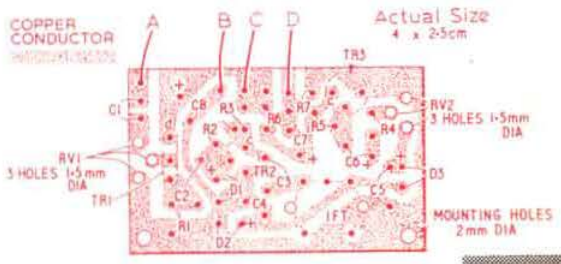
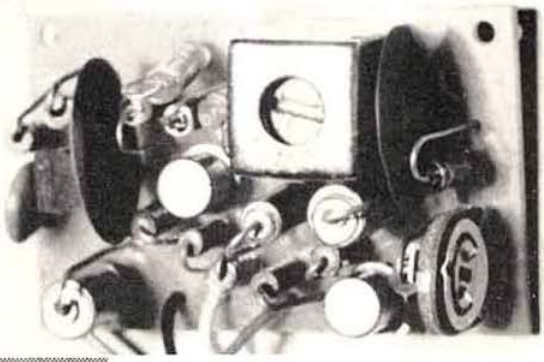
JANUARY 1969

RADIO COMMUNICATION





NBFM Detector Module

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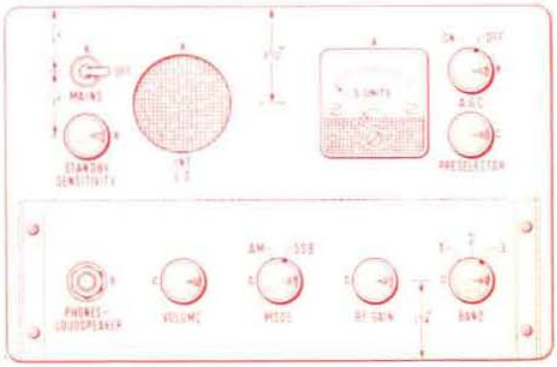
G3RNL Mini Five Receiver



See page 13

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HAPPY NEW YEAR

SOMMERKAMP

STAR

INOUE

doubt it will not be a very happy new year for Lowe Electronics—this 50% surcharge on imports has hit me and hit me real hard. Right where it hurts most, smack bang in the middle of my pocket! It's making me grunt, boy, I'll tell 'ee! Still, if it gets the Country out of a mess, fair enough. I will have to economise a bit and not import so much. However, I will as far as I possibly can, keep prices stable and I will naturally continue to flog what I consider to be the best value for money on the market—Sommerkamp, Inoue and Star. I have tried other makes, checked performances with good test gear and every time I just have to come back to Sommerkamp, Inoue and Star. Maybe I'm stupid, I could make more money selling other brands, but I started this business with the object of giving best value for money and by golly, I'm going to stick to that principle, 50% surcharge or no 50% surcharge! I'll raise the money somehow. Those of you who know me and have dealt with me probably even believe this nonsense—those of you who don't know me most certainly won't believe it, so just think about the small ads. Not many Sommerkamp, Inoue or Star bits secondhand are there? And the very few that are for sale haven't dropped much from their new price, have they? Must be a moral somewhere! Maybe this crooked liar Bill Lowe isn't so far from the truth after all. Anyway, to get down to solid flogging—in the new line in stock at the time of writing I have the entire Sommerkamp line with the exception of the FT-250 which is expected any time and the price will be well under £200 0s 0d. Incidentally, last month I said I would be getting the kit version, but the additional cost of the built up version is so small that when I apply my standard of value for money, the built up version wins every time. Don't forget the built up version is tested before sale and carries a worthwhile guarantee, whereas the kit has neither, so in spite of the fact that the kit is a much more attractive profit maker from my point of view, I have to come down in favour of the built up version. Stupid honest idiot that I am! Also in the new line, Inoue of course—a complete rig for £180 0s 0d. Not only a complete rig, but a damn' fine rig. Once again, top value for money. Also Star ST-700, SR-700 and SR-200. Being in a confidential and honest mood, let me warn you that in view of the 50% import surcharge, I am cutting imports of Star, so they will be scarce for a time. After the current batch are sold, there won't be any more till April or May. I don't know why I'm pushing this stuff—I just *have* to cut down on imports so every one I import will be spoken for, so what's the point of advertising it. Let's push some of the smaller stuff and the secondhand stuff—get some loot in the bank so that I can import some more Inoue!

SECONDHAND RECEIVERS:

HR-22	**£80 0. 0**	**BRT 402E**	**£60 0. 0**
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Can type with mounting clips.
100mF/350V 5/6; 100–100mF/350V 6/8; 100mF/450V 7/2; 40–40/500V 7/3; 100mF/500V 7/9; 100–100/450V 13/2.
Minute low voltage types: 16mF/16V 8d each; 7/- a doz: 10mF/16V 6d each, 5/- a doz: 100mF/12V 8d each, 7/- a doz; 1000mF/12V 6d each, 5/- a doz. 30mF/16V 8d each, 7/- a doz; 100mF/16V 1/- each, 10/- a doz.

TANTALUMS:

4/20V, 4/38V, 8/9V, 8/20V, 10/12V, 16/20V and 100/12V—all at 1/6d each. Believe it or not, lads, these are normally around the 12/6d mark!

DISCS:

.01/500V 6d each, 5/- doz; .001/500V 4d each, 3/6d a doz; 50 volt types .002, .005, .01 3d each, 2/6d a doz; .02, .05 4d each, 3/6d doz.

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DPDT slide switches with centre off 2/-.

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2⅜ in dia fluted 2/-. AR88 type 1⅜ in 1/6d. 1·5/16 in 1/3d.

Crystal holders HC6/U 1/- each, 10/- a doz.
75 or 300 ohm feeder good for 200W 6d. a yard.

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Converters 21 or 28 Mc/s. These are hot stuff—twin triode cascode r.f. amp, 12AT7 low noise mixer/xtal osc. and 6AU6 I.F. out. The output is 5–5·5 Mc/s (21 Mc/s) and 5–7 Mc/s (28 Mc/s). They require 6·3 vac and 150–200vdc and are excellent value at £7 10. 0.

POSTAGE: Please allow lots for postage. We will refund any excess.

All the lovely new stuff can also be inspected at Alan Whitford's, G3MME, 37, Chestnut Drive, Polegate, Sussex, evenings and weekends, for those who can't get over to Matlock, or who are scared they'll get trapped in a blizzard! (We haven't dug 'em all out from last year yet!) If you can't get over to either Alan or myself, send me a s.a.e. and I'll send you my latest lists.

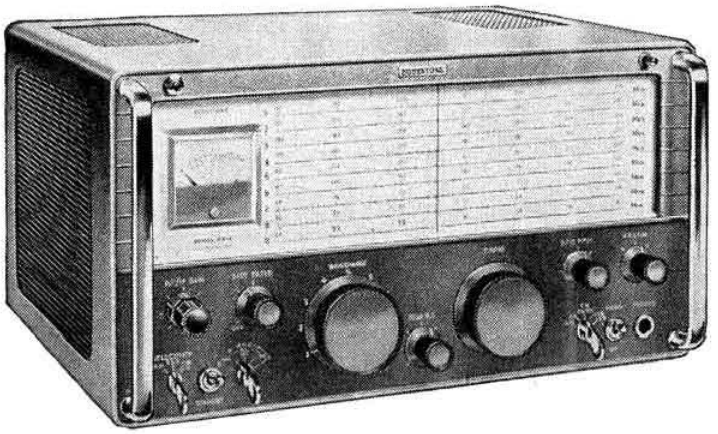
73
The Bandit
VE8DP/G3UBO

Eddystone

BRITISH MADE

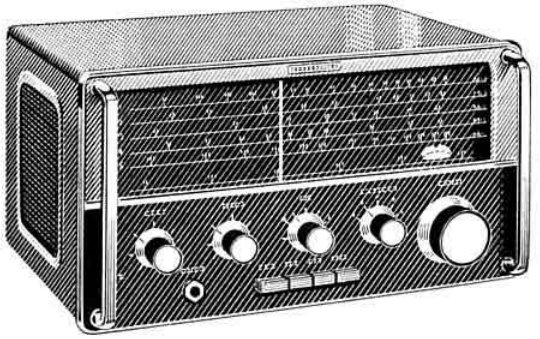
Amateur communications receivers

EA12



An amateur bands double-conversion superheterodyne receiver, for a.m, c.w, and s.s.b reception. For all amateur channels between 1.8 MHz and 30 MHz in nine 600 kHz bands with 28 MHz to 30 MHz in four bands.

Primary features. Crystal-controlled 1st oscillator, 2nd oscillator with continuously variable selectivity to 50 Hz, muting switched or by external relay, twin noise limiters, for a.m/c.w, and s.s.b, short-term drift better than 20 Hz and less than 100 Hz in any one hour, 'S' meter calibrated in nine levels of 6 dB and dB levels beyond 'S9', two a.g.c time constants, deep slot filter, independent r.f, i.f, and audio gain controls with outputs for f.s.k and panoramic adaptor.



EC10 communications receiver

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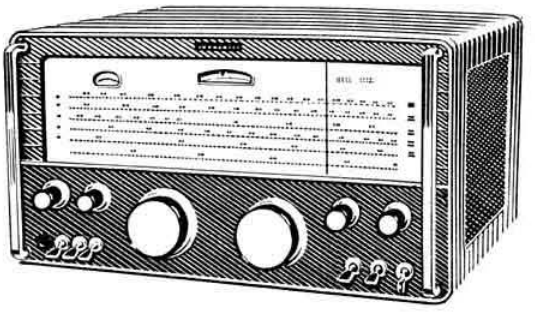

940 H.F communications receiver

An outstanding 13-valve receiver with two r.f and two i.f stages, silicon diode noise limiter circuit and high quality push-pull output. Built to a professional specification, facilities include provision for c.w, a.m, and s.s.b reception over the range of 480 kHz to 30 MHz in five bands. Suitable for 110/125 V and 200/250 V. 40-60 Hz a.c mains.

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Garex ABP70. Transistorised 70cm converter. GM0290a grounded base RF amp. GM0290a mixer. Two trough line circuits at 432 Mc/s. Cathodean VHF crystal. 4½ db. noise figure. Built on copper clad fibre glass laminate and housed in 4½ in. × 3½ in. × 2 in. diecast box. IF 28-30 MHz ex stock; others to order over 20 MHz. 12 volt DC operation.
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Or less spare set of valves: £11 5 0.
Based on ready built units less chassis. All components, Toroidal transformer, relays and circuit supplied.

