from young people and from those in charge of youth organisations, clubs and schools for information on Raynet with a view to participation. While we welcome the interest shown and are only too glad to provide information about our aims, it must be pointed out that the committee has laid down that no applicant under the age of 16 may be granted membership of Raynet. The committee reserves the right to make an exception to this ruling in the case of a fully licensed amateur under this age only after a full examination of the particular circumstances.

Group formation
There are still a number of isolated members known to be scattered about, even in the cities. Some even complain of neglect; sad to say, investigation shows that some of these have not re-registered.

A letter to the honorary registrations secretary requesting information about the nearest members will receive attention and provide an opportunity to get together and consider the formation of a group in areas where there might appear to be little coverage. Remember, five signatures from a prospective group putting forward one of the number as the suggested controller is all that is required to set the ball rolling.

Members might also consider an offer which has been made to provide headed Raynet notepaper and/or Raynet QSL cards at a reasonable cost should the demand make it a viable proposition. Letters are invited on this subject.

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

CONTEST NEWS

BERU 1972

Radio amateurs and short-wave listeners throughout the British Commonwealth are invited to take part in the 35th BERU Contest to be held on 11–12 March 1972.

Entrants should note that the contest duration has been reduced to 24 hours so that the whole contest falls within the weekend period anywhere in the world. This year, awards for single-band entries in the transmitting section have been introduced. The results of this contest will be published in *Radio Communication*, and each overseas entrant will receive a copy of the results by surface mail.

Reprints of the BERU rules, the General Rules for RSGB HF Contests and supplies of log sheets may be obtained from RSGB, 35 Doughty Street, London WC1N 2AE. UK members should enclose a large SAE with their request.

Rules—Transmitting section

1. The **General Rules** for RSGB HF Contests, as published in the January 1972 issue of *Radio Communication*, will apply.

2. When. From 1200gmt on Saturday 11 March 1972 to 1200gmt on Sunday 12 March 1972.

3. Eligible entrants. Members of the RSGB resident in the UK, and radio amateurs licensed to operate within the British Commonwealth or British Mandated Territories.

4. Contacts. CW (A1) only, in the 3·5, 7, 14, 21 and 28MHz bands. Contacts may be made with any station using a British Commonwealth callsign, except those within the entrant's own call area. UK stations may not work each other for points. In accordance with current IARU recommendations, contestants are requested to confine their operations to within the lower 30kHz of each band.

5. Scoring. Each completed contact will score five points. In addition, a bonus of 20 points may be claimed for the first, second and third contacts with each commonwealth call area (as listed in the accompanying table) on each band. All British Isles stations (G, GB, GC, GD, GI, GM, and GW) count as one call area.

6. Logs. A separate log is required for each band. Logs should be set out as shown in the General Rules for RSGB HF Contests. A check list showing the call areas worked on each band must also be included.

7. Entries. Entries may be single- or multi-band. Single-band entries should show contacts on only one band; details of contacts made on other bands should be enclosed separately for checking purposes. Multi-band entries will not be eligible for single-band awards.

Each entry will consist of the log and check sheets together with a signed declaration. The form of declaration is shown in the General Rules for RSGB HF Contests.

Entries should be addressed to the HF Contests Committee, c/o D. J. Andrews, G3MXJ, 54 Roman Way, Thatcham, Newbury, Berkshire, England. Adjudication of this contest will commence on Monday 15 May 1972. Any entry received after this date may be excluded from the contest and may be ineligible for any award. Overseas stations are therefore advised to forward their logs by airmail.

8. Awards. To the winner, the BERU Senior Rose Bowl. To the runner-up, the BERU Junior Rose Bowl. To the leading UK station, the Col Thomas Rose Bowl.

Certificates will be awarded to the leading UK and overseas single-band entries on each band.

Rules—Receiving section

1. When. Times and dates as for transmitting section.

2. Eligible entrants. Members of the RSGB resident in the UK, and all shortwave listeners resident in the British Commonwealth or British Mandated Territories. Only the entrant may operate his receiving station for the duration of the contest. Holders of amateur transmitting licences are not eligible to take part.

3. Scoring. To count for points a station outside the entrant's own call area must be heard in a contest contact. CQ or test calls will not count for points. A station may be logged only once on each band for the purpose of scoring. Where both stations in a contact are heard, they should both be logged separately and points may be claimed for both entries, provided that the stations are outside the entrant's own call area.

Each complete log entry will score five points. In addition a bonus of 20 points may be claimed for the first, second and third stations heard in each commonwealth call area on each band. All British Isles stations (G, GB, GC, GD, GI and GW) count as one call area.

4. Logs. A separate log is required for each band. Logs must show the following details in columns headed: (i) Date/time gmt, (ii) Callsign of station heard, (iii) Report and serial number sent by station heard, (iv) Callsign of station being worked, (v) Points claimed, (vi) Bonus points claimed. Each log sheet must be set out on one side of foolscap or A4 log sheets and must show the band to which the log sheet refers. A check list showing the call areas heard on each band must also be included.

5. Entries. (a) Each entry will consist of the log sheets, check list and a signed declaration that the receiving station was operated in accordance with the rules and spirit of the contest and that the entrant does not hold an amateur transmitting licence.

(b) Entries should be addressed as shown in Rule 7, transmitting section.

6. Awards. The BERU Receiving Rose Bowl to the winner. Certificates of merit to the leading entrant in each IARU continent.

Commonwealth call areas

The following call areas are recognized for the purposes of scoring in the 1972 BERU Contest:

A2	
AC3	
AP	East Pakistan
AP	West Pakistan
C2	
G/GB/GC/GD/GI/GM/GW	
VE1	
VE2	
VE3	
VE4	
VE5	
VE6	
VE7	
VE8	
VK0	Australian Antarctic Territory
VK0	Heard Is
VK0	Macquarie Is
VK1	
VK2	
VK2	Lord Howe Is
VK3	
VK4	
VK4	Willis Is
VK5	
VK6	
VK7	
VK8	
VK9	Christmas Is
VK9	Cocos-Keeling Is
VK9	New Guinea (inc Bismarck and Admiralty Is)
VK9	Norfolk Is
VK9	Papua
VO	
VP1	
VP2	Anguilla
VP2	Antigua and Barbuda
VP2	British Virgin Is
VP2	Montserrat
VP2	St Kitts, Nevis
VP2	Dominica
VP2	Grenada and dependencies
VP2	St Lucia
VP2	St Vincent
VP5	
VP7	
VP8	Falkland Is
VP8	Sandwich Group
VP8	South Georgia
VP8	South Orkney
VP8	South Shetlands
VP8	Grahamland
VP9	
VQ8	Agalega and St Brandon
VQ8	Rodriguez Is
VQ9	Aldabra Is
VQ9	Chagos Archipelago
VQ9	Des Roches
VQ9	Farquar
VQ9	Seychelles
VR1	British Phoenix Is
VR1	Gilbert and Ellice and Ocean Is
VR2	
VR3	
VR4	
VR5	
VR6	
VS5	
VS6	
VS9	Gan
VU2	India
VU	Andaman and Nicobar Is
VU4	Laccadive Is
YJ8	
ZB2	
ZC4/5B4	
ZD3	
ZD5	
ZD7	
ZD8	
ZD9	
ZE	Rhodesia
ZF1	
ZK1	Cook Is
ZK1	Manihiki Group
ZK2	
ZL	Auckland and Campbell Is
ZL1	
ZL1	Kermadec Group
ZL2	
ZL3	
ZL3	Chatham Is
ZL4	
ZL5	
ZM7	
3B8	Mauritius
4S7	
5H3	
5N2	
5W1	
5X5	
5Z4	
6Y5	
7P	
7Q7	
8P6	
8R	
9G1	
9H1	
9J2	
9L1	
9M2/9M4	West Malaysia
9M6/9M8	East Malaysia
9V1	
9Y4	

Second 1·8MHz Contest 1971

It is regretted that an omission ocurred in the rules published on page 640 of the September 1971 issue of *Radio Communication*.

The second paragraph under **Awards** should read as follows:

A certificate of merit will be awarded to the leading entrant whose 18th birthday falls on or after 15 November 1971. Entrants wishing to

compete for this award should state their date of birth on the contest cover sheet and mark clearly at the TOP of the cover sheet "UNDER 18". Entries will only be eligible for this award where operation has taken place under the entrant's own callsign and from the "main address" as stated on the station licence.

Dartford Heath DF Qualifying Event

Nineteen teams from eight clubs assembled at Farthing Corner, Rainham, Kent, on 5 September for the last qualifying hunt before the Final. The weather was fine and good signals were heard from both stations and at a few minutes past 1330 the starting area was deserted.

All except two competitors went for the "A" station first, which was located four miles to the south-west on a quite steep slope on the edge of a wood. The slope was overgrown with very prickly thickets, and it was in one of these that G3LNT had his hide. Eric Mollart was first at the station, followed four minutes later by Mike Hawkins; Ian Butson being a very good third.

Station "B", manned by G3NPA, was in a north-westerly direction about five and a half miles from the start and on the further side of the Medway. The mass of water seemed to be blamed for false bearings here, and many competitors did quite extensive hunting south of the river in the area of HM Naval Barracks at Chatham. Again, Eric Mollart was first at station "B", hidden in a hole in the ground in a wood just off the foreshore.

Only seven teams found both stations which, in view of the short distances involved, proves how important a good hide on a good site really is.

Posn	Competitor	Club	Time of arrival "A" Stn	Time of arrival "B" Stn
1	E. Mollart	Oxford	1420	1521½
2	B. M. Bristow	Oxford	1453	1545½
3	G. Whenham	Coventry	1455	1545½
4	R. Pearce-Boby	Oxford	1443	1555½
5	M. P. Hawkins	Chelmsford	1424	1617
6	I. Butson	Colchester	1427	1618
7	A. Newman	Salisbury	1458	1630
8	B. Pope	Dartford Heath	1440	—
9	W. J. North	Chiltern	1454	—
10	R. J. Worbey	Dartford Heath	1456	—
11	J. Ashcombe	Dartford Heath	1457	—
12	P. J. Tyler	Oxford	1458	—
13	T. C. Gage	Oxford	1459	—
14	A. W. Butcher	Chelmsford	1516	—
15	P. Hudson	Dartford Heath	—	1545½
16	G. H. Taylor	Rugby	1549	—
17	P. Woollett	Dartford Heath	—	1555
18	A. R. Adams	Southend	1627	—

One team failed to find either station

National DF Final

The 1971 National DF Final took place on Sunday 19 September. All 14 competitors, who had previously qualified for entry by taking a first or second position in the seven preliminary rounds, took part.

The carefully-chosen starting point was at Longney in a loop of the River Severn, about four miles south of Gloucester and the only bridge over the river. Strong signals were received from both transmitters, but the bearings proved to be almost diametrically opposed; station "A" being to the east, where the bearing ran through the outskirts of the city into the high Cotswold Hills; and station "B" to the west, the bearing cutting the banks of the estuary of the River Severn in no less than six places before continuing into one of the thickest areas of the Forest of Dean. As was expected, most competitors went for station "A" first, and this transmitter was soon run to earth eight and a half miles from the start on top of a steep acclivity known as Coopers Hill. The organizers had expected that competitors would approach this station from the south which would involve them in a lengthy and exhausting climb from the nearest road to a flagpole on the top, but several parties, with a lucky break or slightly inaccurate bearings, found a longer but much easier route of access from the north and Mike Hawkins, taking advantage of this, was able to find his first station by 1417.

Nearly all competitors disregarded the pitfalls introduced for station "B" and, scorning many possible sites on either bank of the estuary, crossed the river at Gloucester and proceeded direct to the Forest of Dean to the neighbourhood of Cinderford where very strong signals were received. Most competitors walked (or ran) for considerable distances on the many footpaths through this part of the National Park, but a few found a devious track around a gipsy encampment by means of which the transmitter crew had obtained access to the site. A very long thin wire aerial high in the trees added to the difficulties, while the transmitter itself was concealed very thoroughly in a carefully-prepared hide covered with bracken.

Mike Hawkins was again first, with A. Simmons only one minute behind. The afternoon was well advanced before the majority of the competitors succeeded in locating this station, eight and a half miles in a direct line from the start and fourteen and a half miles from station "A".

The event had deliberately been made as difficult as possible and, among the other obstacles to be surmounted, was the necessity to cover a minimum distance of 27 miles from start to finish even if the transmitters were taken in the correct sequence.

The event was attended by Mr. D. A. Findlay, general manager of RSGB, and his sister, and when the result was announced Miss Findlay presented the National Trophy to Mike Hawkins.

Following this it was announced that it was the wish of the President of RSGB that the Founders Trophy, for distinguished services to the Society, should be presented to Mr G. T. Peck at this event, and the presentation was made by Mr Findlay.

Posn	Competitor	Club	Time of arrival "A" Stn	Time of arrival "B" Stn
1	M. Hawkins	Chelmsford	1417	1511
2	A. Simmons	High Wycombe	1421	1512
3	R. Pearce-Boby	Oxford	1413½	1524
4	B. J. Mahoney	Rugby	1432	1555
5	T. Gage	Oxford	1605	1513
6	E. L. Mollart	Oxford	1610	1500
7	W. North	Chiltern	1611	1511½
8	I. Butson	Colchester	1427	1623
9	D. Newman	Rugby	1443	1623½
10	J. R. Vickers	Stratford	1628	1530
11	P. M. Williams	Slade	1629	1501
	B. Bristow	Oxford	1629	1512½
13	A. C. A. Newman	Salisbury	1611	—
14	G. Whenham	Coventry	—	1624

June 1971 70MHz Portable Contest Results

This contest attracted only 21 entrants compared with 34 for the 1970 contest—"Where are all the 4m ops?" A number of stations were noted to be portable but did not submit logs.

Conditions during the contest appeared to be variable, with some stations quoting "good" at first but deteriorating during the period. Sporadic-E caused trouble in some instances.

Powers varied. The first and second stations at 50W, to an average 25W using valve PAs, with about 96 per cent solid state on the receive side.

The best dx was by GM3LTW using cw at 570km to G3YZN/P. GI3TLT made all his contacts in GI or EI with 10 contacts across the water.

Posn	Callsign	Score	Contacts	County	Best dx claimed
1	GM3LTW	509	44	AY	G3YZN/P
2	GW3UCB	441	73	CV	G8GP
3	GW3WRA	393	63	BR	GM3LTW/P
4	GW3ONP	371	51	CA	G3YZN/P
5	GW3ITZ	340	63	DB	G3YZN/P
6	GW3OXD	320	45	RN	GM3LTW/P
7	GWNWR	316	64	DB	—
8	G3TDM	295	75	BS	GW3UCB/P
9	G4ACG	272	75	SX	GW3ITZ/P
10	GW4ABR	232	46	RN	GM3LTW/P
11	G3VIR	215	61	SY	GM3LTW/P
12	G3SJX	194	53	SX	G3XEP/P
13	G4KF	178	49	EX	G3WRS/P
14	GW6OI	166	39	DB	GM3LTW/P
15	G4AFX	147	35	NR	G3WIN/P
16	G3WJG	146	36	GR	GW3UCB/P
17	G3XEP	141	29	YS	—
18	GM3WOJ	128	22	WG	—
19	G2CUZ	91	23	LE	—
20	G2AXH	81	24	LE	GM3LTW/P
	GI3TLT	81	58	DW	—

Check Log from G3FD/P acknowledged.

August 1971 144MHz Contest Results

Contestants did not agree on conditions, and comments varied from very good to fair. Continental stations provided many contestants with their best dx which, for the leading stations, was surprisingly consistent. Maximum legal power and a 10-element long Yagi contributed to the substantial lead of G8BBB, who had 31 QSOs with Continental stations out of a total of 70.

Subject to Council approval certificates of merit will be awarded to G8BBB and runner up G3POI.

Posn	Callsign	Score	County	Best dx-km	Power
1	G8BBB	676	CE	510	400 out
2	G3POI	467	LD	510	450 in
3	GW4ABR/P	362	MN	490	90 in
4	G4AJC	357	KT	450	100 in
5	G3BA	278	WK	420	100 out
6	G8BJK	184	HF	420	100 in
7	G3POU/P	167	YS	445	100 in
8	G3JLA/P	163	EX	—	10 in
9	G3VNQ/P	159	IM	384	50 out
10	G8DDC/A	156	BD	315	160 in
11	G3TCG	154	EX	375	150 in
12	G3SEM	120	NF	—	200 in
13	G3OZT	118	HE	430	100 in
14	G3RND	67	IN	225	130 in
15	GW3NNF	66	AG	326	140 in
16	G3PKF/P	44	CE	325	25 out
Check log	F1AOY/P	—	AKO9J	387	8 out

September 1970 IARU Region 1 VHF Contest Results

It is regretted that results for this contest have been very much delayed principally because many entries (not from the UK) were extremely late—the latest arrived in April 1971. The results were prepared for IARU Region 1 by the Finnish society, SRAL. The placings of UK stations in each section are as follows:

Section 1 144MHz Fixed Stations
Total number of participants 514.

Posn	Callsign	Posn	Callsign
31	G3ZOT/A	218	G8BKR
75	G3PWJ	234	G3UKV
139	G2NH	420	G8CDW

Section 2 144MHz Portable Stations
Total number of participants 397.

Posn	Callsign	Posn	Callsign
8	GD3VXK/P	180	G3OTK/P
30	GW3MAR/P	184	G3UUP/P
41	G3WSC/P	201	G5QK/P
45	G3EMU/P	225	G6UQ/P
51	G8ADV/P	257	G3IXH/P
53	G3PFM/P	261	G3CMH/P
66	G3EFX/P	265	G3SJO/P
68	G8DDC/P	266	G3KFN/P
81	G3VER/P	286	G3WIR/P
129	G3PKW/P	295	G3BPM/P
134	G3TWO/P	300	G3XFT/P
158	G8BKQ/P	368	G3XAG/P
174	G8AKX/P		

Section 3 432MHz Fixed Stations
Total numbers of participants 48.
UK entrants—none.

Section 4 432MHz Portable Stations
Total number of participants 51.

Posn	Callsign	Posn	Callsign
1	G3LTF/P	9	G3VZV/P
2	G8BCG/P	10	G3THQ/P
3	GW3HAZ/P	11	G3VCP/P
4	G3OBD/P	16	G8AFA/P
5	G3HBR/P	17	G3WHL/P
6	GD3WMS/P	19	G3JKY/P
7	G3FRV/P	26	G3OFH/P
8	G3WGC/P		

Section 5 1,296MHz Fixed Stations
Total number of participants 12.
UK entrants—none.

Section 6 1,296MHz Portable Stations
Total number of participants 32.

Posn	Callsign	Posn	Callsign
1	G3LTF/P	15	G3XAD/P
2	G2RD/P	16	GW3LAI/P
3	G3FRV/P	18	G3EEZ/P
4	G8BDY/P	20	G3NIL/P
5	G3WGC/P	21	GW3HAZ/P
6	G3JKX/P	25	G3RZG/P
7	G3OBD/P	26	G8PX/P
8	G3THQ/P	27	GD3WMS/P
10	G8AFA/P	28	G3TLM/P
11	G3VZV/P	30	G3JKY/P
12	G3FD/P	31	G3XPT/P
14	G3HBR/P		

Section 144MHz Listeners
Total number of participants 26.

Posn	Number	Posn	Number
6	A5032	20	BRS31172
16	A6585		

Section 432MHz Listeners
Total number of participants 1.

Posn	Number
1	A5032

October 1970 IARU Region 1 UHF/SHF Contest Results

Section 1 432MHz Fixed

Posn	Callsign	Posn	Callsign
6	G8AUE	33	G3JKY
12	G2RD	36	G8DIV
15	G3LAS	37	G8BKR
32	G2WS		

Section 2 432MHz Portable

Posn	Callsign	Posn	Callsign
3	G3BNL/P	13	G8AFA/P
5	G8ARM/P	15	G6XM/P
11	G3RPE/P	18	G3RZG/P
12	G3TTV/P		

Section 3 1,296MHz Fixed

Posn	Callsign	Posn	Callsign
1	G3THQ/A	4	G2WS
2	G2RD	6	G3JKY
3	G5FK		

Section 4 1,296MHz Portable

Posn	Callsign	Posn	Callsign
1	G3BNL/P	6	G3RPE/P
2	G8ARM/P	9	G8AFA/P
4	G3TTV/P	10	G3RZG/P
5	G6XM/P		

Section 5 2,300MHz Fixed

Posn	Callsign	Posn	Callsign
1	G3THQ/A	2	G5FK

Section 6 2,300MHz Portable

Posn	Callsign	Posn	Callsign
1	G3BNL/P	2	G3RPE/P

Section 8 3,000MHz Portable

Posn	Callsign
1	G3BNL/P

Section 10 10,000MHz Portable

Posn	Callsign	Posn	Callsign
1	G3BNL/P	3	G5FK
2	G3RPE/P		

Contests calendar

1971
6–7 November—144/432MHz CW (Rules in September issue)
6–7 November—7MHz (phone)
6–8 November—CHC/FHC (phone and cw)
14 November—OK Contest
13–14 November—2nd 1·8MHz (Rules in September issue)
27–28 November—CQ WW DX CW
5 December—144MHz Fixed (Rules in October issue)

1972
8–9 January—AFS
12–13 February—First 1·8MHz
11–12 March—BERU
9 April—80m LP
3–4 June—NFD
24–25 June—Summer 1·8MHz
8–9 July—HP Field Day
10 September—80m Field Day
7–8 October—21/28MHz
21–22 October—7MHz CW
4–5 November—7MHz Phone
11–12 November—Second 1·8MHz

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**

Merseyside Luncheon Club—First Monday each month, 12.30 for 12.45, HMS *Landfall*. Please advise G3VQT or G2AMV if you wish to attend.

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

Allerton (Liverpool) Scout Amateur Radio Society—North West Region—Thursdays, 8pm, 1st Allerton Group Headquarters, Aigburth Vale, Liverpool 17. All Scouts interested in amateur radio are welcome.

Blackburn (East Lancs ARC)—First Thursday in each month, 7.30pm, Edinburgh House, Shearbank Road, Blackburn. Further details from G4JS.

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

Bolton (B & DARS)—First and third Wednesdays in each month, Bolton Recreation Club, Kensington Place. Full details from G3ZQS. On 18 September the society put on an exhibition in support of the annual gala at Breighmet. Results were not up to expectations due to the screening effect of the bell tower on St James'. Better results were obtained when the aerial was hooked hurriedly on to the nearest tree. G3SPB's recent talk on receivers from way-back proved to be very entertaining.

Bury (B & RRS)—9 November ("Aerial matching techniques", by G3NOM), 8pm, the "George Hotel", Market Street, Bury. This society is now celebrating its Silver Jubilee. A history of the organization is available on application to G3RSM. The Silver Jubilee Dinner Dance is to be held on 29 January 1972, tickets priced £2.25 each are available from G3RSM or G3SUI. Secretary G3VVQ, 411 Holcombe Road, Greenmount, Bury.

Carlisle (C & DARS)—Mondays, 7.30pm, Currock House, Lediard Avenue, Currock. Secretary G3FZG, QTHR.

Cheshire (Mid-Cheshire ARC)—Wednesdays, 7pm, Technical Activities Centre, Winsford Verdin Comprehensive School, Grange Lane, Winsford. Further details from G3JWK.

Chester (C & DARS)—Tuesdays except for the first Tuesday in each month which is net night, 8pm, YMCA, Chester. Further details from G8AYW, QTHR.

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

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

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

Leyland Hundred Amateur Radio Group—net nights: Thursdays at 2000gmt on 1,915kHz, Saturdays at 1900gmt on 145·8MHz.

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

Liverpool (NLRC)—5, 19 November, 3 December, 8pm, Labour Party Headquarters, 13 Crosby Road South, Liverpool 22. Secretary M. Graham, G3XMG, 14 Albert Road, Waterloo, Liverpool 22.

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

Manchester (SMRC)—Club meets every Friday. 5 November ("Vhf contest operation", by D. Randles, G4AFT), 12 November (Annual Dinner, to be held at the "Woodcourt Hotel", Brooklands Road, Manchester 23), 19 November "(Dxing in 4X4", by K. Kahn, 4Z4IX), 26 November ("A phasing ssb exciter", by P. Lee, G3ZKO), 8pm, Sale Moor Community Centre, Norris Road, Sale, Cheshire. The vhf/uhf activity night is Monday with operation of G3UHF on 2m and 70cm from the club "shack", 8pm, "Greeba", Shady Lane, Manchester 23. Visitors are welcome on Mondays and Fridays.

Manchester University (ARS)—The society operates hf and vhf stations and is organizing a programme of lectures and visits. Tuition for the RAE and morse test is also available. Those interested should contact G8BVF, G3ZNS or GM3YOK at the University Union in Oxford Road.

Preston (PARS)—11, 25 November, 9 December, 7.30pm, Windsor Castle (private room), St Paul's Square. Secretary G. Windsor, 26 St Gregory's Road, Preston.

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

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

Thornton Cleveleys (TCARS)—First and third Wednesdays in each month, 8pm, St John Ambulance Brigade Hall, Fleetwood Road North, Thornton, Blackpool. Secretary G3YWH; *ASR, G3ZBO*.

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

Westmorland (WRS)—Meetings are likely to be once a month and members will be contacted when a new meeting place is arranged. New Chairman G3UEC; secretary, E. P. Goonan Jnr, "Longridge", Storth, nr Milnthorpe, Westmorland.

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

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

Wirral (Wirral DX Association)—Last Thursday in each month at members' homes. Visitors are welcome but the secretary must be advised in advance. November at G3UFO, talk on "Synthesized rf generation". December at G3VVA and the Annual Dinner—both dates will be announced shortly. Secretary G3OKA, 219 Prenton Dell Road, Prenton, Birkenhead.