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MOBILE SOLID STATE MODULATED KITS
De Luxe 12 volt input. 15 watts output. Pre-tested wired and dipped printed circuit boards. OC700a and OA81 limiter. NKT 224 emitter follower. NKT223a amplifier. NKT224 emitter follower. NKT404/OC35 driver. Push Pull NKT404/OC35 output. Complete with transformer (includes P.A. winding) to match QQV03-20a. Inc. tailored mike, press to talk 300-3500 Hz. Average *wiring* time 30 minutes. Less chassis. Postage 6/6 **£7 17 6**

Standard Model 12 volts input. 15 watts output. OC71 amp. OC72 amp. on pre-tested wired and dipped, printed circuit board. NKT404/404/OC35 driver. P.P. NKT404/OC35 output. Including transformer to suit QQV03-20a. Inc. tailored mike 300-3500 Hz. Less chassis. Postage 6/6 **£4 15 0**

QQV03-10 modulator and audio amplifier dual purpose kit, relay switched. OC 200 mod. compressor, NKT223 emitter follower, NKT223a Tx mod. amp and Rx audio amp. NKT 223a emitter follower. NKT404 Tx and Rx driver. P.P. NKT 404 Mod. and Audio output. Complete with transformers. Pre-tested wired and dipped printed circuit board. Inc. tailored mike, press to talk. 300-3500 Hz. Less chassis
Postage 4/6 **£4 18 6**

Built with selected radiotelephone components. All kits include instructions & circuits. Negative or positive earth. Delivery ex stock unless otherwise stated. QQV06-40a/5894. **£2 0 0**

Valves QQV03-10 **6/6**
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Transistors DT1602
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Aerial relay up to 200 mc/s 25 watts 6v or 12v coil **5 0**

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Postage packing insurance 2/6 except on valves large type 1/- & small type 6d each. Orders over £2 post free unless otherwise stated.

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Region 7.—London.	P. A. Thorogood, G4KD, 35 Gibbs Green, Edgware, Middlesex.
Region 8.—South Eastern.	D. N. T. Williams, G3MDO, Seletar, New House Lane, Thanington, Canterbury, Kent.
Region 9.—South Western.	J. Thorne, G3PQE, Jessamine House, Chapel Allerton, Axbridge, Somerset.
Region 10.—South Wales.	C. H. Parsons, GW8NP, 90 Maesycoed Road, Heath, Cardiff, Glam.
Region 11.—North Wales.	M. Williams GW3LCQ, " Dwyros," 12 Penrhos Avenue West, Llandudno Junction, Caerns.
Region 12.—North-East Scotland.	J. MacIntosh, FCCS MIERE, FAIA, GM3IAA, Broom Park, Cradlehall, Inverness.
Region 13.—South-East Scotland.	G. P. Millar, GM3UM, 8 Plewlands Gardens, Edinburgh 10.
Region 14.—West Scotland.	N. G. Cox, GM3MUY, 191 Maxwell Avenue, Westerton, Bearsden, Glasgow.
Region 15.—Northern Ireland.	J. Thompson GI3ILV " Albany," Newry Road, Armagh, N. Ireland.
Region 16.—East Anglia.	W. J. Green, G3FBA, Meadway, Links Avenue, Brundall, Norwich, Norfolk, NOR 86Z
Region 17.—Southern.	C. Sharpe, G2HIF, 20 Harcourt Road, Wantage Berks.

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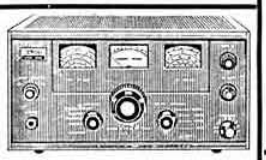
UNR.30. 4 BAND COMMUNICATION RECEIVER

Covering 550 Kc/s-30 Mc/s. Incorporates variable BFO for CW/SSB reception. Built-in speaker and phone jack. Metal cabinet. Operation 220/240V. AC, supplied brand new, guaranteed with instructions **£13 13 0.** Carr 7/6.

TRIO 9R-59DE



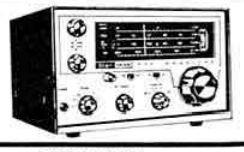
4 band covering 550 Kc/s to 30 Mc/s continuous and electrical bandspread on 10, 15, 20, 40, and 80 metres. 8 valve plus 7 diode circuit. 4/8 ohm output and phone jack. SSB-CW . ANL . Variable BFO . S meter . Sep. bandspread dial. IF frequency 455 Kc/s. . audio output 1·5w . Variable RF and AF gain controls 115/250V. AC.Size: 7" × 15" × 10"with instruction manual **£39 15 0.** Carr paid.

TRIO COMMUNICATION TYPE HEADPHONES. Normally £5/19/6, our price **£3/15/-** if purchased with receiver.

NEW LAFAYETTE SOLID STATE HA600 RECEIVER

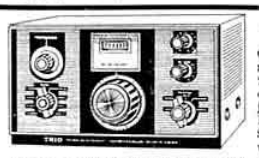
5 Band AM/CW/SSB amateur and short wave 50 Kc/s-400 Kc/s and 550 Kc/s-30 Mc/s FET front end. 2 Mechanical filters. Huge Dial. Product detector. Crystal calibrator. Variable BFO. Noise limiter. S Meter. 24" Bandspread. 230V. AC/12V DC. Neg earth operation. RF gain control. Size: 15" × 9¼" × 8" Wt 18 lb. Exceptional value, **£45.** Carr 10/-. SAE for full details.

NEW STAR SR-200 SSB AMATEUR RECEIVER



An exciting new receiver covering 6 amateur bands 160/80/40/20/15/10 metres. Illuminated slide rule dial. S meter. Crystal calibrator. Product detector. Automatic noise limiter. RF tuning and gain controls. Speaker or phone outputs. 8 valves, 2 transistors, 2 diodes. 220-240V AC. Supplied brand new and guaranteed. **£40 0 0.** Carr 10/-.

TRIO JR-500SE AMATEUR RECEIVER

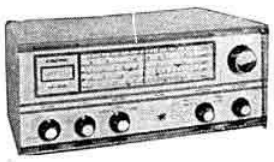


Covers all the amateur bands in 7 separate ranges between 3·5 and 29·7 Mc/s. 7 valves, 2 transistors and 5 diodes plus 8 crystals. output 8 and 500 ohm and 5000 ohm phone jack. Crystal controlled oscillator . Variable BFO . VFO . AVC . ANL . S meter . SSB-CW. Stand-by switch . special double gear dial drive with direct reading down to 1 kHz.

Remote control socket for connection to a transmitter. Audio output 1 watt, 115/250v. AC Mains. Superb modern styling. Size 7 × 13 × 10in with instruction manual and service data. **£68/10/-.** Carriage 12/6.

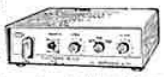
ADMIRALTY B.40 RECEIVERS

Just released by the Ministry. High quality 10 valve receiver manufactured by Murphy. Five bands 650 Kc/s-30 Mc/s. I/F 500 Kc/s. Incorporates 2 RF and 3 IF stages, bandpass filter, noise limiter, crystal controlled BFO calibrator, IF output etc. Built-in speaker, output for phones. Operation 150/230 volt AC. Size 19¼ in × 13¼ in × 16 in. Weight 114 lb. Offered in good working condition. **£22/10/-.** Carr. 30/-. With circuit diagram. Also available B.41 LF version of above, 15 Kc/s-700 Kc/s. **£17/10/-.** Carr 30/-.



CODAR EQUIPMENT	£	s	d
CR.70 Receiver	19	10	0
CR.45 Receiver	11	19	6
CR.45 Kit from	9	16	0
Pr.30 Preselector	5	19	6
PR.30X (Built in PSU) ..	7	19	6
RQ.10 Q Multiplier ..	7	5	0
RQ.10X (Built in PSU) ..	8	17	6
CC.40 Control Unit	6	15	0
AT.5 Transmitter	16	19	6
T.28 Receiver.	15	17	6
12/MS Mobile P.S.U. ..	11	10	0
12/RC Control Unit ..	2	10	0
AT5 Mains PSU	8	10	0
Mini Clipper Kit	2	4	6

DA-1 Electronic Keys



Fully transistorised. Built in monitor oscillator and speaker. Fully automatic, semi or hold positions. Any coding speed can be obtained. 15 amp contact capacity. 220/240V AC or 6/12V DC. Brand new **£18 0 0.** Carr 5/-.

HANSEN SWR-3 SWR BRIDGE

Impedance 52 ohms. Also operates as field strength indicator, complete with telescopic aerial. **69/6** each. P/P 3/6. PL259 plugs to suit **7/6** each.

CLEAR PLASTIC PANEL METERS

First grade quality. Moving Coil panel meters, available ex-stock. SAE for illustrated leaflet. Discounts for quantity. Available as follows. Type MR 38P, 1 21/32 in square fronts.

50μA	37/6	5mA	25/-	A1 DC	25/-		
100μA	35/-	10mA	25/-	2A DC	25/-		
200μA	32/6	20mA	25/-	5A DC	25/-		
500μA	27/6	50mA	25/-	3v DC	25/-		
50-0-50μA	35/-	100mA	25/-	10v DC	25/-		
100-0-100μA	32/6	150mA	25/-	20v DC	25/-		
500-0-500μA	25/-	200mA	25/-	50v DC	25/-	500v DC 22/6	150v AC 25/-
1-0-1mA	25/-	300mA	25/-	100v DC	25/-	750v DC 22/6	300v AC 25/-
1mA	25/-	500mA	25/-	150v DC	25/-	15v AC 22/6	500v AC 25/-
2mA	25/-	750mA	25/-	300v DC	25/-	50v AC 22/6	'S' Meter 29/6

Larger sizes available—send for lists.

TYPE 13A DOUBLE BEAM OSCILLOSCOPES

A high quality instrument offered at a fraction of original cost. Timebase 2 C/s-750 Kc/s. Separate Y1 and Y2 amplifiers up to 5·5 Mc/s. Built-in calibrators at 100 Kc/s. and 1 Mc/s Operation for 115/230 volts AC. Available in excellent condition, fully tested and checked and complete with leads and probe. **£25.**

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A crystal controlled heterodyne frequency meter covering 1·7-8 Mc/s. Operation on 6 volts DC. Ideal for amateur use. Available in good used condition **£5 19 6.** Carr. 7/6, or brand new with accessories **£7 19 6.** Carr. 7/6.

TE.18 GRID DIP METER

Valve type, mains operated, 8 ranges, 360 Kc/s-220 mc/s. Full instructions. **£13 13 0.** 4/6 P/P.

TRANSISTORISED FIELD STRENGTH METERS

Range 2·53 to 57 Mc/s in 3 bands. Large 200μA indicator. Earphone monitoring jack. Complete with telescopic antenna. **£4 19 6.** PP 3/6.

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6 Ranges, 440 Kc/s-280 Mc/s. Operates on 9V battery. Full instructions. **£11 11 0.** P/P 3/6.

SEMI AUTOMATIC BUG KEYS

Precision built. 7 adjustments for speed. Speed variable from 5 WPM-60 WPM. Brand new **£4 10 0.** PP 3/6.

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100 Kc/s/1 Mc/sCrystals. 3-pin new, **22/6**
AR88D Crystals **15/-.**
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EX-AM Control Box with two Londex 7026 24V DC Aerial change-over Relays. New, **39/6.** Carr 5/-.