REGION 2 **RR K. Sketheway, BRS20185**

Barnsley (B & DARC)—12 November ("Vhf frequency measurement", by J. Ward, G4JJ), 26 November (Lecture by W. Lee, G6LZ, subject to be announced), 7.30pm, King George Hotel, Peel Street, Barnsley. *G3LRP*.

Bradford (BRS)—16 November ("Filters and stubs", by L. W. Burkitt), 7.30pm, 10 Southbrook Terrace, Great Horton Road, Bradford 7. *G3HJP*.

Fulford (York) (FARS)—Tuesdays, 7.30pm, Scout HQ, 31 George Street, York. *G5KC*.

Halifax (NHARS)—10 November (Mr Craven's Lecture), 24 November (Flea market), 7.45pm, Peat Pitts Inn, Ogden.

Hull (H & DARS)—5 November (Natter night—make do and mend), 12 November ("Starting on top band with valves", by G3MVO), 19 November (SWL night—local df event), 26 November (Top band continued with transistors—G3PQY). Club meets at the clubroom, 592 Hessle Road, Hull.

North Riding (NRARG)—Club meets at the Railway Hotel, Seamer Road, Scarborough. Further details from the secretary J. E. Ager, G8AZA, 88 Rothbury Street, Scarborough, Yorks. *G8AZA.*
Scarborough (SARS)—Thursdays, 7.30pm, c/o RAF Association, 3 Westover Road, Scarborough. Club callsign is G4BP. Hon secretary J. Cutter, G3VAN. *G8KU.*
South Shields (SS & DARC)—Meetings on Fridays. 5 November (Business meeting), 8pm, Trinity House Social Centre, Laygate, South Shields. The AGM was held on 17 September and the following officers were elected: President, Capt E. Clarke, G8AO; Chairman, F. Harrison, G3SFL; vice-chairman, K. Sketheway, BRS20185; secretary, A. Dixon, G8BQF, and treasurer, M. Muir, G3WOM.
Spen Valley (SVARS)—10 November (Visit to Batley & Spenborough Observatory at Batley Park), 25 November ("SSB transistor transceiver", by A. R. Walker, G3DAR), 2 December (Film show), 7.30pm, The Grammar School, High Street, Heckmondwike. G3IJC.
Sunderland (SARS)—Meetings on the first and third Tuesdays in each month, 7pm, Sunderland Polytechnic. *G3XID.*
York (YARS)—Thursdays, 7.30pm, The British Legion, 61 Micklegate, York. *J. A. Rainbow.*

REGION 3 — RR R. W. Fisher, G3PWJ

Birmingham (MARS)—16 November (Surplus sale), 8pm, Midlands Institute, Margaret Street, Birmingham 3.
South—First Thursday in each month, 8pm, Hampstead House, Fairfax Road, West Heath.
Bromsgrove (B & DARC)—Second Friday in each month, Royal Oak, Barley Mow Lane, Catshill.
Coventry (CARS)—5 November (Bonfire night social), 12 November (Night on the air), 19 November ("VE holidays", by G3UOL), 26 November (Night on the air), 8pm, City of Coventry Scout HQ, 121 St Nicholas Street, Radford Road, Coventry.
Dudley (DARC)—9, 23 November, 8pm, Central Library, St James' Road, *G3PWJ.*
Hereford (HARS)—5, 19 November, Civil Defence HQ, Gaol Street, Hereford.
Leamington Spa (MWAE & RS)—Every Monday, 8pm, 28 Hamilton Terrace, Leamington.
Shrewsbury (SARS)—Every Thursday, 7.30pm, Harlescott Youth Centre, Sundorne Road, Shrewsbury, *G3VZG*
Solihull (SARS)—16 November (Films of radio interest), 7.30pm, The Manor House, High Street. 7 December (Informal), 9pm, Malt Shovel, High Street, Solihull. *G3ZXO.*
Stourbridge (STARS)—2 November (Annual bring and buy sale), 8pm, Longlands School.
Sutton Coldfield (SCRS)—8 November (AGM), 22 November, 8pm, Club House, Sutton Town FC, Coles Lane, Sutton Coldfield. *G8CZM.*
Telford (WARS)—3 November (Firework night special), for further details contact Mr. F. Smithson, 32 Vicarage Drive, Manor Park, Shifnal, Salop.
Wolverhampton (WARS)—1 November (Film show), 8, 15, 29 November, 8pm, Neachells Cottage, Stockwell End, Tettenhall, WV6 9PH.
Worcester (W & DARC)—Third Saturday in each month, 8pm, Crown Hotel, Broad Street, At the AGM the following officers were elected: Chairman, Mr. Luckock, G3VDX; treasurer, Mr. Parry, G8BVP; secretary, Mr. Jones, G8ASO.

REGION 4 — RR T. Darn, G3FGY

Derby (DADARS)—6 November (Members will be assisting at the Drum Hill Boy Scout Camp. Everyone is welcome, there will be the usual bonfire and fireworks and an exhibition station will be operating), 10 November (Film show), 17 November ("My trip to the USA", part 1, by G2CVV), 18 November (vhf/uhf night), 24 November ("My trip to the USA", part 2, by G2CVV), 1 December (Surplus sale), 11-12 December (GB3ERD will be operating from the market place in the centre of Derby to commemorate the 70th anniversary of Marconi's first transatlantic transmission. There will also be an exhibition opposite the station in the foyer of Derby Guildhall). All meetings are held at the clubroom, 7.30pm, 119 Green Lane, Derby. Visitors are always welcome. Monday nights are now "bull" nights when all willing helpers will be able to assist in renovating the clubroom. The club has inaugurated the "1930 net", this takes place every Saturday on 1,930kHz at 1930 clock time—a.m. transmissions only and everybody welcome to join in. *G2CVV.*
Heanor (SEDARS)—9 November ("Transistor circuits"). 16 November ("Low ohm meter"), 23 November (Open night), 30 November (Bring and buy sale). All meetings held at the South East Derbyshire College of Further Education, Ilkeston Road, Heanor, commencing at 7.30pm. *W. Clarke.*
Melton Mowbray (MMARS)—19 November (Shack visit to G3FDF, QTHR), *R. Winters.*
Nottingham (ARCON)—11 November (Junk sale), 18 November (On the air and general natter night), 25 November (G3YCT and G8CXK will talk about their summertime expedition to the Scottish Islands). All meetings start at 7.30pm prompt and visitors are welcome at the club any Thursday evening. A slow morse practise net has been started on Mondays at 8pm clock time on 3·650MHz. The idea is to encourage better cw operating in readiness for NFD etc. Callsigns to listen for are G3YUT, G3WFP and G4AFJ. *G4AFJ.*

REGION 5 — RR S. J. Granfield, G5BQ

Bedford (B & DARC)—4 November (Demonstration of KW Atlanta by G3SOA), 11 November ("Vic's van of goodies"—G4AAA), 18 November ("Radar", by G3XNG), 25 November (Lecture by G8EIG). Club meets at "The Dolphin", Broadway, Bedford.
Cambridge (C & DARC)—5 November (Informal), 12 November (Talk by G6LL and G2XV), 19 November (Informal), 26 November (Lecture to be arranged), 3 December (Informal). Meetings at Club headquarters, Corporation Yard, Victoria Road, Cambridge.
Shefford (S & DRS)—4 November ("Station safety", by G2DPQ), 11 November ("Sounding the ionosphere", by G3TDW), 18 November ("Frequency checking", by G3VMI and G3EUS), 25 November (Final dinner planning and judging of homebuilt equipment). Meetings at the Church Hall, Ampthill Road, Shefford, Beds.
Stevenage (S & DARS)—4 November (Open discussion), 18 November (Lecture on aerials in satellite communication by Mr Z. F. Voyner of Hawker-Siddeley Dynamics Ltd. This meeting is open to all radio amateurs, but please notify G3OVT if attending). Meetings held at Hawker-Siddeley Dynamics Ltd, Gunnels Wood Road, Stevenage, Herts.

REGION 6 — RR L. W. Lewis, G8ML

Cheltenham (RSGB Group)—First Thursday in each month, 8pm, "Royal Crescent", Clarence Street, Cheltenham. *G2FWA.*
Gloucester (GRS)—First Thursday in each month, 7.30pm, RAFA Club, Spa Road, Gloucester, and each following Wednesday at the Drill Hall, Chequers Road, Gloucester. *G3MA.*
North Bucks (ARS)—Meetings are held on the second and fourth Wednesdays in each month, 8pm, Wolverton and New Bradwell Youth Club. *G3WXO.*
Oxford (O & DARS)—Second and fourth Wednesday in each month, 7.30pm, Cherwell Hotel Clubroom, Watereaton Road, North Oxford. Meetings include RAE type questions and answers. Contact the secretary D. R. Wood, G4AOQ, telephone Oxford 47771, for further details.
South Bucks VHF Club—7 December (Surplus equipment sale), 8pm, Bassetsbury Manor, High Wycombe.

REGION 7 — RR P. A. Thorogood, G4KD

Clubs and groups requiring lecturers or subjects should contact the RR. New films—details are available from the RR. Also trade shows are now held daily at the Cinema, Heathrow Airport. See published list.
Acton, Brentford & Chiswick (ABCRC)—16 November (Film show), 7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick.
Addiscombe (AARC)—Second and fourth Tuesdays, 7.30pm, Prince George Hotel, High Street, Thornton Heath.
Ashford, Echelford (ARS)—Last Thursday and second Monday in each month, 7.30pm, St Martins Court, Kingston Crescent, Ashford, Middlesex.
Barking (BR & ES)—Thursdays, 7.30pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking.
Bexleyheath (NKRS)—Second and fourth Thursdays in each month, 7.30pm, Congregational Church Hall, Chapel Road, Bexleyheath. The TVI meeting was very well received.
Cheshunt (CDRC)—First Friday in each month, 7.30pm, Methodist Church Hall, opp Theobalds Station, Cheshunt.
Chingford (RSGB Group)—Fridays, telephone 01-524 0308.
Chingford (SRC)—Fridays, 7.30pm, Friday Hill House, Simmons Lane, Chingford, E4.
Civil Service (CSRS)—First and second Tuesdays in each month, 6.30pm, Civil Service Recreation Centre, Monck Street, Westminster.

Croydon (SRCC)—Third Tuesdays, 7.30pm, Swan & Sugarloaf, South Croydon.
Crystal Palace (CP & DRC)—Third Saturday in each month. 20 November (Film and slide evening—club activities reviewed by G3SBY, G2LW and others), 8pm, Emmanuel Church Hall, Barry Road, SE22. The club's score for VHF NFD exceeded all expectations and was well up on last year's.
Dartford Heath DF Club—Club meets weekly. 7 November (Mobile walking hunt), 12 November (Club night), 26 November (Club night), 8pm, Scout House, Broomhill Road. Club holds a Sunday net at 1100 hours on 1,930kHz.
Dorking (DR & DRS)—Second and fourth Tuesdays in each month, Wheatsheaf, Dorking.
Ealing (E & DARS)—Tuesdays, 7.30pm, Northfields Community Centre, Northcroft Road, W13.
East London—21 November ("Broadband microwave links", by D. Penny, G3PEN), 3pm, Wanstead House, The Green, London E11 (by Wanstead station, Central Line).
Edgware & Hendon (E & DRS)—Second and fourth Mondays in each month, 8pm, St Georges Hall, 51 Flower Lane, Mill Hill, NW7.
Farnham, Bucks (Burnham Beeches RC)—Fortnightly on Mondays, Buffaloes Hall, Victoria Public House, Victoria Road, Farnham Common.
Gravesend (GRS)—Mondays, 8pm, Northfleet Recreation Centre, Springhill Road, Northfleet, Kent.
Guildford (G & DRS)—Second and fourth Fridays in each month, Guildford Engineering Society, Stoke Park.
Hampton Court (TVARTS)—First Wednesday in each month, 7.30pm, The Three Pigeons, Portsmouth Road, Long Ditton.
Harlow (DRS)—Tuesdays (General and cw practice); Fridays (Junior), 7.30pm, Mark Hall Barn, First Avenue.
Harrow (RSH)—Every Friday. 5 November (Practical), 12 November (G3NNG talking on his vhf receiver), 19 November (Practical and bring and buy sale), 26 November (G3RPE and G3HWR on 3cm), 3 December (Practical), 8pm, Harrow County School for Boys, Sheepcote Road, Harrow.
Havering (H & DARC)—Fortnightly, 8pm, British Legion House, Western Road, Romford.
Hemel Hempstead (HH & DARS)—First and third Fridays in each month, 7.30pm, "Addmult" Sports Club, Hemel Hempstead.
Holloway (GRS)—Mondays (RAE), 7pm; Fridays (Morse), 7.30pm, Whittington School, Highgate Hill, N19.
Hounslow (BEAARS)—Last Wednesday in each month, 7pm, BEA Training Centre, Southall Lane, Heston, Hounslow. (This club is open to non-BEA employees by invitation—contact David Evans, G3OUF, telephone Amersham 3257 for details).
Ilford—Every Thursday, 8pm, 50 Mortlake Road (off Ilford Lane), Ilford.
Kingston (K & DARS)—Second Wednesday, 8pm, Penguin Lounge, 37 Brighton Road, Surbiton.
Loughton—Fortnightly on Fridays, Loughton Hall, Rectory Lane. (nr Debden station).
New Cross (CARS)—Wednesday and Fridays, 8pm, 225 New Cross Road, SE14.
Paddington (P & DRS)—Wednesdays, 8pm, Beauchamp Lodge, 2 Warwick Crescent, W2.
Purley (P & DRS)—First and third Fridays, 8pm, Railwaymen's Hall, Side Entrance, 58 Whytecliffe Road, Purley.
Reigate (RATS)—First Wednesday in each month, 7.45pm, George and Dragon, Cromwell Road, Redhill.
Romford (R & DRS)—Tuesdays, 8.15pm, RAFTA House, 18 Carlton Road.
Scouts (ARS)—Third Thursday in each month. 18 November (Martin Milner and John Waters—Jamboree in Japan), 16 December (Junk sale, construction contest and Christmas social), 7.30pm, Baden Powell House, Queensgate, South Kensington, SW7.
Sidcup (CVRS)—First and third Thursdays in each month. 4 November (25th anniversary celebration), 18 November (natter night), 2 December (The equipment of EMSAC Ltd, Mr Crowther-Watson), Congregational Church Hall, Court Road, Eltham, SE9. *G3IAR.*
Southgate (SRC)—Second Thursday in each month, 7.30pm, Civil Defence Hut, Bowes Road, N21.
St Albans (Verulam ARC)—17 November (KW Electronics Ltd will lecture and demonstrate their currect range of amateur equipment, also advance information on 1972 products. Visitors are welcome.), 22 December (AGM), 7.30pm, Town Hall, St Peters Street, St Albans.
Sutton & Cheam (SCRS)—Third Tuesday in each month—16 November (Junk sale), 21 December ("Antenna noise bridge", talk and demonstration by Bob Tillin, G3MES), 8pm, The Harrow Inn, High Street, Cheam.
Welwyn (Mid-Herts ARS)—Second Thursday in each month. 11 November (G. Jessop, G6JP, will talk on valves and valve efficiency in hf/vhf transmitters), 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 Dain Evans G3RPE, at 904 1262, for further details).
Woolwich—Contact G3ZOJ—re-forming this society.

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

Brighton (BTCARC)—15 November ("DX and contest working", by G3FXB, also slides taken during his recent visit to amateur stations in the USA). Meetings held at Richmond Terrace, Brighton. Further details from G3OMH.
Canterbury (EKRS)—18 November ("Semi-conductors", by G3JIX), 16 December (Constructional contest).
Dover (SEKYMCAARC)—Meetings held every Thursday at YMCA, Leybourne Road, Dover.
Eastbourne (SARS)—Meetings held on the first Monday in each month at the Victoria Hotel, Latimer Road, Eastbourne.
Horsham (HARC)—3 November (Hints and tips on metal work applicable to rig construction), the "Swan", West Street. 17 November (Informal), 8pm, the "Star", Roffey.
Maidstone (MYMCAARS)—Meetings held every Friday, the first and third Fridays in the month being devoted to beginners primarily, classes in the club room, and "on the air" sessions in the shack. 12 November ("CW operating techniques", by G3ORP), 26 November ("Quagi aerials", by G3ORP).
Mid-Sussex (MSARS)—All meetings at Marle Place, Leylands Road, Burgess Hill. Further details of meetings from G3RXJ.
Thanet (TRS)—5 November (G3YCV, G3DNR and the treasurer talking on vhf).
Worthing (W & DARC)—9 November (Illustrated slide lecture on The World Administrative Radio Conference), 7 December (Christmas "take your pick" competition).

REGION 9 — RR J. Thorn, G3PQE

The ORM held in Weston-super-Mare on Sunday, 19 September was well supported with 114 callsigns signing in plus many visitors to this popular resort. Will A. G. Bounds, G3KDP, from Aldridge, Staffs, please contact the RR with his address as he won the lucky prize.
Bristol (City & County RSGB Group)—29 November ("Oscilloscopes", by K. Otway, G8AGT, and D. Philpott of Tektronix Ltd), 7.30pm, Becket Hall, St Thomas Street, Bristol 1. *G3ULJ.*
(University)—Meets every Saturday, 2.30pm, Royal Fort, Dept of Physics, Tyndall Park Road, Bristol, 1. *G8ADP.*
Burnham-on-Sea (BOSARC)—Contact J. Robertson, G3ZOR, telephone 2333.
Cornish (CRAC)—First Thursday in each month, 7.30pm, SW Electricity Board Social Centre, Pool, Camborne. PRO, G3NKE. *G3UCQ.*
(Newquay)—Meets alternate Wednesdays. 3, 17 November. 1 December, 7.30pm, Treviglas School, Newquay. *G3THT.*
Exeter (EARS)—9 November, Club HQ, Community Centre, St Davids Hill, Exeter.
North Devon (NDRS)—10, 24 November. Club meets at "Grinnis", High Wall, Sticklepath, Barnstaple. *G4CG.*
Plymouth (PRC)—2, 16 November, Club HQ, Virginia House, Batter Street, Bretonside, Plymouth. A construction class is being run for uhf equipment by R. Daw, G3OIQ. The Annual Dinner is being held on 20 November at the Davie Hall, Plymouth.
Saltash (S & DARC)—5 November (Talk), 19 November (AGM), Burraton Toc H, *G3XWA.*
Torbay (TARS)—Club meets every Tuesday and Friday, 27 November (special demonstration), Club HQ, rear of 94 Belgrave Road, Torquay. *G3NQD.*
Weston-super-Mare (WSMRS)—12 November ("Air traffic control", by G. Booth, G3KHA, Lulsgate Airport Flying Controller). Please note that all future meetings will be held on the second Friday in each month at 7.30pm, Lecture Theatre, Room 2, Weston-super-Mare Technical College. *G3GNS.*

Other clubs meet in the region—Bristol ARC, Bristol Shirehampton Club, Bath Radio Society, South Dorset Radio Society, Taunton Radio Society, Wells Radio Society, and Yeovil ARS. AGMs are coming up soon so clubs are advised to publicise their activities.

REGION 10 — RR D. Thomas, GW3RWX

Blackwood (ARC)—Fridays, 7.30pm, Oakdale Community Centre, Oakdale, Mon. *GW3TUG.*
Barry College of Further Education (ARS)—Thursdays, 7pm, the College of Further Education, Colcot Road, Barry, Glam. The AGM was held on 14 October and the 75th anniversary of the Marconi-Kemp tests from Lavernock to Flatholm Island was discussed at length. A very ambitious programme is planned, including a possible postage stamp issue and an exhibition of the original Marconi equipment in the National Museum of Wales. Full details will be available later in the year. *GW3VKL*
Cardiff (RSGB Group)—Monday 8 November, 7.30pm, BBC Club, Llandaff, nr Cardiff. *GW3GHC.*
Glamorgan Raynet Group—Details of meetings, exercises, etc, available from GW3ZFG, telephone Cardiff 62411.
Haverfordwest (ARS)—Tuesdays, 7.30pm, HQ Rosemary Lane, Haverfordwest, Pembs. Club callsign GW3XZT. Secretary GW3YBB.
Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, nr Merthyr, Glamorgan. Secretary Mr F. E. Tribe.
Port Talbot (ARC)—Second Tuesday in each month, 7.30pm, Trefelin Club & Institute, Trefelin, Port Talbot, Glamorgan. *GW5VX.*
Pontypool (ARC)—Tuesdays, 7pm, Educational Settlement, Rockhill Road, Pontypool, Monmouth. *GW3JBH.*
Pembroke (ARC)—Last Friday in each month, 7.30pm, Defensible Barracks, Pembroke Dock, *GW3LXI.*
Sully & District Shortwave Club—Tuesdays, 7pm, The Annexe, Sully Bowls & Social Club, 59 South Road, Sully, Glamorgan. Club callsign GW3ZIT. Secretary Mr Glyn Maggs, 3 Thorley Close, Cyncoed, Cardiff.
Rhondda (ARS)—Meets at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glamorgan. Details of meetings from *GW3PHH.*
Swansea Telephone Area (ARS)—Tuesdays, 7.30pm, Telephone Engineering Centre, Gors Road, Swansea. Secretary Mr D. E. Connor, 7 Glenmon Road, Sketty, Swansea, Glamorgan.
University College Cardiff (ARS)—Although it is not possible at the time of publication to estimate numbers, it is hoped that a very successful session will occur, with plenty of activity for the society callsign GW3UWC. Secretary c/o Students Union, Dumfries Place, Cardiff.
University College of Wales, Aberystwyth Radio & Electronics Society—Meetings on Wednesdays, 10 November ("Electronics in broadcasting", by R. J. Luke of BBC Blaenplwyf), 8pm, in the Physics Building, Penglais Campus, U.C. Aberystwyth. Secretary Miss Ruth Bury, c/o Students Union, University College of Wales, Aberystwyth, Cardiganshire.

REGION 12 — RR G. M. Grant, GM3UKG

Aberdeen (AARS)—Fridays, 7.30pm, 6 Blenheim Lane, Aberdeen. A popular visitor to the clubrooms of AARS recently (for the second year running) was "Banks", FOPQ/WA3MER/MM Region 1, who now resides at Villa Tia, Avenue Des Lucioles, Quartier Trianon, Juan-les-Pins. GM3HGA, telephone Aberdeen 33838.
Inverness (IRS)—Clubroom is open most Thursdays, and is situated at 4 Falcon Square (nr Railway Station), Inverness. Miss A. Veith, telephone Drumnadrochit 266.
Lerwick (LRS)—Tuesdays and Thursdays, 8pm, Annisbra House, Lerwick. GM3XPO, telephone Bixter 249
Lhanbryde (MFARS)—Wednesdays, 7.45pm, St Andrew's School, nr Llanbryde, Elgin, Morayshire. GM3UKG, telephone Clochan 225.
Thurso (CARS)—Second Tuesday in each month, 7.30pm, contact GM3JUD who will give QTH.

REGION 13 — RR V. W. Stewart, GM3OWU

Berwick (BARS)—First Sunday in each month, 3pm, Tweed View Hotel. Further details from C. H. Crook, G3YOG, 19 Hatters Lane, Berwick on Tweed, or from the AR, G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick, Roxburghshire.
Glenrothes (GDARC)—First Sunday in each month, 7.30pm, Old Nursery Buildings, Leslie, Fife. Further details from K. Home, GM3YBQ, 14 Liss Way, Kirkcaldy.
Edinburgh (LRS)—Second and fourth Thursdays, 7.30pm, 66 Hanover Street, Edinburgh. Further details from R. Manners, GM3ZVB, 165 Mayfield Road, Edinburgh.
Lothians Radio Society—11, 25 November, 9 December, 7.30pm, 66 Hanover Street, Edinburgh.

REGION 14 — RR N. G. Cox, GM3MUY

Ayrshire (AARG)—7, 21 November, 7.30pm, YMCA, Howard Street, Kilmarnock.
Ayrshire (Ardeer Recreation Club)—2, 4, 9, 11, 16, 18, 23, 25, 30 November, 7.30pm, Ardeer Recreation Club, Amateur Radio Section, Stevenston. Details from J. F. McCreight, GM3DJS, 10 Auchenharvie Road, Stevenston. Ayrshire.
Falkirk & District RSGB Group—12 November, 7.30pm, Temperance Cafe, Lint Riggs, Falkirk.
Glasgow University (GURC)—5, 12, 26 November, 7.30pm, George Service House, University Gardens, Glasgow, W2.
Greenock & District (G & DARC)—5, 12, 19, 26 November, 7.30pm, James Watt Library, Union Street, Greenock.
Mid-Lanark RSGB Group—19 November, 7.30pm, YMCA, Brandon Street, Motherwell.
West Scotland (ARS)—5, 12, 19, 26 November, 7.30pm, 81 Virginia Street, Glasgow.

REGION 16 — RR W. J. Green, G3FBA

Again, no Club News has been received this month, and below are the latest details of club secretaries so far as is known. Club secretaries are requested to note the information at the heading of Club News if they wish for publication of their club's events.
Ipswich (IRC)—*G3YWM.*
Norwich (NARC)—Mr J. L. Lockwood, G3XLL, 29 Coppice Avenue, Hellesdon, Norwich, NOR49M telephone Norwich 48685.