Stockists of ELECTRONIQUES AND JOYSTICK PRODUCTS

LAFAYETTE DE LUXE SELF POWERED V.F.O.

Five bands 80-10 metres. 10-20 volts output to drive most transmitters. Stabilized HT supply. Employs high Q Clap oscillator size 6¼ × 5¼ × 7¼ in. Operates 220-240V AC. Brand new with instructions. **£13 19 6.** Carr 7/6.

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RSGB Publications, 35 Doughty Street, London, WC1

QTC

New VHF/UHF Publication
Postal Delivery of Radio Communication
Council Election Results

New VHF-UHF Publication

VHF COMMUNICATIONS, the international edition of the well-established German publication UKW-BERICHTE, is an amateur radio magazine especially catering for vhf, uhf and microwave technology.

VHF COMMUNICATIONS specializes in the publication of exact and extensive assembly instructions for transmitters, receivers, converters, complete transceivers, measuring and auxiliary equipment, which can be easily duplicated. The latest advances in the semiconductor, printed circuit, and electronic technology are considered in great detail. All special components required for the assembly of the described equipment, such as epoxy printed-circuit boards, trimmers and coil formers, as well as complicated metal parts and complete kits, are available either from the publisher or national representative.

VHF COMMUNICATIONS also features information regarding the development of electronic equipment, measuring methods, as well as technical reports covering new techniques, new components and new equipment for the amateur.

VHF COMMUNICATIONS is a quarterly, published in February, May, August and November. Each edition contains roughly sixty pages of technical information and articles. The annual subscription is US $3.00 or national equivalent; individual copies are available for US $1.00, or equivalent. Every copy is despatched in a sealed envelope by surface mail, although it can be sent via airmail if this is desired; the subscription rates for this service can be obtained from either the national representative or direct from the publisher, who will be only too pleased to supply any further information.

Editors: Robert E. Lents, DL3WR, and Terry D. Bittan, G3JVQ/DJ0BQ.

Publisher: UKW-BERICHTE, D-8520 Erlangen, Gleiwitzerstr. 45, Federal Republic of Germany.

Representative for the UK: Mr D. Hayter, G3JHM, 4 Newling Way, High Salvington, Worthing, Sussex.

QSL Bureau Sub-Managers

Holders of calls in the new series G3YAA to G3YZZ now being issued, should note that their QSL Bureau Sub-Manager is: P. R. Cheesman, G3KDE, 10 Nursery Road, Hook End, Brentwood, Essex.

Postal Delivery of Radio Communication

Despite the exuberance of the Postmaster-General in the House of Commons the two-tier postal delivery system has been an unmitigated failure in so far as our Journal is concerned. The Society is now paying at least an additional £50 per month for a delivery service that is, frankly, appalling. Many telephone calls have been received at Headquarters from irate members complaining of non-delivery up to nine days after the Journal has been posted at Letchworth. Complaints made to local Postmasters seem to have little effect and it is now suggested that complaints from Members should be addressed to: Mr D. A. Hyams, Operations Controller Group 6, King Edward Building, King Edward Street, London, EC1.

When writing the Radio Communication wrapper should be enclosed.

Amateur Radio

There is to be a World Administrative Radio Conference in 1970, to deal with Space Radio Communications. The International Amateur Radio Union must therefore, be very much on the alert, so that any suggestions that might adversely affect Amateur Radio frequencies can be immediately countered.

To provide information about Amateur Radio for Government Officials, Administrators and Delegates, who attend such Conferences and who, as likely as not, know little about Amateur Radio, but whose deliberations may affect profoundly the future of our frequencies, the Executive Committee of Region 1 Division of the IARU have produced a booklet giving details of Amateur Radio, its aims and its value to the community as a whole.

This booklet, written by John Clarricoats, G6CL, Secretary-Editor, Region 1, IARU, is an attractive, pocket sized, well illustrated publication, dealing with such matters as "What is Amateur Radio"; "When did it Begin"; how many radio Amateurs are there; what frequencies do they use; their technical achievements, and so on. It is indeed, an excellent introduction to Amateur Radio for the layman and Region 1 are to be congratulated for their initiative in producing such a booklet. If it is read by the delegates for whom it is intended, it cannot but help to impress upon them the value of Amateur Radio, both to those who participate in it, and to the communities in which these radio amateurs live.

G2UK

HF Contests—A New Approach

An innovation will be found on page 55—the publication of General Rules for HF Contests. This will be supplemented by detailed rules for each Contest.

The objects of this system are: firstly, to eliminate the frequent repetition of certain rules; hence, secondly, to make less demand on space in RADIO COMMUNICATION; thirdly, the opportunity was used to rationalize the rules.

Both the principle of making General Rules, and these rules themselves, were discussed at length, and at several meetings, by the HF Contests Committee. It is their considered opinion that this new scheme should be of assistance to all contest entrants.

RAIBC Can you Help?

The Radio Amateur Invalid and Bedfast Club is in need of your help. Among various services provided to members is the supply to those in need of communication receivers capable of resolving its 80m net on 3·67 MHz. If you have old equipment able to receive on this frequency and would like to donate it to RAIBC, write giving details to Mrs Frances Woolley, G3LWY, 331 Wigan Lane, Wigan, Lancs. If you're at home weekdays and would like to join this Net, listen on Tuesdays at 10 am, Wednesdays 2 pm and to the Cheshire Homes Net on Thursdays at 2 pm.

John Clarricoats, G6CL

Members will be sorry to know that John Clarricoats, G6CL, former General Secretary of the Society, and Secretary of the Region 1 Division of the IARU, was admitted to Highlands Hospital, Southgate, on Monday, 9 December, suffering from a coronary attack. At the time of writing he is making a steady recovery and we know that all members will wish G6CL a speedy return to good health.

Area Representatives

BEXLEY
R. Holland, 35 Blanindon Drive, Bexley, Kent.
BRENTWOOD
R. A. E. Fronius, G3MCW, 30 Rowan Green East, Brentwood, Essex.
PRESTON
G. Lancefield, G3DWQ, 191 Higher Walton Road, Walton le Dale, Preston, PR5 4HS, Lancs.

Class B Licences

It is regretted that an ambiguous sentence appeared in last month's Editorial, entitled "Christmas Message from our President." The fourth paragraph could be misinterpreted to infer that the Class V Licence has been extended to include four metres. Such an extension would be impossible under present ITU regulations.

Silent Keys

We record with sorrow the passing of:
J. Morris-Casey, G8JC, of Fernhill Heath, Worcester.
J. W. Ismay, G6JI, of Walthamstow, E17.
F. Brian Smith, G5TS, of Petts Wood, Kent.
P. W. Willcocks, G8AIE, of Barnet, Herts.
H. Grube, DL9VZ, of Oberkassel, West Germany.
H. G. Boreham, BRS26570, of Bridport, Dorset.

Results of 1969 Council Elections

Ordinary Members			
J. Etherington,	G5UG	809	
G. R. Jessop,	G6JP	880	ELECTED
A. D. Patterson,	GI3KYP	514	
G. M. C. Stone,	G3FZL	1100	ELECTED
R. G. B. Vaughan,	G3FRV	615	
Zone B Election			
E. J. Allaway,	G3FKM	125	
R. W. Fisher	G3PWJ	64	
F. C. Ward,	G2CVV	165	ELECTED
Zone C Election			
F. J. Barns,		declared invalid (Article 27 of the Articles of Association)	
R. J. Hughes,	G3GVV		ELECTED

RSGB Dinner Club

The Dinner Club will meet on Friday, 31 January 1969, at the Kingsley Hotel, Bloomsbury Way, London, WC1 at 7.30 for 8 p.m.

This is a completely informal occasion and all members are welcome. Reservations accompanied by a remittance of 25s per person should be sent to RSGB Headquarters marked for the attention of Mrs Jardine.

Installation of President 1969

Mr J. W. Swinnerton, G2YS will be installed as the thirty-fifth President of the Society during the course of a Social Evening on

Friday 10 January, 1969

at the

Bonnington Hotel, Southampton Row, London, WC1

commencing at 7.30 pm

Admission will be by ticket, available on request (with sae) from Headquarters, Tickets are restricted to two per member.

What you got for your money—second year

Several of 1968's public relations projects have been featured separately in *Radio Communication*, so here I need only summarize, so that members may judge for themselves whether the Society public relations venture is earning its keep.

We began the year with a talk which I gave to the Rotary Club of London, at the Cafe Royal, W1, on one of the " Family Days," with an audience of over 200. I was accompanied on this occasion by the 1968 RSGB President, John Graham, G3TR. It was the first formal duty of his year of office. I was glad of his presence, as he was able to answer those of the many questions, from the audience, which dealt with technical matters!

Our trouble-shooting venture, when we did a 100-mile trip in a blizzard to sort out a sensational TVI case in a Wiltshire village, was covered in a *Radio Communication* article by Jack Etherington, G5UG, who liaisoned with us at Corston and played a big part in convincing the local Press of G3DRF's innocence, so that we won a bet from the Chief Complainant and gained £20 for the Royal National Institute for the Blind!

The most successful of the 1968 promotions was, of course, GB2LO, the exhibition station installed for the City of London Festival, by courtesy of the *Daily Mirror*. Even the Americans agree that GB2LO was the biggest publicity venture ever mounted for amateur radio. I am proud that it was selected for inclusion in the remarkable RSGB Film, which the Society now has available for hire. What worries me is whether we shall ever get the chance of launching a project that would compete with GB2LO for excitement and achievement. The fame of GB2LO was world-wide. For instance, *Electronics Australia*, published a long article about it.

Although I have had few calls from local organizations for RSGB Speakers outside the area I can myself cover, there have been frequent requests from members for advice and assistance with local talks. Our Speakers' Brief seems to have been of value in all these cases. We have arranged for me to address several very prominent Rotary Clubs during the early part of 1969. The fact that I am notoriously non-technical, yet that every talk I give generates requests for more talks, proves how effective can be humorous, non-technical, *human* talks about amateur radio. In 1968 I spoke to audiences ranging from Old Peoples' Clubs, through Cultural Clubs, Rotaries and several sophisticated Women's Clubs.

A new venture in 1968 was the contributions, by Pat Hawker, G3VA; Roy Stevens, G2BVN; and on a regular basis, myself, to the BBC's weekly World Service programme, *World Radio Club.* The Society could thus achieve world-wide publicity for its own activities and ideas, but we have also been able, through this programme, to project the image of amateur radio, without the RSGB angle, to a vast international audience. We are most grateful to the Producer, John Pitman, for his never-failing patience and kindness.

These BBC activities led to others, similar. We now get regular "airings " on the British Forces' Broadcasting Service and on the programmes sent out for transmission from foreign broadcast stations by the Central Office of Information (Radio Division).