The West of Scotland ARS (GM4AGG) was formed early in 1970, quickly became a success and has continued to grow. It now has some 100 members and permanent clubrooms which it occupied in May 1971. All radio enthusiasts are welcome at its meetings on any Friday evening at 8pm. The photograph shows members present at a meeting attended by Zonal Council Member A. W. Smith, GM3AEL; front row (l to r) are GM3JRP, GM8MJ, GM3AEL, GM6MD, GM3SSB and GM3HLQ

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

Basingstoke (BARC)—Meeting on the first and third Saturday in each month. 6 November (Morse and station operation), 20 November ("Oscillators", lecture by P. Sterry, G3CBU), 7pm, Chineham House, Shakespeare Road, Basingstoke, Hants. *G3CBU.*

Harwell (AEREARC)—Meetings on the third Tuesday in each month, also informal gatherings and junk sales every Friday lunchtime. Next meeting on 23 November (Visit by the Swindon ARC), 7.30pm, Social Club AERE, Harwell, Didcot, Berks, *G3NNG.*

Maidenhead (MDARC)—16 November (Vhf Field Day inquest and film), 6 December (Informal), 21 December (Home construction competition), 7.30pm, Victory Hall, Cox Green, Maidenhead, Berks. Club nets are held on 1·88MHz each Sunday at 1100 hours, and on 144·7MHz each Tuesday at 2000 hours. The club secretary is now G3ZPK. *G3VMR.*

Newbury (NDARC)—Meetings on the first Monday in each month, 7.30pm, South Berkshire Technical College, Newbury. Forthcoming topics include G3MPS talking on amateur tv, safety in the shack and home, and films. *G3KJC.*

Portsmouth (RNARS)—The 11th AGM of the RNARS took place on HMS *Mercury* on Saturday 4 September. There were about 30 members present including the society's President, Capt B. H. Kent RN. The meeting closed at 5pm when the visitors were shown around HMS *Mercury* and G3BZU went on the air. Details of the new committee line-up will be given after the next bi-monthly meeting. *G3DOT.*

Reading (RDARC)—Meetings are held on alternate Tuesdays at the club's new address at Ashmead School, Northumberland Avenue, Reading. The next meeting will be on 9 November, 7.30pm. The AGM will take place on 7 December. *G3NBV.*

Southampton (RSGB Group)—13 November, 7.30pm, Lanchester Building, Southampton University.

(SDARC)—Club meets every Wednesday, 7.30pm, G3ZKR, Kent Road, Southampton, telephone 73378. *G3ZKR.*

Swindon (SDARC)—5 November (Bonfire party), 10 November (Lecture "operating procedure"), 23 November (Visit to Harwell ARC), 24 November (Social evening and junk sale), 7.30pm, Penhill Junior School, Penhill, Swindon, *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 postcard similarly laid out. Each must be accompanied by a recent *Radio Communication* wrapper addressed to the advertiser, as proof of membership.

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. Valid advertisements not published in the issue following receipt will be held over until the next issue and should not be resubmitted.

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

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

No correspondence concerning this free service can be entered into.

See the current order form for further details.

FOR SALE

HA500 with calibn xtal, gd cond, £25, buyer coll. Fox, 172 Bedford Road, Letchworth, Herts SG6 4EA. Tel Letchworth 6820.

KW2000B with ac psu, exc cond, £175. TW communicator, 2m, £35. Tibbert, 11 Darwin Road, Mickleover, Derby. Tel 511434.

TF144G sig gnrtr 85kHz-25MHz, £13. Cossor 1035 db scope, vgc, £17. AVO 7 in case with leads + external shunts, £15. RCA KT66 modulator with UM1, £4. Will del rsnble dist. Homer, 32 Ironmill Lane, Crayford, Kent. DA1 4RR. Tel Crayford 24625.

Panda PR120V tx, £10 ono. Also Codar PR3OX preselector, £3. G3UKW, QTHR. Tel Garforth 5165.

BC221 wavemeter in wooden case, comp with charts and spare valves, £15. G3OSE, QTHR. Tel Nuneaton 67992.

Geloso G4/217, mint cond, £45. Geloso tx G222TR, £32. Eddystone 68OX, £45. Aircraft rx HA55, £12. Teleprinter Creed 7B, tu commercial psu, comp utb, £25. Post and packing not inc. GI5ABZ, 27 Glengoland Gardens, Dunmurry, NI.

KW Vanguard, 160-10m, gd cond, ptt, spare 6146, £33. Howie, 28 Lucas Street, Leeds 6.

Trio JR310, mint cond, no mods, £55 ono. Fuller, 12 Alexandra Drive, London, SE19 1AJ.

Two Hammarlund SP600 rxs, one perf cond, £85 ono, other less cab, req attention, otherwise clean, £35 ono. G3MRQ, "Breckside", Brook Street, Fenny Compton, Nr Leamington Spa, Warks.

Eddystone 750, gd cond, £45 ono. Also rx sctn Pye 704 base stn cnvtd for 2m, tuneable, £7.50 ono. Carr to be arranged. G3OBX, QTHR.

Eddystone 840C, 550kHz-30MHz, gd cond, £40 ono. Codar PR3OX, self-powered rf preamp, as new, offers. Kent, 4 Haig Road, Bedlington, Northumberland, NE22 5AW.

Murphy Rambler walkie-talkie on 70·26, £15 ono. Admiralty power pack 100336 with 565-0-565 at 400mA, trans, heavy duty chokes etc, total weight 128lb, £5 ono. G3UFS, QTHR. Tel Lancing 5679.

3 band Labgear cubical quad with 30ft tower, 30ft aluminium pole, 45ft low loss coaxial thrust bearing, £30. Buyer coll or extra for carr. Feary, 4 Orchard Site, Wootton Bassett, Nr Swindon, Wilts.

Collins KWM-2 tx/rx with PM-2 ac psu, factory checked with every worthwhile official mod + Waters rejection fltr. Also HY204BA beam. Offers. Thurlow, 2 Church Street, Wimblington, March, Cambs. Tel Doddington (Cambs) 255. (Std 035-45 255).

3 band 3-ele G4ZU/Panda beam comp with tuning unit full technical and erecting instrctns, £15 + carr. G5ND, 23 George Avenue, Blackpool. Tel 64508.

Collins 75A4 rx, 160-10m 1MHz segments, 3 fltrs 110V (auto trans supplied), £150 ono. Command rxs, Wilcox Gay vfo, valves, xtals, meters, "*Bull*", *SWM* etc, 1946-71, 50p per vol, + post. Moorhead, 32 Hillsborough Road, Lisburn, N. Ireland.

Hi-band Pye Ranger tx/rx suitable for cnvsn to 2m, £5 ono (12Vpsu). Underwood, 6 Bell Lane, Narborough, Leicester LE9 5HB.

Unica UNR3O with extra audio stage, rf gain, mute, anl etc, £12. Can arrange coll in London area at w/ends. G3ZVW, c/o PO Radio Station, Leafield, Oxon.

Mohican, £15. AR88, £26. Variac, £8. 10A stepdown trnsfmr, £8. Taylor v tester minimeter, £4. AVO all-wave oscillator, £4. TUSB tuning unit, £2. 234 psu, £2.50. Ac motor, £2.50. Buyer coll. Earnshaw, 12 Clarke Brow, Middleton, Manchester.

HW17A 2m tx/rx comp with 12V dc invtr and hndbk, 4 xtals, exc cond, £45. G8EEN, 77 Chichester Park, Westbury, Wiltshire.

Going abroad: FR100B, £75. BC348 with psu, spkr, £9, Kokusai fltr, £6. 898 dial, £4. Multiminor, £5. TE18 gdo, £8. Homebrew qrp 80m cw /P tx, £5. Offers consd, pref buyer coll. G3NFB, QTHR. Tel Alsager 4153 (evenings).

KW2000A with ac psu, Shure mic, swr bridge (KW) and channel 4 lpf, i.f. wanted, new pair 6146Bs, immac cond, £165 ono. Lockwood, 29 Coppice Avenue, Hellesdon, Norwich NOR 49M. Tel Norwich 48685.

Wilcox Gay vfo fitted stblzr and nbfm circ, rust on case otherwise OK, £3.50. Scope timebase Y amp, ideal tx monitor, £7. G3GFM, QTHR. Tel Bookham 4813.

Comp *Radio Communication* January 1969 to June 1971. *SWM* July 1969 to June 1971, both for £3.25 ono + carr. RSGB *Amateur Radio Handbook* 3rd Ed, 544 pages. Hamgear preselector atu mains operated, both vgc, offers? Stephenson, 82 Morris Lane, Leeds LS5 3EN.

Unused Weston m/Vmtr relay, 28·5mV low, 31·5mV high, contacts 1mA centre reading, £5. Unused C & H sequence switching relay, 10 stage 240/1/50, £15. ⅓hp 240/1/50 motor, £10. Mains variable 2A trnsfmr, £5. Grieve, "Freshfields", Crouch House Road, Eden Bridge, Kent. Tel Eden Bridge 2526.

AR88D S meter, manual, gd cond, £30. AR88D gearbox, £3. Cowlgill motor, £3. 42ft 3 sctn mast, £12. 2m cnvtr 28-30MHz i.f., £4. 2in and 3in magslips, hd trnsfmr, chokes. G3PYP, 15 Winston Road, Melksham, Wilts.

BRT400 recently revalved, £70. Solartron scope CT316 DC-5MHz, £30. BC221 with psu, £20. Scope type 10, mint, £10. 8A variac, £10. 6ft /M rack with rear door, £5. Mulford, 139 George Lane, Lewisham, London SE13. Tel 01-852 1308.

4ele Yagi beam for 10m, G3MHW design, folded dipole radiator, 72Ω, lightweight 8dB gain, £7. Buyer to coll. G3VIE, QTHR. Tel West Forest 4048 (Berks).

KW2000 late model with dc/psu and mc mic, £100. GW3FKO, QTHR.

Eddystone 888A, vgc, £55. Heathkit SB1OU, £15. 4CX25OB new, boxed, sealed by GEC, £6. Noise diodes for *Radio Communication Handbook* noise gnrtr, new, boxed, CV2398 (several available), £1 ea. G3UYD, QTHR. Tel Chandlers Ford 2309.

KW Vespa Mk 2 6LQ6 alc psu, £90. KW201 rx, £75, del in 1st class cond. G3YBK, QTHR. Tel Exeter 7810.

Trio JR500SE rx, unused, £48 ono. Phillips, Shandon, Willesley Pound, Cranbrook, Kent.

Electroniques i.f. amp module type IFA/1·6/ssb Mk 3, brand new, unused, with mtchg diecast case and full info, £12 ono. G2AFD, QTHR. Tel Malvern 3242.

Radio Communication Handbook, latest edn, vgc, £1.80. psu 250V dc 70mA, 6·3 ac 2A, £1. Mic trnsfmrs lo:hi, lo:med, £1 ea. Mic

goosenecks, 60p ea. 813 new, ex wd, £1.50. Ceramic formers 2in dam, 35p. G3VWE, 35 Ledbury Road, Fishponds, Bristol.

Brookes Mosley ssb Commando tx, built-in psu, £35. G4ZU beam, £5. Fielding, 397 Torbay Road, Harrow. Tel 01-866 4357.

Joystick aerial and atu, brand new, never used. Also morse instrctn records course, beginners and advanced, new. Any offers? Dr R. Le Sueur, 2 Wood Path, Southsea, Hants. Tel Portsmouth 25220.

4CX25OK comp with coaxial base, ideal uhf, £12.50. G3JNX, QTHR. Tel Brixham 3142.

Lafayette HA700 rx, perf order, unmodded, mech fltrs, unmarked with hndbk 10-160m, £25 ono. G3XPI, QTHR. Tel 41209 (Rochdale).

Hammarlund SP600 rx, 0·54MHz-54MHz, cont cov, £100 ono. Part del. G2CBC, 115 Thorpe Road, Peterborough, Tel Peterborough 5080.

Cossor 339 scope, hndbk, £10. Shack contents: resistors, capacitors, trnsfmrs, 522 Set 18 Set, psu, 11 etc, £7 or the lot £15. Buyer coll. Hemes, 8 Hazelton Road, Marlbrook, Bromsgrove, Worcs. Tel Bromsgrove 73626.

Class D Mk 2 mains wavemeter with charts, 19·2MHz, comp set of spares, £8, new. BRS29791, 4 Hill Farm Road, Chesham, Bucks. Tel Chesham 5557.

B46 rx, 1·4-15MHz, slight fault, needs ht trnsfmr, It trnsfmr already fitted, needs about 200V ht, pref buyer coll or pay carr, £7.50 ono. Iredale, Drummond Lodge, Conway Road, Llandudno, N. Wales. Tel 77615.

Webster bandspanner, 80-10m,, spring mount, unused, £15. HRO bndsprd coils, 80, 40, 20, 10m + 160m, £2.50 ea. BC221, £10. HRO dial condenser, £3.50. S-meter, £1.50. All plus carr. G3DAR, QTHR. Tel Guiseley 3279.

Collins KWM2 /M psu, also /M mount type 351D2, both fb cond, half price ono. G3VKP, QTHR. Tel Cambridge 55341.

Lafayette 99-2501, vfo, 10-80m, £5. Presentation Vibroplex, all chrome £12. Both immac, post extra. G3RB, QTHR. Tel Whitley Bay 30504 (after 7pm).

Stab psu, various output voltages, suit transistor eqpmnt, £3.25, post paid. Ross, 16 Glebe Crescent, Airdrie, ML6 7DH.

80ft BICC sectnl mast, 10 bolted sectns, all comp with erection pole and base insulators etc, now dismantled, £25. Will arrange del if reqd. G2AMJ, QTHR. Tel Hull 653358.