Members again gave me their enthusiastic support, even if their contribution meant only the bitter-sweet one of thumping in local or national newspaper cuttings about amateur radio. Many of these were complimentary, but there were some nasty ones. However, the letters we send, by broomstick, to offending editors, usually get published! We have had letters in several national papers, including the *Daily Mail* and *Daily Telegraph* and leading Irish papers. Even the *Times*, when they attacked radio amateurs after the affair of the unspeakable RAF spy, published the vitriolic letter sent to them without altering a single word. The *Chicago Sunday Tribune* also published a letter from me on this affair.

I sincerely appreciate the many compliments we got from members on our handling of this distasteful incident.

Again in this sphere I come up against my biggest problems. Whenever we can achieve " controlled " publicity, as we did in the feature in *Woman* and in many other publications, we seize the chance. Only by showing Press representatives amateur radio at its most attractive and altruistic can members serve amateur radio. During the Czech crisis, although my phone never stopped ringing with calls from members all over the country who were being besieged by local reporters, I was able, at least, to instruct them to say NO STATEMENT! This did save us a lot of trouble!

Please notify me at once if an incident of bad Press representation occurs in your area. Like the police at the scene of a crime, we can often do a lot when the scent is still warm.

Some Clubs handle their own public relations in a way that teaches me plenty! Notable among these are Cornwall and Worcester. For their support and encouragement I am most grateful. I must pay tribute, too, to the help and encouragement I have enjoyed from the RSGB Council, particularly from G3TR,G2BVN and G4AR, General Manager.

Sylvia Margolis

The G3RNL Mini-5 Receiver

by B. A. WATLING, G3RNL*

The G3RNL Mini-5 receiver has been designed as a simple and cheap ssb receiver, and as part of a unit constructed, all hf bands station. The vfo used is a separate unit, and can also be used with a matching transmitter thereby offering transceive facilities on all bands.

BEFORE commencing work on a prototype, various design considerations were analysed and in order to simplify matters, single conversion is used. Not only does this offer simplicity, but, the high selectivity filter appears nearer the front end of the receiver, offering improved cross-modulation characteristics, and with only one mixer, a reduced risk of spurious responses.

With a single conversion the choice of intermediate frequency is important. Bearing in mind that the matching transmitter will also use this as its generating frequency, it must be chosen such that no unwanted signals will appear at the output of the transmitter and the "birdies" on the receiver are well down. Several frequencies are possible. The choice of 9 MHz could be used with advantage as two bands are covered by one vfo, 9 MHz $\pm$ 5 to 5·5 MHz gives 20m (sum) and 80m (difference). However the resultant signals will be on the same sideband, as sideband reversal occurs only when the ssb is subtracted from the conversion oscillator. This means that sidebands will have to be switched using two carrier oscillator crystals, which adds to cost. However if a commercial filter were used at 9 MHz (McCoy or KVG) both carrier crystals are supplied in the retail package.

The choice of 9 MHz was rejected for the G3RNL Mini-5 design partly because of sideband switching plus the slight problem of a "birdie" on 20m in the transmitter mixing process.

The alternative to 9 MHz is around 5·2 MHz. This also provides two bands with one vfo. 5·2 MHz $\pm$ 9 MHz provides 20m (sum) and 80m (difference). With this mixing process for 80m, the 5·2 MHz generating frequency is subtracted from the conversion oscillator (9 MHz) and therefore sideband reversal will occur. In the transmitter, the original sideband signal will be generated at usb, and remain on usb for 20m, but reversed for 80m as is required.

While the previous discussion has been in the light of a transmitter, most of the considerations also apply to the receiver. With the choice of intermediate frequency made, the basic design was determined and is illustrated in the schematic diagram of Fig 1.

* 280 Clayhill Road, Basildon, Essex.

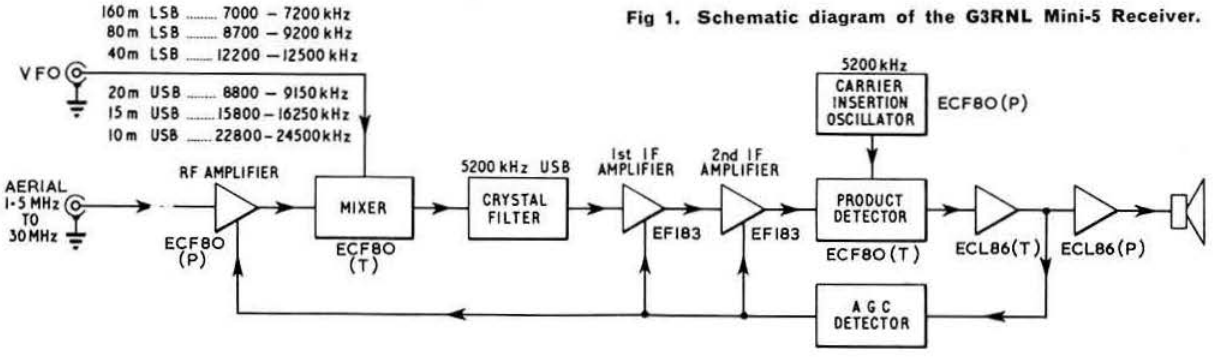


Fig 1. Schematic diagram of the G3RNL Mini-5 Receiver.

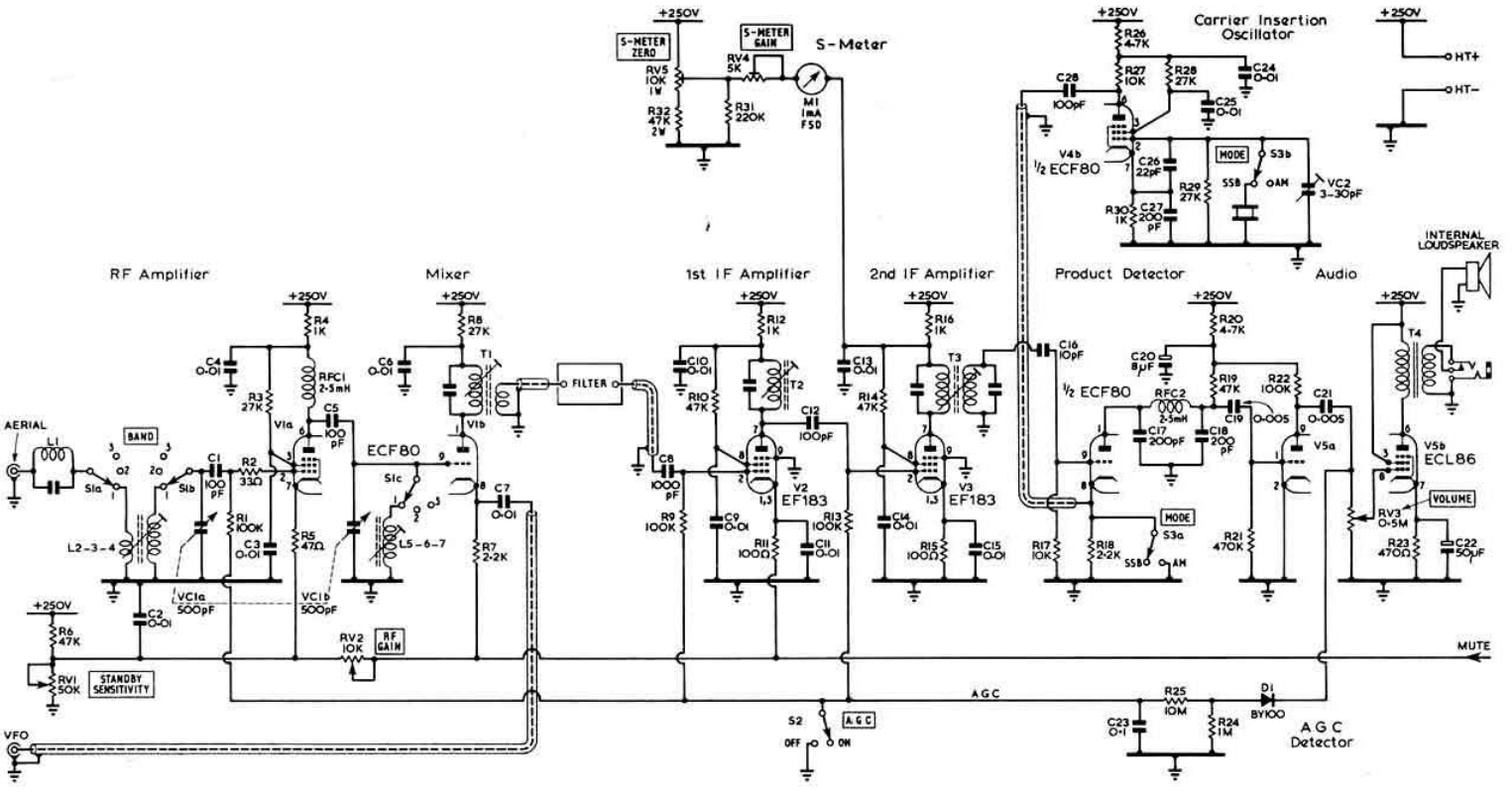


Fig 2. Circuit diagram of the G3RNL Mini-5 Receiver.

Components List

V1, V4	ECF80	RV1	50 K ohm
V2, V3	EF183	RV2	10 K ohm
V5	ECL86	RV3	0·5 M ohm
		RV4	5 K ohm
M1 1mA fsd (S-meter)		RV5	10 K ohm (1 watt)

T1 Pri: 45t (pilewound) shunted with 47 pF
Sec: 15t spaced ¼ in from pri. all on 0·3 in dia Aladin former
T2 Pri, as T1 primary on 0.3 in dia Aladin former
T3 Pri and Sec: 45t pilewound shunted with 47 pF on 0·3 in dia Aladin former
T4 L/S transformer
VC1, 2 gang 500 pF each section
VC2 3-30 pF preset trimmer
RFC1, RFC2, 2·5 mH r.f. choke Electroniques type CCC-7
D1 BY100 or similar
S1 2 wafers: 1 off 2p 3W
1 off 1p 3W spaced about 1 in apart with screen between. (Radiospares Maka-switch)
S2 1p 2 way wafer switch
S3 2p 2 way wafer switch
L1 Stabqoil type RLZ5
L2, L5 Stabqoil type 3(LZ)
L3, L6 Stabqoil type 4(LZ)
L4, L7 Stabqoil type 5(LZ)
} Electroniques

In order to keep the cost down, dual valves are used where possible. The rf amplifier is the pentode section of an ECF80 while the triode section is used as the mixer. The noise figures for a triode mixer are considerably less than those for a multigrid mixer such as a 6BE6, so although it may be considered that using this triode-pentode is a compromise, it does offer some advantages.

The if amplifier stages comprise two EF183. There is no compromise in this if strip, as the maximum amount of gain is required from these stages. The if stages are preceded by the crystal filter, which can be either a simple half-lattice configuration using only two crystals or, for much better unwanted signal rejection, two half lattice sections back to back. Both of these filters are discussed later.

The product detector and carrier insertion oscillator (cio) or bfo utilize a further ECF80. The pentode section is used as the oscillator while the triode is the product detector.

The audio stages of the receiver also use a dual valve, namely an ECL86, providing a maximum of four watts to the loudspeaker. Automatic gain control (agc) is derived from the audio stages in this receiver. This eliminates the problem, when using if derived agc, of the bfo leaking into the if stages causing a standing reading on the S-meter in addition to the gain of the if strip being reduced owing to the standing level of agc. The audio derived agc is applied to both if amplifier stages as well as the rf amplifier, resulting in good characteristics for high ratio signals. This is particularly good when one is listening to a multi-way net with one of the stations a few doors away.

By using an external vfo the construction, particularly band switching, is greatly simplified. With this "compromise" certain other advantages come to light. Firstly, considering constructional simplicity, the full band coverage from 1·5 MHz to 30 MHz can be covered using just three switched bands:

Band 1 1·5 MHz to 4·1 MHz.
Band 2 6·0 MHz to 16 MHz.
Band 3 12 MHz to 30 MHz.

Just six general coverage coils are therefore used, greatly reducing the cost and complexity of the design.

Circuit

Fig 2. is the circuit diagram of the G3RNL Mini-5 receiver. The front end circuits include an if trap comprising L1, tuned to 5·2 MHz. At times, particularly during darkness hours, a strong teleprinter signal appears at the intermediate frequency. This can be troublesome on the lf bands should the if trap not be included. Manual gain control, applied to the rf amplifier V1a, is effected by RV1. The earthy end of RV1 is taken to the mute line along with the earthy end of the cathode bias resistors of the mixer and first if stage. The second if stage is not muted, thereby preventing the S-meter hitting the stop on transmit.

The external vfo is cathode injected into the mixer V1b. This has a tuned anode load comprising T1 with a low impedance link to match the input impedance of the crystal filter. The two stage if amplifier following the crystal filter is of conventional design, and is followed by the product detector V4a. The carrier insertion oscillator V4b is cathode injected into the product detector stage. For occasional am reception the product detector is converted to a leaky grid detector by short-circuiting the cathode to earth and switching off the cio.

The audio agc is provided by D1 and associated components. This is a very simple form of agc but does provide adequate characteristics. The components R22, R23 and C24 are chosen to provide a fast attack time and slow decay, as required for ssb or cw reception. However this type of agc is unsuitable for am reception, and should therefore be switched off. An if derived agc could be added to the circuit for am reception but was not deemed necessary.

Crystal Filter

As mentioned previously, two types of crystal filters are possible. A simple half-lattice, using only two crystals or alternatively, a filter using four crystals thus improving unwanted signal rejection.

In the prototype, surplus FT243 crystals were used in the filter, all purchased at 5200 kHz. One was used as the oscillator crystal, the others were etched to the required frequencies. One of the problems with a filter using surplus crystals is the availability of crystals around the frequency required. The other point which put many off using surplus crystals is that they need to be etched on to the required frequencies. An alternative to this is to use new crystals, purchased at the required frequencies. This does put up the cost somewhat, but a filter using new crystals can give far superior performance, compared with a surplus crystal version.

Filter Design

The exact frequency of the carrier is not particularly critical but choosing exactly 5200 kHz or 5250 kHz the calibration points on the two bands covered with one vfo will line up. For the sake of the following calculations assume a carrier of 5200 kHz. For any other choice of frequency around this the relevant corrections can be made to the final figures.

The first thing to consider is the circuit of a single half lattice filter (Fig 3) and the choice of crystal frequencies. Using an approximation, the filter bandwidth at 6dB points is 1·6 times the frequency spacing of the filter crystals. Fig 4. illustrates the situation, showing the carrier position for usb.

The bandwidth required for ssb is somewhere between 2 kHz and 3 kHz. The 2 kHz bandwidth is rather narrow, and does restrict the audio frequency response of the receiver. At the other end 3 kHz is somewhat wide, and does accept more adjacent channel QRM, which can be particularly troublesome on a crowded band. A bandwidth of 2·6 kHz

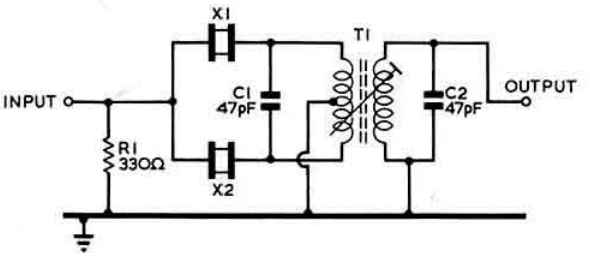


Fig 3. Circuit of a half lattice filter
R1 = 330 ohm T_1; Pr1 = 2 × 23t Bifilar wound Sec = 45t pile wound ¼ in from pri. Wound on 4 mm Alladin former.
$C_1 = C_2 = 47pF$. X_1 and X_2, see text.

is probably the optimum and the following calculations are based on that figure.

By knowing that:

$$BW = 1{\cdot}6\ fs$$

Where BW is the required bandwidth and fs is the frequency spacing of the crystals used in the filter

$$\text{therefore} \quad fs = \frac{BW}{1{\cdot}6} = \frac{2{\cdot}6}{1{\cdot}6}$$

$$fs \simeq 1{\cdot}6\ kHz$$

Knowing the bandwidth (2·6 kHz) and the frequency spacing of the two crystals (1·6 kHz) the frequency difference between the 6dB down point and the lower frequency filter crystal can be calculated.

The carrier crystal is a further 300 Hz lower than the 6dB point (see Fig 4) therefore the frequency relationship between carrier and the lower frequency filter crystal can be determined. The frequency difference between the lower frequency crystal and the 6dB point is half the difference between the bandwidth and frequency spacing. Adding 300 Hz to this provides the difference between carrier and lower frequency crystal:

Where FD equals the frequency difference

$$FD = \frac{2{\cdot}6 - 1{\cdot}6}{2} \times 1000 + 300\ Hz$$

$$= 800\ Hz$$

This means that if the carrier is chosen as 5200 kHz, then the lower frequency crystal is 5200 kHz + 800 Hz = 5200·8 kHz and the upper frequency crystal is 1·6 kHz more than this, which is 5202·4 kHz.

These same frequencies will apply for a filter using two half lattice sections back-to-back as shown in Fig 5. Crystals if purchased new, can be obtained from Cathodeon Crystals, Ltd, Linton, Cambridge and it should be specified that they are required to resonate with 30pF. A filter made up and used as G3RNL with such crystals proved to be far superior to the surplus crystal version, as well as being less critical with the alignment, which, incidentally, can be performed on this receiver with no test equipment. The total cost of crystals and components is just over £6 10s, which is very much cheaper than commercial filters of similar design.

Using Surplus Crystals

If the surplus crystals cannot be purchased at the required frequencies—and even if they are marked at the desired frequency it is unlikely that they are accurate enough for this purpose—then etching of the crystals is necessary. Before discussing this technique it is as well to point out that when using the filter shown in Fig 5 the two crystals at the same frequency must be pretty close, certainly within 50 Hz of each other. If not a good shape to the passband will be impossible to achieve.

For the prototype filter all crystals were purchased at the same frequency. By using a crystal oscillator, and listening on another receiver with the bfo in, the lowest frequency crystal can be selected from the bunch. This is used as the carrier crystal. If you are very lucky, one, or more, of the remaining crystals may be 800 Hz higher in frequency, and could be used for the lower frequency crystals in the filter.

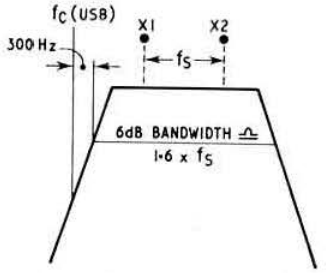


Fig 4. Diagram showing the frequency relationships between bandwidth, frequency spacing of filter crystals and carrier crystal.

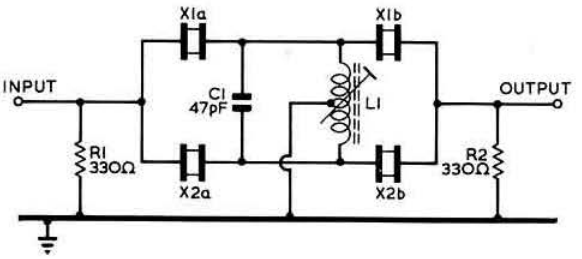


Fig 5. Circuit of crystal filter using two ½ lattice sections back-to-back.
$R_1 = R_2 = 330$ ohms. $C_1 = 47pF$.
$L_1 = 2 \times 23t$ Bifilar wound on 4mm Aladin former.
See text for details of crystals.

If not, then these, as with the higher crystal(s) must be etched on to frequency as described later. Before that, the method of checking the frequency difference can be by zero beating a receiver with the carrier oscillator crystal, and then replacing this crystal with one of the lower frequency crystals used in the filter. The beat note should be 800 Hz, and this can be checked against the tone output from an audio signal generator. Few stations have an audio oscillator, so an alternative source of 800 Hz (or 1600 Hz when checking the frequency difference between the crystals in the filter) can be a musical instrument of some description. Apologies to anyone who must lug the piano into the shack! Based on orchestral pitch, where A is 440 Hz, the nearest to 800 Hz is the second G above middle C (784 Hz), and the nearest to 1600 Hz is the third G above middle C (1568 Hz).

Etching Crystals

The corrosive used is Ammonia Bifluoride, and is purchased in crystal form from a chemist.

WARNING This chemical is dangerous and should always be kept in a plastic container.

The solution used is five parts of water to three parts crystals. An ideal container for this solution is a plastic bottle with a screw-top as used to hold some washing-up detergents. This solution is not too potent but if, by accident, some is spilt on to the skin it should be quickly washed off in clean water. If the plastic container for the solution has a screw-on lid (also plastic) this can be used as the bath for the crystals being etched. The materials required therefore are:

One small acid bath
One large clean water bath
One pair of tweezers (preferably plastic)
Several toilet tissues.

The procedure for etching a crystal is to carefully remove it from its holder and place the crystal in the bath of acid. As all of the crystals etched at G3RNL have moved at a different rate, the frequency against etching time cannot be equated. It has been experienced that some crystals begin by moving down in frequency before they start on their upward path. Depending on how far the crystal is to be shifted the time in the bath for the first go should not exceed about 90 seconds. The crystal should be removed using the tweezers, and then washed in the water bath. The crystal can then be dried using the tissues. A rag must NOT be used for drying. This will leave fibres on the crystal and consequently reduce its resonant frequency and its stability.

When the crystal is completely dry, it should be re-assembled in its holder and the frequency checked. The holder screws MUST be fully tightened as the pressure on the crystal will affect its frequency. This process can be repeated until the required frequency is reached. If the frequency is exceeded then the crystal can be brought down by adding a pencil mark to the crystal. This should only be used for small shifts of 50 Hz or less otherwise the crystal Q is reduced.