KW2000 with ac psu, mint cond, £140. Linear in matching cab. 4X6HF5 prof built, £40. Pref Buyer coll or + pp. G2COP, "Iona", Sherwood Lane, Worcester, WR2 4NU. Tel Worcester 25008.

Selling cheap: base for 813. 32MHz wideband i.f. strip for microwave rx. Heavy duty smoothing chokes. Instant heat soldering iron. Wanted: coaxial c/o switch, dc operated. G3KH, 133 Station Road, Cropston, Leicester, LE7 7HH.

HW30 comp. Offers. G8BXO, QTHR.

Lafayette HA350, spkr, £55. Low band Pye Reporter, unmodded, £2.50. *SWM* from 1961 to present day, offers pse. G3TWX, QTHR.

Courier CTR1 ssb tx/rx, 200W p.e.p., 160-10m, Vox ptt, ac 12V psu, 16in by 5½in by 11in, Shure mic. G3RHZ, QTHR. Tel Leicester 883291.

Comp stn comprising TCS-10 tx and ac psu with HRO-MX, psu and all gd cond coils, plus 80m bndspd. Also Class D wavemeter, £45 the lot or will split. G3ZYN, 9 Quendon Drive, Waltham Abbey, Essex. Tel 97 23820.

B & R coaxial relays, 24V dc with mtchng plugs, 75p. G8BNJ, QTHR. Tel Cheltenham 57595.

Electroniques HB166T Mk 2, IFA/1·6/ssb Mk 2 and Eddystone 898 dial, all in vgc. Vlaswinkel, 22 Ravensmead, Chinnor, Oxon. Tel 0844 51113.

Murphy low band /M TR821/25 PA QQVO3/10, transistorized psu, £3.50. Cossor walkie-talkie CC3, low band, mainly transistorized, 250mW output, 3 channels, canvas case, less batts, £4.50. Both units unmodded. GM3RHR, 41 Southesk Avenue, Bishopbriggs, Glasgow. Tel 041-772 3085.

Trnsfmr 1,000V 400mA, 300V 100mA, 6·3V 3A + others, with rectifier bridge, £5. 250W auto tx/rx, 240V input, 103V, 110V, 117V and 124V outputs, £2. New boxed 5B254/M, 75p. Xtals: 144·085 145·20, 40p ea. Angell, "Littlemead", 46 Upton Park, Slough, SL1 2DE. Tel Slough 21086.

Videcon type 7038, brand new, perfect, offers. G3ION, QTHR.

Panda PR120V, fb performance and appearance, 12 new spare valves inc rectifiers and delay switch, manual and "turn to talk" relay unit inc, £38. G3UQP, QTHR. Tel St Neots 2236.

New unused QCC 10X gold-plated xtal 8,004kHz, cost approx £2.40 4 yrs ago, OK for 144m cw allocation, offers. Sae pse. G3IXO, QTHR. Tel Winscombe 2360.

Hallicrafters S38 gen cov with bndsprd, £7. Wavemeter Class C with manual, £1.50. Dentsu bug key, £2.50. RA1 manual, new, 50p. DX60U vfo manual, new, 50p. CR100, overhauled, gd performer, £15. Buyer coll pse. G3ZDR, QTHR. Tel Gravesend 63284.

2m Cnvtr, i.f. 6-8MHz + 6CW4 Nuvistor for pre-amp, also 4 by 14 ele Yagi. The lot £6 + postage. DFG24/2 with psu, 1-20MHz, ideal for beginner but needs attntn, buyer coll, £3.50. Lot together, £8.50. Martin, 22 Ross Gardens, Edinburgh, EH9 3BR. Tel 031-667 8707.

Electroniques coilpack QP166HB, three 1·6MHz i.f. trnsfmrs, bfo coil, Q mult coil and 3 6BA6 valves, £12. EC10 Mk 1, gd cond, £35. Eagle sig gnrtr SG70, £8, nearly new. G3WXG, QTHR. Tel Brighton 553150.

Heathkit SB301 rx, immac mtchg spkr SP600 + hdpns, £100. Eddystone S640 rx, cnvrtd to D shet, spkr, hdpns, manual, some spare valves, £11. Callers after 6 pm weekdays. G3MGF, QTHR.

6 ele 2m beam, new, £2. 2N3866, 50p ea. 2N3553, 50p ea. BLY35, £1.50 ea. BFY50, 12p ea. BSX20, 10p ea. G8BSO, 10 Crutchley Road, Wokingham, Berks. Tel West Forest 6923.

KW2000A with mtchg ac psu and hndbks, perf, first genuine offer over £140 secures. Heathkit OS-2 scope in mint cond with hndbk, £25. Carpenter, 10 Avenue Road, Frome, Somerset.

Padded swivel chairs, ideal for shack, £5 to £12. Filing cabs for QSLs (metal), £2 per pair. Pye Base station. Wanted: SB600 and 813s. G3LDI, QTHR. Tel Wymondham 3463.

Hartley 13A double beam scope, 2Hz-5·5MHz, leads + probe, gd wkg cond, £17.50 inc pp. Bradley, Royal School for the Deaf, Topsham Road, Exeter, Devon.

Trio 9R59D gen cov rx, spkr — stab valve, gd cond, £30 ono. Geloso G2O9R, 10-80m rx, just prof realigned, £30 ono. G3ZSQ, 27 Hurst Way, Luton. Tel 0582 591020.

Olympic T15OX tx, variable power, am/cw, offers. Buyer coll. G3YQR, QTHR.

KW Vanguard, 50W am/cw tx, £20. AR88LF rx, spkr, £25. Both in vry gd wkg cond. Stn going ssb. GC3ZIP, "Les Varendes Cottage", Catel, Guernsey, CI. Tel Guernsey 56025.

3W audio amp. £2. 20W audio amp, £10. Both in cabs and gd cond. Rutland, 23 Farndale Crescent, Greenford, Middlesex.

VRL rx, £5. Transistor inverter, 12-250V, £2. G3VCA, QTHR. Tel 01-573 6624.

Codar CR70/A, spkr etc, still under 12 mth guarantee, £21, mint cond. Pryce, 2 Seven Sisters Road, Lower Willingdon, Eastbourne, Sussex. Tel Eastbourne 33476.

200 new 1% and 2% resistors, 5p ea or £2.75 the lot. Mann, 45 Old School Lane, Milton, Cambridge.

Trio 9R59DE and spkr SP5D, £35. Can del rsnble distance. Hitchins, 66 Buttermere Road, Stourport, Worcs. Tel Stourport 4877.

Trio 9R59DS, £40. New Command rx, 5-9MHz. Q5er, R220, vhf 715, £5 ea. Wanted: HRO coil 14-30MHz, pref b/s. G3OMF, QTHR. Tel Lapworth 2190.

Pye 20W and 10W Rangers. Pye Cambridge unmodded, circs and hndbks available. BC221 comp with psu and charts. Many other spares. G3SBT, QTHR. Tel 01-542 7943.

Reslosound ribbon hi-fi mic, stand, trnsfmr £8. 2X6BW6, 2X6BH6, 1X15OB2, 30p ea. Buyer coll. Following *Radio Communications*: Mar 1961 to Dec 1970, £2. Douglas MT11, 300-0-300, 100mA, £1.25. G3XKA, QTHR. Tel Woking 3260.

KW2000A, £170. KW600, £70. CDR, £10. 7H3DX, £40. Heathkit tower, £25. Feeder, £5. Mains feeder, £5. B44, £5. BC221, £15. The lot, £325, postage extra or buyer coll. G3PXX, 16 Collingham Green, Little Sutton, Wirral, Cheshire. Tel 051-339 4571.

MWT/BCC HP18A hi-band, /M, hndbk, £5·25. Murphy 806/25, /M, hi-band, QQVO3-20, hndbk, £10.50. Bendex TA12D aircraft tx, 2X807 pa, £5. Wanted: hf trap vertical 14AVQ or similar. Partridge, 232 Chamerlayne Road, London NW10 3LG. Tel 01-459 2169 or 01-743 8000 xtn 3494/5.

Atlanta VFO4A, new, £20. EK-9X electronic keyer, £5. Helical G whip, 160m, £4.50. SSM 2m cnvtr, £8 Pref buyer coll or will del by arrngmnt rsnble distance. G3TRK, Kitson, Bent Lane, Colne, Lancs. Tel Colne 4187.

Hammarlund SP200SX with psu, £30. EMI Vidicon 9677, £7. EAP Cadenza ribbon mike. £4.50. Pair Re-entrant pa spkrs £5.50. Monarch Ham-1 rx, 1·6-30MHz + mw, £10. Pref buyer insp and coll. G3XUS, QTHR. Tel Newhaven 4465.

3X4X150A, 75p ea. Coaxial relay, £1. Thermo-couple meter 1A fsd, £2. Glass B7G, xtals 2000kHz, 4000kHz, £1.50 ea. 3 E88CCs, 25p ea. 1¼in diam crt, £1·50. CW base, 2X4D32, 25p ea. G3SVD, QTHR.

DX100U, rsnble cond wkg all bands, spare 6146s, £40 ono. Wanted: Gen cov rx around £35, EC10 Mk 2 or sim prefd. G3WCG, 27 Wades Road, Filton, Bristol, BS12 7EA.

Panda cub tx, £10. AR88D S-meter, realigned, cab and spares, £40. R107A, spares and hndbk, £15. Sphinx ssb tx, 160, 80, 40m, spares and mic, hndbk, £45. All in gd cond, £80 the lot. GD4AMZ, Walters House, King William's College, Castletown, Isle of Man.

KW2000A + psu, recently checked and revalved by KW, fb cond £165. G3URE, QTHR. Tel 089-426 3044.

KW2000A, new cond, £160. Green & Davis 500W linear, £40. G3LBG, QTHR. Tel 0702-521561.

Comps inc xtal mic, 17W modulator for 25W tx, RSGB *Radio Communication Handbook*, no psu, modulation trnsfmr, valves—EF86, ECC81, 2XEL84, £3.50 inc pp. Newton, 5 Hardwick Crescent, Sheffield S11 8WB

Mags inc *Radio Constructor, RSGB Bulls* and *CQ* 1960-71, over 160 to clear, 5p ea or offers for the lot. Post extra. Barnes, 105 Godstow Road, Wolvercote, Oxford, OX2 8PF. Tel Oxford 57697 (evenings).

EC10 Mk 2 with 924 psu, mint cond and appearance, hndbk, £60. Pref buyer coll or carr extra. Wanted: recording wire ·004 for KB, EWR60. Clampin, 12 Kersey Drive, Clacton-on-Sea, Essex, CO16 8AP.

1600-0-1600 300mA trnsfmr, £5. Two 813s and bases, £2.50 ea. Capacitors and switches for linear, £1. 300V psu, 150V stab and 6·3in 17in rack panel, £10, on sub chassis, £5. G3ZOJ, 54 Nightingale Place, Woolwich, London SE18.

TW Communicator-Two, £30. Will del within 30 miles. G8EJR, 9 Barncliffe Glen, Sheffield 10. Tel Sheffield 306427.

JR500SE rx, £45. Dowkey valve t/r switch, £5. E-zee match. £10, LG300 tx spare 813s, WBM pi-coil, pi-choke, circ, £20. Mod/psu for LG300 modulation not wkg, £10. PM2 preselector, new, £4. Stone, 39 Purrett Road, Plumstead, London SE18 1JR. Tel 01-854 6646.

Hallicrafter S120, accessories, S-meter, anl, ldspkr etc in mtchg box, 100kHz bndsprd + manual. PM1 preselector (mtchg) autotrnsfmr psu (value £5), clean, recently realigned, exc on ssb + a.m., £25 lot. Coll or pp extra. Marsden, 343 Wanstead Park Road, Ilford, Essex. Tel 01-554 9457

SB300E + cw fltr, £80. TA33jnr, £15. LM14 + psu, £20. TF144G Marconi sig gnrtr 85kHz-25MHz, £18. G3RMC, QTHR. Tel Southend 88382.

1967 Ford Anglia de-luxe, sound reliable car, £285. Consider high quality rx or tx/rx in part exch. Two 10in dual cone ldspkrs 15Ω £4 ea. G8CNV, QTHR. Tel Gt Missenden 3405.

Heathkit S-3U scope electronic switch + manual, £12. GD-1U grid dip meter with additional range coils + manual, £10. Acton CG6/1 rf sig gnrtr with output indic and af mod, £10. All carr extra. GM3VXR, 70 Leven Street, Motherwell, Lanarkshire. Tel M'well 66597.

Part built psu, all parts inc oil filled trnsfmr mtrs, suit Heathkit tx/rx, £7.50. LSB fltr carrier xtal 436kHz, £2.50. Home built 20m beam, full size 3ele, £4.50, all ono. G3UBL, 7 Beamish Drive, Bushey Heath, Herts. Tel 01-950 3443.

3KVA trnsfmr primary 415V secondary 110V, 27A, best offer secures Garrard 1025 turntable, xtal cartridge, little used, £3.50. Pref buyer coll. G8DII, QTHR.