Again it is important that when checking crystals for a double half lattice filter, pairs of crystals on the same frequency must be within 50 Hz otherwise an unacceptable passband will result.

Filter Construction

The filter used in the prototype receiver, using surplus crystals, was constructed on a separate chassis to minimize the leakage between input and output. This could be further improved by completely enclosing the filter in a metal box. The chassis, for the prototype filter was a small four-sided chassis measuring 3 × 1¼ × 1¼ in. To reduce the overall height the transformer was made from a cut-down ift can and former.

The filter made using new crystals is built in a small box, completely enclosing the filter. The box size is 2¼ × 1 × 1¼ in deep but could be made somewhat larger as there is adequate space available on the chassis. The filter circuitry is wired on Veroboard. No crystal holders are used in this filter. The crystals are soldered direct to the copper on the under side of the board. As an alternative to HC6/U type crystals for this filter, wire-ended types could be used, which take up a little less space.

Power Supply

The power supply (Fig. 6) is built onto the same chassis and is a conventional full wave rectifier circuit using BY100 silicon diodes. The mains transformer used is optimistically rated at 250-0-250 V at 100 mA. It does get a little warm but has stood up to the strain for several months now, and its cost, from G. W. Smith and Co Ltd of 3 Lisle Street, London, WC2, was just less than £1. Its size is ideal for this receiver.

Mechanical Construction

The complete receiver is built on a four sided chassis measuring 8 × 8 × 2½ in. The front panel, measures 9 × 5½ in, and is spaced off from the chassis by ¾ in. Major

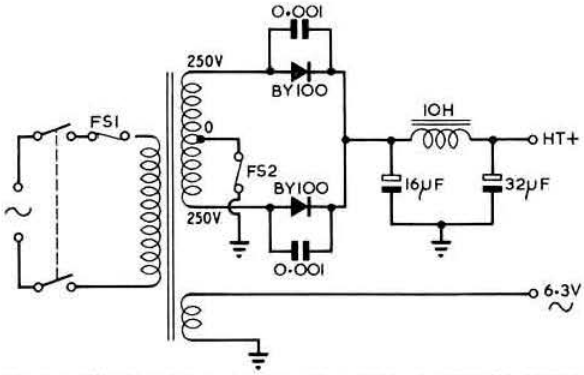


Fig 6. Circuit of the power supply used in the G3RNL Mini-5 Receiver.

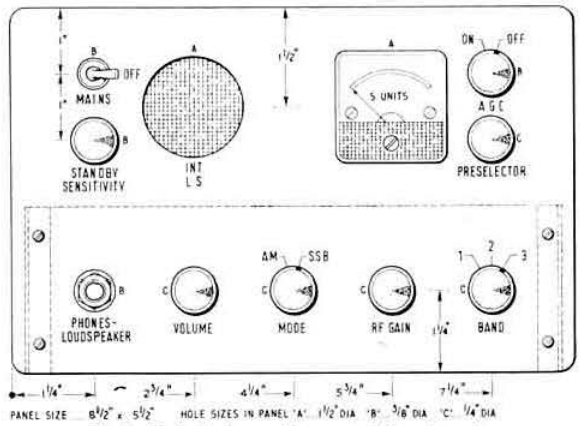


Fig 7. Main holes and layout of the chassis.

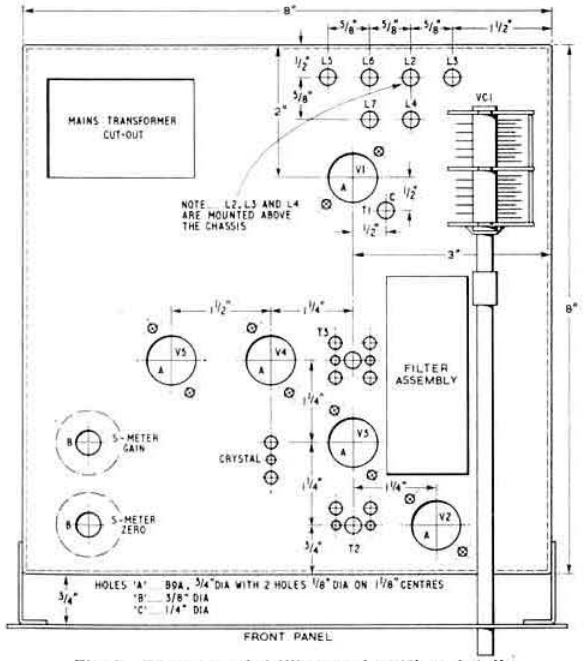
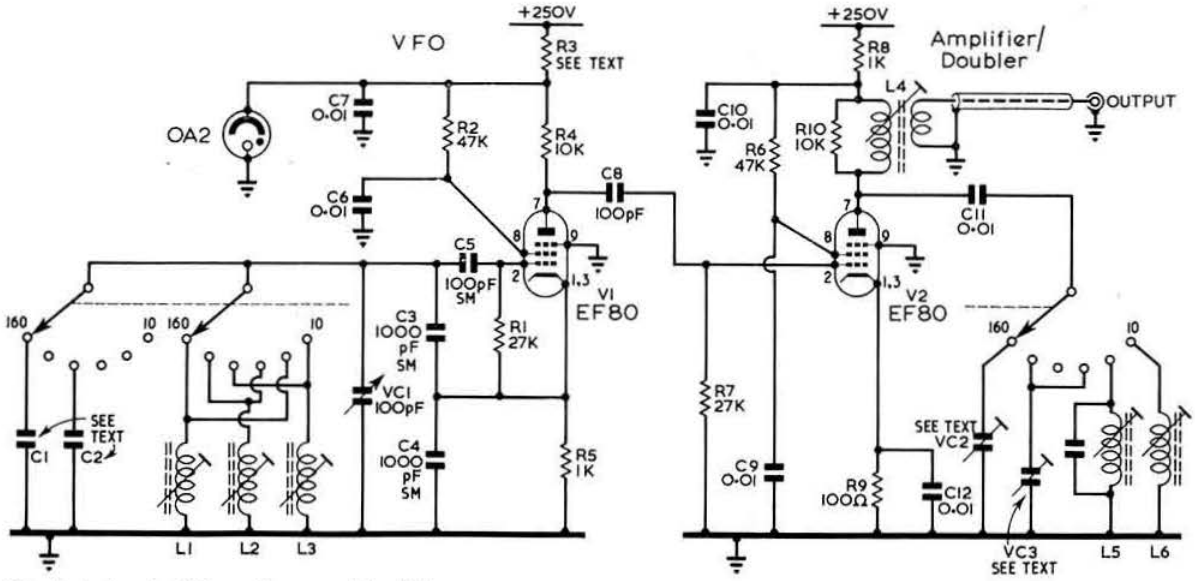
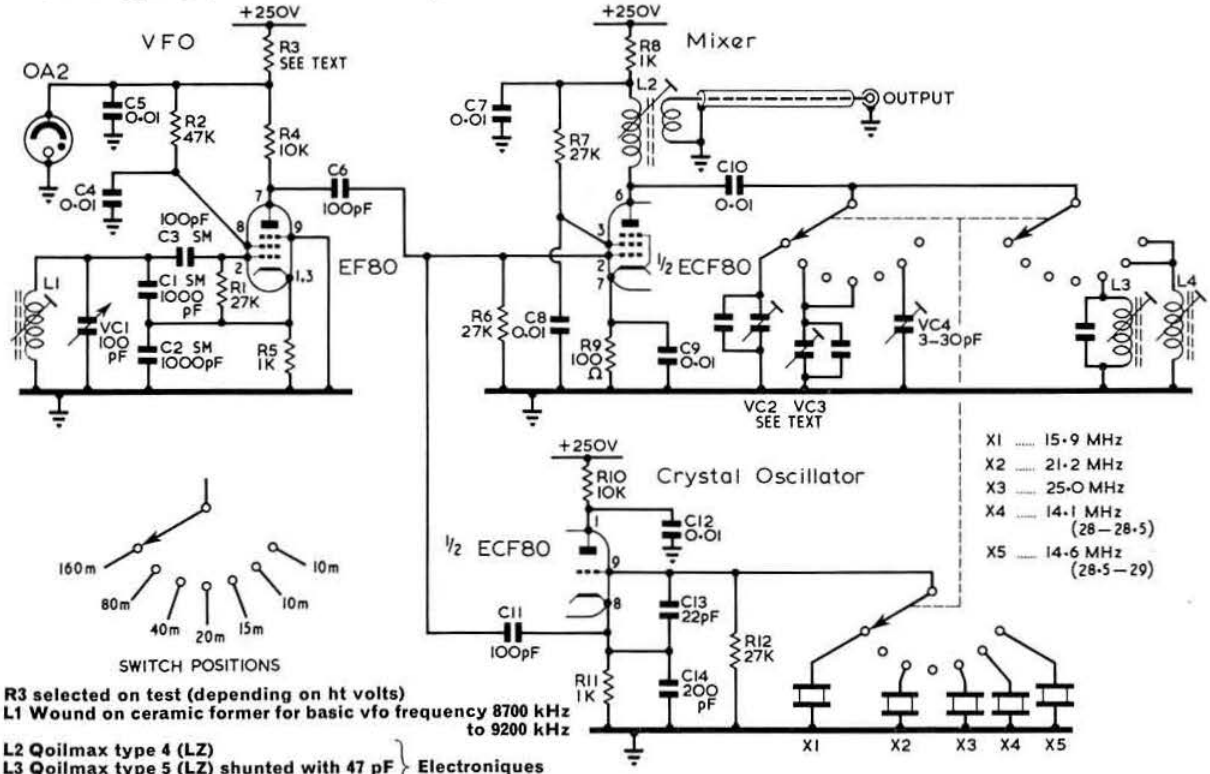


Fig 8. Front panel drilling and cutting details.



R3 selected on test (depending upon ht volts)
VC2 trimmer and parallel C to make up approx 150 pF
VC3 trimmer and parallel C to make up approx 250 pF
L1, L2, L3, See text
L4 Qoilmax type 4 (LZ)
L5 Qoilmax type 5 (LZ) with parallel C = 47 pF } Electroniques
L6 Qoilmax type 5 (LZ)

Fig 9. Circuit of simple switched vfo that can be used with the receiver.



R3 selected on test (depending on ht volts)
L1 Wound on ceramic former for basic vfo frequency 8700 kHz to 9200 kHz
L2 Qoilmax type 4 (LZ)
L3 Qoilmax type 5 (LZ) shunted with 47 pF } Electroniques
L4 Qoilmax type 5 (LZ)
VC2 trimmer and parallel C to make up 150 pF
VC3 trimmer and parallel C to make up 250 pF

Fig 11. Circuit of the recommended crystal mixer vfo for use with the receiver and matching transmitter.

cut-outs for the chassis are shown in Fig 7 while Fig 8 shows the front panel arrangement.

No special construction techniques are employed. Only suffice to say that leads carrying rf should be kept as short as possible, and screened wire should be used for all long af leads. Each rf and if stage should, where possible, use one earth point for that valve.

Alignment

After the building is complete, checked and the receiver switched on and checked for audio (by touching the top of the volume control if necessary), the S-meter should first be set for zero and the S-meter gain can, at this stage be set to maximum. The if strip can be set up with the vfo not connected. A signal at the intermediate frequency, producing a beat note of about 1 kHz can be injected at the aerial socket and the two if transformers peaked for maximum reading on the S-meter, reducing the rf gain control as required. If this does not reduce the signal enough this could be owing to stray coupling, and the output of the signal generator must be reduced accordingly. The filter coil can be roughly set up also at this stage by peaking it for maximum reading on the S-meter. To tune the rf circuits, the vfo must be connected. If the vfo is not built at this stage the signal generator can be used, and the rf circuits tuned up on actual received signals. This is not the best way to do things but adequate results can be obtained by this method. Two bands are covered by each setting of the bandswitch. On the lowest band a steady signal should be tuned in at about 1·5 MHz, with the tuning capacitor set to almost full mesh. The cores of the appropriate coil must then be adjusted for maximum on the S-meter. The top of that range must now be set up by tuning the vfo to receive a signal of around 4 MHz with the tuning capacitor adjusted for maximum signal. The trimmers on the coil must then be adjusted for maximum. This process should be repeated until no further improvement is possible.

On Band 2 (40 and 20m) the same process can be repeated. On the higher frequency band, both 15 and 10m will tune with the capacitor almost fully open. The 20m band can also be covered on this range, therefore this should be used as the low frequency tuning point and will coincide with the tuning capacitor about half meshed.

The VFO

The vfo can be one of several types. For good ssb use the stability must be excellent, particularly if the same vfo is to be used with a transmitter. For a simple vfo this can be a switched Colpitts oscillator using the basic circuit shown in Fig 9. For simplicity the 15m band, requiring an oscillator frequency of 16 MHz can use the same coil as for 160m. The basic frequency of the oscillator should be around 8 MHz and doubled to 16 MHz for 21 MHz operation. For 160m, a capacitor can be switched in parallel with this coil to bring the oscillator frequency down to about 7 MHz (as detailed in Fig 1). For 10m operation the 40m vfo (running at about 12 MHz) can be doubled and used. Trial and error must determine the coil and parallel capacitor values for this type of vfo.

Crystal Mixer VFO

For really high stability operation a crystal mixer vfo must be used. With this circuit the vfo can be at one basic frequency and mixed, to the required oscillator. Fig 10 shows the schematic diagram of such an arrangement. The basic oscillator frequency is chosen as the frequency which, when mixed with the 5·2 MHz, provides two band operation, namely 80m and 20m. The circuit diagram of this design is shown in Fig 11.

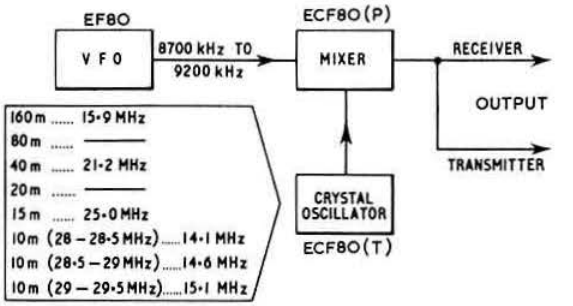


Fig 10. Schematic diagram of a crystal mixer vfo.

Alignment of the VFO

The alignment of each of the oscillators described is similar. Alignment should first be performed on the 40m position, and L_2 (Fig 11) or L_4 (Fig 9) tuned for maximum output. The 160m position can then be tuned by adjusting VC2 and then the 80/20m position by adjusting VC3 for maximum output.

The 15 and 10m positions can then be resonated by adjusting the cores of L_3 and L_4 (Fig 11) or L_5 or L_6 (Fig 9). With the circuit of Fig 9 the higher frequency position of 10m should be aligned first, and the lower position then tuned by adjusting VC4.

Alternative VFO

A transistor vfo can provide excellent stability and could be used with this design. A suggested circuit would be a high C grounded base Colpitts oscillator followed by a high gain cascode amplifier. This circuit is currently the subject of some development at G3RNL.

Results

The results with this small, simple and relatively cheap receiver have been surprisingly good. Although no precise measurements have been made as to sensitivity the receiver performs well in comparison to more sophisticated home built designs as well as expensive commercial receivers.

Operation of the receiver is quite simple, and was used by the XYL of G3RNL when the station operator was away from home and operating /A. The only difficulty encountered was the sharpness of the preselector tuning control which could, to great advantage, have a slow motion drive fitted. This should also be calibrated on the front panel so that the wrong peak cannot be inadvertently selected.

VHF SSB

DURING recent months there has been a considerable increase in ssb activity on the two metre band. There are basically two methods of achieving ssb output in this frequency range: (i) by the construction of a purpose built 2m transmitter, and (ii) the use of existing hf bands ssb equipment together with a transverter which will provide the appropriate frequency translation. A number of operators desiring to retain their hf bands capabilities, whilst also wishing to operate in the vhf bands, have adopted the latter method. Whilst the basic principle of a transverter is not new, the blending of the principles involved with the practical application has, in some cases, left much to be desired in so far as the generation of spurious frequencies is concerned.

This problem was brought to the Society's Technical Committee where a small VHF SSB Subcommittee was formed to make recommendations for publication in the Society's Journal and to form the basis of a paper to be presented at the Region 1 IARU Conference in May 1969. The Subcommittee comprised the following members: G. M. C. Stone, G3FZL (Chairman), R. T. Greenwood, G3LBA, F. A. Griffiths, G3MED, G. R. Jessop, G6JP, and R. G. Pett, G3SHK. As the work of the Subcommittee progressed it was evident that the subject had a number of angles that had not been appreciated initially and it was decided that a symposium by four of the five subcommittee members could well be valuable and informative. This then is the background which led to the successful London Lecture Meeting which took place at the IEE on 15 November and was attended by more than 100 members.

Simultaneously with the work of the VHF SSB group a short article for publication in *Radio Communication* had been prepared by B. D. A. Armstrong, G3EDD, a member of the Technical Committee. This also dealt with the problems of the generation and radiation of spurious frequencies when using transverter equipment.

The material that is presented below therefore consists of two separate sections. Firstly, the article by G3EDD followed by the recommendations made by the Sub committee and the Technical Committee.

Some Aspects of the Design of VHF SSB Transmitters

Whenever anything new happens in amateur radio technique, the initial approach is to use some form of breadboard arrangement to the exclusion of any parameter other than readable communication. The pioneers of 144 MHz used either super-regenerative or vhf eco's in their converters. Time and experience showed that neither of these approaches was satisfactory for various reasons, but they had the merit of simplicity. In exactly the same way, the pioneers of vhf ssb used whatever was available to get going; they used an hf ssb transmitter and mixed the output with a crystal controlled source to bring the final frequency within the 144 MHz band. It was perhaps unfortunate that this approach has been so successful for communication that there have been few queries raised as to whether or not this is the most satisfactory approach.

Many operators who are geographically close to some vhf ssb stations report signals from these ssb stations which are present in addition to the main signal. This is obviously an unsatisfactory state of affairs and it is hoped that the following notes will encourage vhf ssb operators, bo thold and new, to generate a signal which is clean and not a nuisance to the other users of the amateur band and especially adjacent bands.

Choice of Mixing Frequencies

It is a fact that any transmission will contain not only harmonics of the main output frequency, but harmonics of any oscillator involved in the final frequency generation, and mixing products of any frequency present. It is essential to take steps to attentuate these outputs to a minimum. Remember, however, that they will always be present even if at very low level.

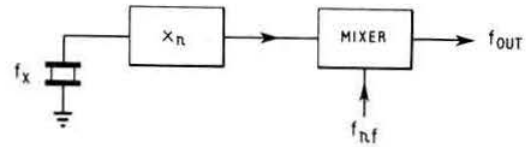


Fig 1.

$nf_x + f_{hf} = f$ out.

This is the wanted result, but in addition the output will contain:

1) $f_x, 2f_x, 3f_x, 4f_x, 5f_x, \ldots$ etc.
2) $f_{hf}, 2f_{hf}, 3f_{hf}, 4f_{hf}, 5f_{hf}, \ldots$ etc.
3) $nf_x \pm mf_{hf}$ where n and m are any integers.

All of these are important and it is often not appreciated how large n and m can be. They can (but admittedly rarely) reach three digits.

To take an actual case, as in Fig. 2.

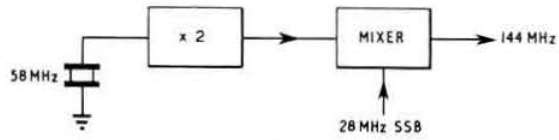


Fig 2.

Not only does $(2 \times 58) + 28 = 144$ MHz but
$(3 \times 58) - 28 = 146$ MHz.

In this case, since post mixer selectivity is invariably low Q, the unwanted 146 MHz transmission could be expected to be at a high level.

However both Figs 1 and 2 are simplified. The actual generation of the hf ssb injection involves yet more frequencies, so that the full arrangements can be shown in Fig 3.

The total arrangement thus involves three crystal oscillators and one vfo. The calculation of potential spurious emissions from this is a task for a computer. It should not be forgotten that the crystal controlled injection frequency can be higher than the output frequency. Some problems concerning spurious frequencies can be solved in this manner, but the approach does result in inverted tuning direction and sideband transposition.

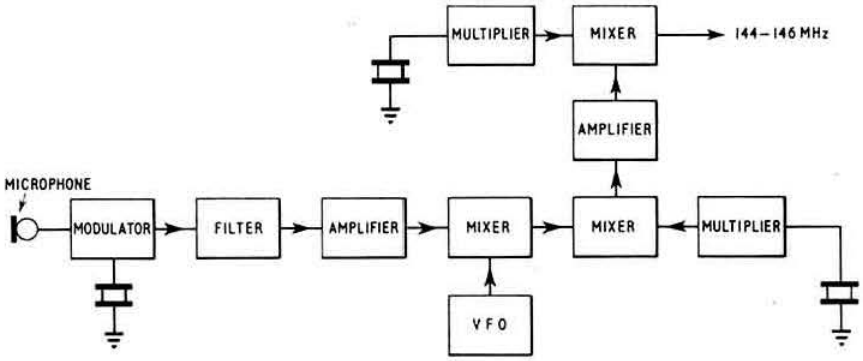


Fig 3. Block diagram showing the stages necessary to generate vhf ssb using a transverter.