Few Brandenburg psus, input 200-250 output 200-250, 50mA, dc regulated X2·6·31·5A ac, low ripple front panel, mains switch fuse indicator, ht fuse pot, size 6½ by 4½ by 7in, 2in series 500V, £5.50 + post 45p. G3JKU, 40 Hempshaw Avenue, Woodmansterne, Banstead, Surrey, Tel Burgh Heath 51799.

Heathkit DX-40U tx, £15, ono. Heathkit S-99 stereo amp, £25. GW3WTZ, QTHR.

Shack clearance: New QQVO2-6s, £1. QQVO3-20As, £1.75. QQZO3 -20As, £2.50. QQVO3-10s, 75p. QQVO6-40As, £2.50. AE c/o relays vhf/uhf, £3. Xtals, mics, 10·7MHz fltrs, many other items, sae list. G3AAZ, QTHR. Tel Welwyn 4078.

Eddystone EA12 with manual in orig packing, £150. Solartron CD711S scope with manual, £80. Prices inc del. Straight or part exchs welcome. GW3UCJ, QTHR. Tel Briton Ferry 2376.

Yaesu-Musen FTDX100 tx/rx, immac with homebrew external transistor vfo for /M wkg, £175. Also 12AVQ, 1 mth old, £14. G3KLF 12 Aveland Road, Ketton, Rutland.

Labgear type quad, 8 new Burma poles, 16 new Jubilee clips, 100yds new 3/029 Emra strong light spider. Will del rsnble dist, £15. G3MTX, QTHR. Tel Bexhill 177.

KW Victor tx, am/cw, 150W wkg, some attntn may be reqd, £15. G3DMJ, 49 Stanchester Way, Curry Rivel, Somerset.

Trio JR500SE rx + spkr, just over 12 mths old, mint cond orig packing, £50 ono. Hurst, 9 Wyndham Way, Newmarket, Suffolk. Tel Newmarket 2392.

Swan Cygnet 200W p.e.p. trnsfmr, built in psus, ac—dc, mint cond, £160. Eddystone 902 GDO, £15. Rotator AR22R, £14. G M whip 10, 15, 20m, £5. Quad mini boom, comp, £6. GM8AT, QTHR.

HE30, exc cond, £23. Wanted: Heath HW12A. G3ZIG, QTHR.

G2DAF Mk 2 tx, 200W 160-10m, mic/ptt, 898 dial and sep psu immaculate £45 ono. Psus, 300V 250mA, £5. 250-300V 250mA and 800V 250mA + 6·3 6A, £5. 250pF + 250pF split stator wide spaced, £2. G3MGW, QTHR. Tel Brightlingsea 2382.

BC342 rx + manual, £11. Class D wavemeter, mains internal psu, £5. Two 17in by 10in by 9in cabs, £1 ea. Buyer coll. G3MCA, QTHR. Tel Orpington 28790.

Ferguson 3228 tape recorder (1970), 4 track 2 speed, wooden case, transparent lid, numerous auxiliary sockets, vgc, £20. KW 52Ω dummy load, £3. LED 52Ω swr bridge (with graphs), £4. G3NRU, QTHR.

Codar AT5 with mains psu, unused, £20. Sharp, 1 Linnell Close, Meadway, NW11. Tel 01-458 3937.

Going QRT, KW600 linear, £50. KW2000A + KW Q mult, Shure mic, £160. G3WGF, QTHR.

Comp stn of G2LT: Panda PR120 tx. Hallicrafter SX28 rx, two mics, wavemeter, spare valves, £50 ono. Buyer coll. Mrs K. Walker, 20 Dalewood Road, Sheffield S8 OEB. Tel 355318.

Mk 2 19 Set, wkng but req attention, £2.50. Also 19 Set, psu, in perf order. £2.50. Variometer, 65p. Buyer coll. Adams, 180 Windmill Road, Gillingham, Kent.

HM11U 75Ω, HM15 52Ω, Heathkit swr meters, mint cond, 500mA Heathkit power choke, potted, shrouded, 7050, 7075 xtals, FT243, genuine Hallicrafter spkr, R47 unused, cost £8.50. Offers, sae. G3BRT, 10 Burlington Road, Redland, Bristol 6.

Marconi sig gnrtr, 20-80MHz, £24. Plessey mic tester inc multivibrator, £10. Canadian "52" rx and psu, £10. Trnsfmr primary, 230V ac, secondary 1,100V 3mA, 4V 1·5mA, offers. Buyers to arrange carr. Hunter, Dalesview, Geboykes, Masham, Nr Ripon, Yorkshire.

Two DM50 dynamic mics with Jack plugs for use with any Sommerkamp tx, new, £2 ea. GM3LLB, 4 Todlaw Way, Stonehouse, Lanarkshire.

Heathkit RA1 gen cov rx, + xtal calib, inc manual, £23 ono. Dallow, 89 Northwood Park Road, Bushbury, Wolverhampton, Staffs. Tel Fordhouses 3485.

Strobe unit, brand new, high quality and vy powerful, suit disco etc, £30. G3TGF, 29 Hillcrest Road, Orpington, Kent. Tel Orpington 26802.

Pye 15W a.m. base stn modded 144MHz, QQVO3-20A pa, £10. 80mB loading coil for hy-gain 12AVQ, £3. Invertor 12/500V dc 130mA/s, full screened, £3. Modulator p/p NKT404 suit 5B254M pa, £3. Woden UM1, £1.50. G3JMJ, QTHR. Tel Edenbridge 3467.

Exch Hammarlund SP600JX in mint cond table top cab with hndbk for KW2000 or sim. G3JNF, QTHR. Tel Loughborough 63832.

Marconi a.m. base stn tx, 2m, 20W output, £12. Rohde and Schwarz limit bridge type KZS, offers. G8CLY, QTHR. Tel Chelmsford 68824.

Trnsfmrs, chokes, meters, capacitors in exc cond, tested valves, 1% 1W resistors, 0·05 + 0·1mfd condensers, 400V suflex, brand new, 10p ea. Sae for lists. Kilner-Smith, 101 Oxford Road, Marlow, Bucks SL7 2PL. Tel Marlow 71284.

Western Electric AM913 and 914 vhf cnvtrs, 90-400MHz, as new, £40 the pair. Hickock valve tester I-177B comp with manual, adaptors etc, new, £18. All + carr. G3GUU, QTHR.

Codar CR70A rx with PR30 preselector, 1st class cond, manual, £18. + post. Leighton, 14 Wilton Park Road, Shanklin IOW. Tel Shanklin 3438.

Potentiometric recorder 230V, Cambridge 6 point 2·5mV. offers over £30. Wanted: circ dets etc for Miniscope. Also miniature /M rig. G3UZZ, 88 Warwick Road, Ealing W5. Tel 567 5003.

Collins TCS12 tx, offers. Pettman, 1 Mymms Close, Whitstable, Kent.

Variac 240V 500W, £4.50. Low loss UR67 coaxial, 15p yd. Airmec manuals, most types, 50p ea. Marconi valve voltmeter TF428B, ac—dc 100mV-150V mains input, £4.50. Boxed EF91, new price £1.50, offers. G8APS, QTHR.

Heathkit assembly manual for ssb tx model SB401, available free to first applicant. Phillips, 9 Furze Croft, New Milton, Hants. BH25 6NH. Tel New Milton 615007.

Star SR200 rx, all amateur bands and WWV, perf, £33 ono. Buckley, 17 The Weald, Chislehurst, Kent. Tel 01-467 8093.

National HRO fitted with Kokusai ssb fltr, miniature valves and G2DAF front end cnvtr, £30 or would swop for Trio 9R59DE, Heathkit GR78, Mohican or Lafayette HA600. G3ZNY, 11 Kingston Avenue, Stony Stratford, Wolverton, Bucks. Tel. Stony Stratford 2382.

2m Nuvistor cnvtr, int psu, £8.50. 4m fet cnvtr, £5.50. Solartron reg psu type SRS151A, 0-500V, £10. Sae dets. G5RS, 20 Hedgeway, Guildford. Tel Guildford 61786.

Two 2m cnvtrs Swindon Club project type BF180-40602-2-2N706, 26-28MHz, no case, £5.50 post paid. Browne, 5A Kitchener Street, Swindon, Wilts.

Swindon Club still have few 2m tx/rx books left which were on sale at /M rally 25p + 5p post. Kits also available. G8AVG, 29 Okus Grove, Swindon.

Creed 75 teleprinter with perforator, £25. Creed 7B teleprinter, £10. Codar preselector 1·5-30MHz, £2.50. Homebrew 807, 10-80m tx, 150W, £5. No 19 Set, tatty plate and screen mod, £2.50 (all ono). G3JKN, QTHR. Tel Denham 2229.

HRO psu, 6GC coils, £16 ono. 45ft triangular sectnl steel tower for fixed stn, £15 ono. G8BIM, QTHR. Tel Wickford 61806.

TU9B tuner unit, £1 Xtal control unit, £2.50. GPO type counter 25p. Numerous other cheap items, sae for list. Meek, 39 Horsebrook, Lane, Brewood, Stafford. Tel Brewood 850760.

HW12A 80m with ac psu, FR100B with 160m, both in gd cond with hndbks, offers? Wanted: 8 or 10 ele J Beam for 4m. GM3WOJ, The Manse, Glenluce, Wigtownshire.

15W cw tx 80, 40, 20m with atu, £5. G5RV with steel masts and stanchions, £5. Swr meter, morse oscillator keys, phones, fltrs, relays, books, mags, offers? G3VDG, QTHR. Tel Aldridge 51377.

Miniature ovens 6/12V 80°C for HC6U xtals with base socket, 50p ea. 1·2V "deac" rechargeable cells, 1in by ¼in by ¼in, 10p ea or six for 50p, add 5p post each order. Jeapes, 165 Cambridge Road, Gt Shelford, Cambridge.

Marconi impedance bridge No 5, £26. RCA audio freq meter, £14. BD627 picture + waveform monitor, £4. Psu to suit 300V at 500mA stablzd, £4. Modulator pair 807 about 50W, £4. Can del. G8AYN, 32 Ironmill Lane, Crayford, Kent DA1 4RR. Tel Crayford 24625.

Hf/vhf power transistors 2N3866, 75p. 2N3053, 25p. 40290, £1.25. 2N3553, £1.50. All new, other vhf/uhf types available, sae for list. Elliott, "Oatlands", Southend Road, Howe Green, Chelmsford, Essex. Tel Chelmsford 71604.

R206 Mk 2 rx, 6W/bands 600kHz-30MHz with spkr in ac psu + manual, £12. Naylor, 6 Broomhills, Welwyn Garden City, Herts. Tel Welwyn Garden 22112.

Elementary Telecommunication Principles by R. N. Renton, pubd 1967, vgc, £1.40. 4 mercury rectifiers type 866A, any offers? G3ZRD, 20 Pearson Avenue, Hull, Yorkshire.

Decca Type 121 projection tv set, comp wkg order with /P screen and hndbk, £15 or offers? Buyer coll. G2MI, QTHR. Tel 01-462 1877.

Electroniques IFA/1·6/ssb Mk 2, unused, £11. 9 vols Newnes *Radio and tv servicing*, up to 1960, £6. Two 70cm 14 ele Yagi with combining harness, only used for contests, £7.50. Woden UM2, £2.50. G3FRV, QTHR.

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One to several min fifth overtone xtals, range between 58-87MHz. G3HUL, 45 Crown Road, New Costessey, Norwich N0R O9K. Tel Costessey 3646.

KEF Concord spkr, gd cond, G8FW, QTHR. Tel 0703 22534.

KW77 rx, circ of Minimitter 8 band cnvtr (1·5MHz i.f.). G3WVP, QTHR. Tel 01-300 5891.

Manual or circ diag for Minimitter 44 rx, purchase or loan, expenses pd. Lewis, 75 Ellerton Road, Birmingham B44 OQE. Tel 021-373 8577.

Graticule and visor for Cossor scope mod 1035 Mk 3, also CRT type CR93D, pref mint. Gillen, 22 The Knole, Faversham, Kent.

KW match swr bridge, must be perfect. G4ABU, 24 Latona Street, Walney Island, Barrow in Furness.

Redifon ac psu type 6211/A for use with Redifon ssb tx/rx type GR410 (army type SRC14). Capt M. G. Taylor, G SD Branch, HQ 1 (BR) Corps, BFPO 39.

Urgently req pi-net choke 1kW rating, state price. Selling: Geloso xtal mixer vfo, rig 10W output 10–80m, comp mains psu, transistor shaped keying, ideal NFD group, £15, buyer coll. G3HVA, QTHR. Tel Tadley 4445.

Urgently reqd 12AH7 valve. Davis, 33 Pollard Close, West Hooe, Plymstock, Plymouth, Devon.

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Airflow cooling socket and ceramic chimney for 4CX250B. GW5VX, QTHR. Tel Swansea 72632.

KW1000 linear amp. G3DFS, QTHR.

Dc psu for KW2000A. G3VHA, QTHR. Tel Kingswinford 4258.

A2521s. G3TAA, QTHR.

School Radio Club, just beginning, req am band rx, not too expensive, offers? Pryce, 2a Seven Sisters Road, Lr Willingdon, Eastbourne, Sussex. Tel 53476 (Eastbourne).

R115N and T1154N rx and tx in wkg order. Dets and price pse. Mulholland, Glen Tor, Colin Road, Dunmurry. Tel Belfast 617800.

High band Pye Cambridge modded for 2m, will buy or exch Electroniques Qoilpax transistor HB166T, new, unused, comp with Electroniques psu. G8CJM, QTHR. Tel Medway 47280.

To loan, hire or buy, your price pd. *Wireless World* March 1965, also *Hi-fi News* January 1969. G3OEI, 28 Rimmer Green, Southport, Lancs. PR8 5LP.

Xtals FT243 type—6075kHz Channel 286. Dets of quantity etc. G3EFY, QTHR. Tel Exeter 71764.

B2 psu xtals: 8100, 10120, 7806·6, 6746·6 gnrtr 230V ac to 3kV, also charging gnrtr. For sale: Ranger 2002 lowband, £4 + carr. GI3OTU, QTHR. Tel Bangor 3759.

Eddystone 750 rx, must be in exc cond, not modded. Your price given for one in mint cond. G3FK, QTHR. Tel Broadstone 2631.

Info on Murphy vhf tv turret tuner, advertised by A. J. H. Electronics. Also buy or borrow circ diag. Bartlett, 4 Kelsall Close, Kidbrooke, London SE3 OJJ.

Vhf tx/rxs: BCC69 type D, F or G pref with transistor psu. G3XOF, QTHR.

Short Wave Radio and the Ionosphere by Bennington (Iliffe). Benbow, 81 Anglesmede Crescent, Pinner, Middx.

70cm cnvtr pref commercial (wkg or otherwise) also vhf commercial tuneable rx. G3OWB, QTHR. Tel Cambridge 59127.

Starting school swl club. HRO b/s coils or g/c coils to convert to b/s, pse state coils and price. Reply to Robinson, Maths Department, Hayling Secondary School, Church Road, Hayling Island, Hants.

EC10 in gd cond, also Radio Communication Jan 1967 to Feb 1968 inc. Will coll rx. Hirons, 7 The Triangle, Poole, Dorset BH16 5PG.

Buy or borrow Feb 1969 edn of *Vhf Communication* for det of DL6SW cnvtr (2m). Hughes, 81 Hawarden Road, Pen-y-ffordd, Nr Chester.

Invertor 12V dc or p/e gnrtr, 250V ac 300W, swr bridge. GW4AHV, 1 Western Road, Pontardawe, Swansea. Tel (0792) 862297.

Eddystone 750 and HE30 reqd in 1st class cond only. Selling Hamgear preselector PM2 xtal calib, £6.50 Codar Q mult, £6. G3YHC, QTHR. Tel Plumtree 3708.

Buy or borrow circ diag and mods for Pye Ranger. Lord, 18 Westfield Road, Woking, Surrey. Tel Woking 62575.

Any info on R209 Mk 2, R7303 and TR1986. Mason, 34 Central Park Avenue, Wallasey, L44 OAQ.

Eddystone 504 rx, unmodded pref. G4PL, 65 Brook-Lea, Haigh Moor Road, West Ardsley, Nr Wakefield, Yorkshire.

Command rx BC454B, 3–6MHz. G3KNB, QTHR. Tel Stafford 62105. OAP offers rsnble price + post for fb CR45. Cranke, 91 Carisbrooke Road, Newport, IOW.

Original S meter for Eddystone 640, also Eddystone 888A rx. Allport, The Linnels, Green Lane, Skellingthorpe, Lincoln.

Hndbks, GEC miniscope, xtal calib No 7 Mk 2. Circ of Simon Minstrelle tape recorder. Service sheet Ferguson Courier/P tv. Cheap Heath HFW-1 tv alignment gnrtr, part built or faulty pref, for intended mods. Shepherd, 72 Westerland Avenue, Canvey Island, Essex SS8 8JS.

Circ diag 9in Bush tv—model No TV22. Payne, 159 Micklefield Road, High Wycombe.

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Electroniques oscillator coil type OS10 for 460kHz i.f., also mod det of vhf rx type 3673. Rimmer, 1B Millhill Terrace, Kilmarnock, Ayrshire. Pair tx/rxs capable of mods to work on 173MHz, ½W output. G3HZO, QTHR. Tel 01-647 3443.

TW Two-Mobile rx, gd mech cond of i.f. and audio reqd. G3BW, QTHR.

RSGB blazer badge, pref wire type. G3WXT, QTHR.

Circ-hndbk Zenith transoceanic shortwave rx model 8G005 YTZI. Lloyd, 70 Heath Drive, Ware, Herts. Tel Ware 2272 (office).

RSGB *Bulls* from 1945 to June 1971, also Aug 1963 to June 1969. Andrews, ZL4MB, 14 Como Street, Dunedin, New Zealand.

Mains psu for Codar AT5 and T28. G3XFV, 49 Clare Avenue, Darlington, Co Durham.

Gd price offered for mint Heathkit sig monitor SBG10E or will swop Ferrograph tape recorder by arrangement. G3YYI, QTHR.

Buy or borrow literature or circ for W5737 rx. All letters answered. Rundell, The Vicarage, Tarvin, Chester CH3 8EB. Tel Tarvin 40354.

60cm beam and tx. G30HC, 50 Essex Road, Four Oaks, Sutton Coldfield. Tel 021-308 2512.

T1154 and R1155 with ac psus. G3TGH, QTHR. Tel Cambridge 45763. Auto tx (five bit tape reader) Creed, teletype, Olivetti etc. G3YKB, QTHR. Tel 01-452 3376, 362, (daytime only).

GDO swr indicator for 50Ω. G3NBP, QTHR. Tel 0223 48779.

Horwich County Secondary School ARS would appreciate any free or extremely cheap rxs, junk etc. Moss, Horwich County Secondary School, Albert Street, Horwich, Lancs. Tel Horwich 66140.

Urgently req xtals between 36·353 to 36·490 (any type), cash or swop 36·250 (/M freq). Also cons 12 or 18MHz xtals. G4ADN, see G8DMK, QTHR. Tel Bolton 55051.

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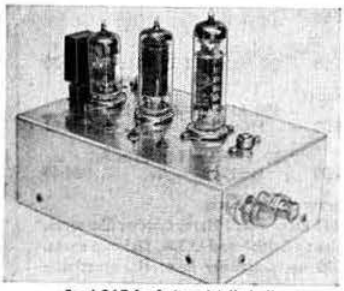

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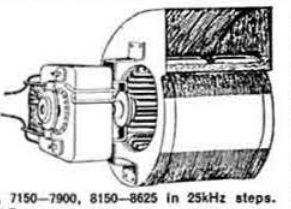

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PATRON H.R.H. THE PRINCE PHILIP
DUKE OF EDINBURGH, KG

APPLICATION FOR CORPORATE* OR ASSOCIATE* MEMBERSHIP

RADIO SOCIETY OF GREAT BRITAIN,
35 DOUGHTY STREET,
LONDON WC1N 2AE
Tel 01-837 8688
Giro A/C No 533 5256

* I hereby apply for election as a Corporate Member of the Society and enclose a remittance for £4 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 £2 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 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.

Date _____ Signed _____

PERSONAL DETAILS TO BE COMPLETED BY APPLICANT

SURNAME (BLOCK LETTERS) _____

CHRISTIAN NAMES (IN FULL, BLOCK LETTERS) _____

ADDRESS FOR ALL CORRESPONDENCE (BLOCK LETTERS) _____

_____

NATIONALITY _____ *AGE (IF UNDER 21)* _____

CURRENT CALLSIGN (IF ANY) _____

DETAILS OF PREVIOUS MEMBERSHIP (IF ANY) _____

DETAILS TO BE COMPLETED BY THE PROPOSER†

I WISH TO PROPOSE _____ *FOR *CORPORATE/*ASSOCIATE MEMBERSHIP*

PROPOSER'S NAME (BLOCK LETTERS) _____

ADDRESS (BLOCK LETTERS) _____

CALLSIGN (OR BRS NO.) _____

SIGNED _____

* Please delete where inapplicable.
† If the applicant is not acquainted with a Corporate Member willing to propose him for election he may submit a suitable reference in writing as to his interest in Amateur Radio.

The first subscription should be enclosed with this application to avoid delay.

FOR OFFICE USE ONLY

APPROVED BY COUNCIL _____ *BRS OR A No. ISSUED* _____ *FIRST SUB. PAID* _____

RSGB PUBLICATIONS

RSGB

Amateur Radio Circuits Book	70p
Amateur Radio Techniques	£1·13
Guide to Amateur Radio	47p
Morse Code for the Radio Amateur	14p
RSGB Countries List	9p
RSGB Amateur Radio Call Book, 1972	57p
Radio Amateurs' Examination Manual	31p
Radio Communication Handbook (4th ed.)	£3·15
	postage 35p extra
Radio Data Reference Book *(out of print)*	
SSB Equipment	19p
Service Valve and Semiconductor Equivalents	29p
VHF/UHF Manual (2nd ed.)	£1·80
World at their Fingertips (Paperback)	76p
(De-Luxe)	£2·53

MORSE

RSGB Morse Instruction Tape (900ft)	£1·84
RSGB Morse Practice Tape (450ft)	71p
G3HSC Rhythm Method of Morse Tuition—	
Complete Course (two 3-speed LP records and one EP record plus books)	£4·50
Beginner's Course (one 3-speed LP record and one EP record plus books)	£3·30
Beginner's LP (0-15 wpm) plus book	£2·75
Advance LP (9-42 wpm) plus book	£2·75
Three-speed simulated GPO test 7in ds ep record	85p

ARRL

Antenna Book	£1·38
Course in Radio Fundamentals	61p
Hints and Kinks	62p
Mobile Manual	£1·38
Radio Amateur's Handbook	£2·75
Radio Amateur's Operating Manual	83p
Single Sideband for the Radio Amateur	£1·60
Understanding Amateur Radio	£1·37
VHF Manual	£1·38

CQ

Amateur Radio DX Handbook	£2·26
Antenna Handbook Vol. 1	£1·80
Antenna Roundup Vol. 1	£1·46
Antenna Roundup Vol. 2	£1.84
Mobile Handbook	£1·41
Sideband Handbook *(out of print)*	
RTTY A-Z	£2·21
RTTY Handbook	£1·64
Shop and Shack Shortcuts	£1·87

USA MAGAZINE SUBSCRIPTIONS (pa)

QST (including ARRL membership)	£2·93
QST (Societies and organizations)	£3·28
CQ	£2·50
73	£2·95
Ham Radio	£2·50
Braille Technical Press	£3

RADIO PUBLICATIONS INC

Beam Antenna Handbook (3rd ed)	£2·08
Better Short Wave Reception (2nd ed)	£1·78
Cubical Quad Antennas	£1·75
S-9 Signals	85p

MISCELLANEOUS

Basic Electricity	£1·67
Dictionary of Electronics	48p
Foundations of Wireless (case bound)	£3·25
(paperback)	£2·04
Guide to Broadcasting Stations	59
How to Listen to the World	£1·43
Improve your Short Wave Reception	£1·19
Radio Amateur Operator's Handbook *(out of print)*	
Simple Shortwave Receivers	89p
Transistor Audio and Radio Circuits (Mullard)	£1·61
Transistors in Practice	£1·85
Wireless World Radio Valve Data (9th ed)	88p
World Radio TV Handbook	£2·25

LOG BOOKS

RSGB Standard Log	56p
RSGB Receiving Station Log	43p
Mobile Mini-Log	21p
RSGB De-Luxe Log	£1·41

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Care and feeding of a Ham Club	47p
Simplified Maths for the Hamshack	25p
VHF Antenna Handbook	£1·31

MAPS

Admiralty Great Circle Map *(in tube)*	57p
Counties	35p
QRA Locator Map (Western Europe) *(in tube)*	47p
QRA Locator Map (Western Europe) *(on card)*	10p
VHF/UHF band plans *(on card)*	10p
Amateur Radio Prefixes (World)	14p

MEMBERS ONLY

Lapel Badge (RSGB or RAEN emblem, pin fitting)	15p
Callsign lapel badge (RSGB or RAEN pin or stud fitting) *	50p
Car badge (RSGB or RAEN)	70p
Callsign car badge (RSGB) *	£1·25
Callsign car badge, de-luxe (RSGB or RAEN) *	£2·19
Ties (Maroon or Blue)	£1
Tie bar (RSGB emblem)	28p
Radio Communication Easi-binders	£1
Car window sticker (RSGB or RAEN). (No adhesive required)	9p
Member's headed notepaper (50 sheets) quarto	33p
octavo	20p

*delivery 4 to 6 weeks.

Prices include postage and packing except where stated. Stamps and book tokens cannot be accepted.

35 DOUGHTY ST.,

LONDON WC1N 2AE

Printed in Great Britain for the RADIO SOCIETY OF GREAT BRITAIN, 35 Doughty Street, London WCIN 2AE
by The Garden City Press Limited, Letchworth, Hertfordshire SG6 1JS.