The Levels Involved

Measurements on transmitters where no deliberate attempt has been made to reduce spurious emissions show that 40dB spurious attenuation is typical. Thus if a local receiver receives an S9 + 40dB wanted signal from a vhf ssb transmitter, a spurious signal of S9 could also be received. Assuming 3dB per S point and an acceptable interference level of S2, the extra attenuation required is (7 × 3) dB i.e. 21dB. We are looking for approximately 60dB spurious attentuation in this case. However, local signals can well be in excess of S9 + 40dB and a case can be made for a target of 100dB spurious emission attenuation.

Only the professional engineer with access to specialized test gear and who has had experience of attempting to design to this target can truly appreciate the enormity of the task. It is possible however to indicate lines of approach which will at least show a major improvement on the 40dB figure.

The Design Approach with an HF SSB Transmitter

Both hf and crystal frequencies should be chosen so that no spurious emissions produced by low order harmonics fall in the band or close to it. The crystal frequency should be as high as possible, but bear in mind the need to avoid use of a 58 MHz crystal with 28 MHz hf for instance. However 28 MHz ssb is preferable to a lower frequency in that the greater spacing between the carrier and injection frequency the better the attenuation of the 144 MHz circuits to the injection frequency and image. (This statement is not universally agreed—Ed.)

Final Mixer

Although the double tetrode mixer has almost universal acceptance, a number of other approaches are open if mixing is kept at a low level. Both conventional and Schottky diode bridges, and balanced transistor circuits are possibilities. Whatever arrangement is decided, the aim should be to arrange for maximum rejection of the vhf injection frequency. Provision for balance adjustment should always be provided.

With a high level ssb input in which high power is dissipated in a resistive load, "hop over" effects can occur, in which appreciable ssb energy (with doubtful spectral purity) gets into both pre and post mixer circuits thus bypassing any selectivity in the ssb input. If this energy mixes with a second frequency to produce a third frequency within the bandwidth of either the oscillator or 144 MHz circuits a spurious emission close to the wanted output frequency will result.

Crystal Oscillator and Multiplier

In order to provide the mixer with injection of excellent spectral purity, coupled tuned circuits should be used throughout, with low impedance link coupling.

HF SSB Input

The input level should be kept to a minimum. It is bad practice to use many watts of hf only to dissipate them in a resistor located on the converter chassis. On the other hand bad carrier rejection will result in the hf ssb transmitter if the level is turned down by reducing the audio drive. The best approach is to feed the input to the hf pa direct to the converter and it is often possible to obtain sufficient level by switching off the pa screen voltage and using the feed through voltage. Band pass filtering should be used in the converter hf feed in order to filter unwanted emissions.

Post Mixer Filtering

Band pass filtering should be provided immediately after the mixer. A series of low working Q tuned circuits in successive amplifiers is not considered sufficient.

Aerial

Use an aerial with the narrowest acceptable gain-bandwidth characteristic. A broad band antenna may have appreciable gain at the local oscillator injection frequency or the image frequency. It is important not to confuse the vswr bandwidth with the gain bandwidth; they can be very different and the latter is rarely quoted.

Practical Design

A near perfect design can be unsuccessful if the engineering is poor, conversely an indifferent design can sometimes produce near acceptable results if the engineering is excellent.

The following points should be borne in mind:

1 Every tuned circuit should be properly screened and preferably every stage should also be screened.

2 Decoupling must be effective not only at the desired frequency but also on high order harmonics.

3 Lt and ht feeds to individual stages must be thoroughly decoupled.

4 In-line layout should be employed with the oscillator at one end and the output at the other.

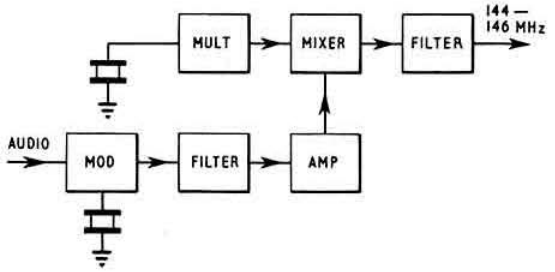


Fig 4. Suggested arrangement for a purpose built vhf ssb transmitter.

The Final Solution ?

From the above discussion it becomes clear that there are serious problems using an hf ssb transmitter as the ssb generator. The best answer appears to be a purpose built vhf ssb transmitter along the lines of Fig. 4.

The main problem is generating the ssb signal at a sufficiently high frequency. Filters at 10·7 MHz are obtainable, but 20 MHz would be better. For variable frequency operation the injection frequency should be varied. Again this is a problem if full 2 MHz coverage of the 2m band is required, but if ± 50 KHz on the sideband channel of 145·41 MHz is acceptable, a vxo offers a simple solution. As last comment, it is hoped that many operators will not continue to be unthinking followers of the great god, Power. It is anti-social and in contravention of your licence conditions to use more power than is needed for satisfactory communication. It is difficult for the am operator to reduce power, but for the fm or ssb operator it is an easy task to fit and use an rf power control.

Recommendations for 2m SSB Out of Band Radiations

Great care must be taken to ensure that no out of band spurious radiations occur. All rf circuits should be adequately screened and a bandpass filter with sufficient out of band attenuation should be included in the aerial feeder.

In Band Radiations

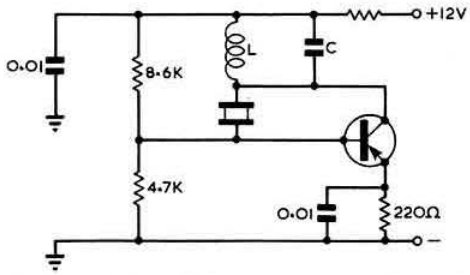
To avoid interference with other operators and other services on the nominated frequencies between 144 and 146 MHz:-

1 Every effort should be made to keep the spurious radiations down to 90dB below the wanted signal.

2 The following precautions should be taken when a transverter is used in association with an hf bands transmitter/transceiver as a ssb source.

(*a*) Do not use the 28–30 MHz tuning range because the fifth harmonic is in the band and the level of spurious signals is likely to be higher at the highest frequency of the hf bands unit.

(*b*) The transverter crystal oscillator should be on as high a frequency as possible (although certain high frequencies must be avoided, eg 58 MHz). The use of fundamental crystal oscillators below 30 MHz must be avoided unless very special design precautions are taken. Any frequency



Circuit of a crystal oscillator recommended for use in the range 30 to 60 MHz. Suggested transistor types are 2N706A, 2N2926 or p-n-p types ASZ21 or OC171.

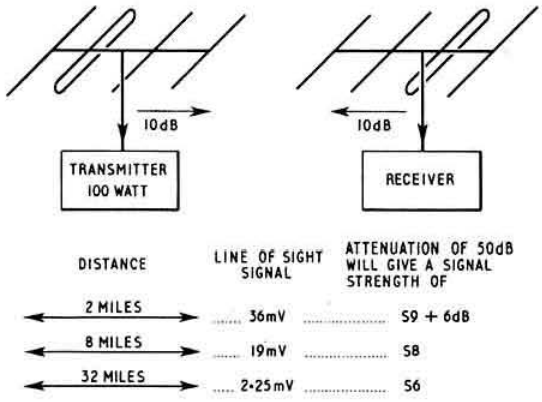
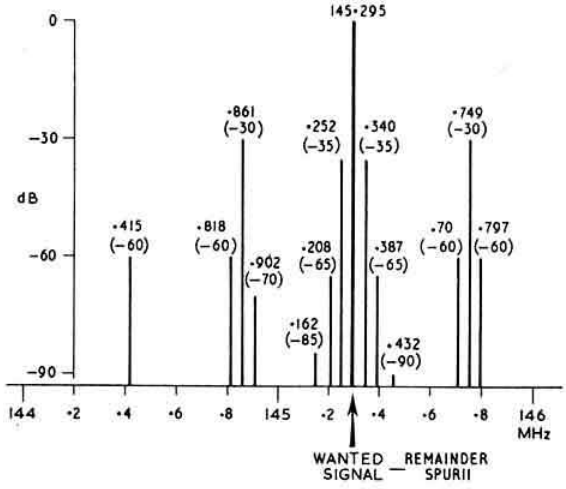


Diagram showing the signal strengths to be expected from a typical situation at various distances. A spurious transmission attenuated by 50dB from the desired signal will produce the strengths given in the third column.



Spectrum of a signal from a home constructed transceiver and transverter combination.

The GSPK Printed Circuit Kit

by R. F. STEVENS, G2BVN

IN many cases home constructed projects call for a printed circuit as the basis. When semiconductors are used this form of assembly is convenient and where complete screening is desired a printed circuit board may be readily mounted in a die-cast box of which a number of types and sizes are available. Articles in the amateur radio journals frequently provide printed circuit layouts thus giving the constructor the incentive to adopt this method.

The *GSPK Printed Circuit Kit* provides the means whereby a board may be produced in the laboratory or at home with the minimum of trouble. The kit contains supplies of copper surface laminate board, resist and etchant. The plastic box in which these items are contained is suitable for use in the process. After the board has been cleaned with a domestic type abrasive cleaner the desired circuit is painted on using the resist and the brush supplied. The etchant from the larger bottle is poured into the plastic box and the laminate is completely immersed. When the unwanted copper has been completely dissolved, the board is rinsed in water and the resist is removed with cleaner. The board is now ready for drilling which should be carried out with a new drill to avoid the possibility of tearing the copper. When soldering components to any printed circuit care should be taken not to apply excessive heat thereby weakening the bond between the copper and board.

The *GSPK kit* is very suitable for use where small quantities of circuits are required and the home constructor should have no difficulty in producing a completely satisfactory board. The kit is obtainable from GSPK (Electronics) Ltd, Hookstone Park, Harrogate, Yorks at a cost of 25s. plus 3s. 6d. postage.

VHF SSB—*continued*

that gives in-band signals of less than tenth order should be avoided.

(*c*) Precautions must be taken to minimise radiation of the crystal oscillator chain output frequency. This can be done by using a balanced mixer—which can attenuate this component by 20dB or more—and by subsequent tuned circuit selectivity. In the latter case a minimum of *four* tuned circuits are required between the mixer and the aerial feeder. If two of these tuned circuits are coupled this should be done inductively.

(*d*) A frequency of 58 MHz must be avoided in the transverter—either as the oscillator frequency or a multiplier stage output—when a 28 to 30 MHz ssb feed is used.

Reason: $58 \times 2 + 29 = 145$ MHz

$58 \times 3 - 29 = 145$ MHz

Another undesirable combination is a 43·333 MHz crystal used with a 14 MHz ssb feed. The third crystal harmonic is 130 MHz and this with the addition of the feed frequency will give 144 MHz output. However the fourth harmonic is 173.333 MHz and if twice the feed frequency is deducted from this a frequency of 145·333 MHz will be obtained This is another unwanted in-band spurious.

(*e*) There must be an adequate degree of frequency selectivity between the hf feed and the transverter mixer as most hf ssb transmitters or transceivers will have unwanted frequency components in their output. Even those far removed from the nominal feed frequency can cause serious problems if fed without further attenuation to the transverter mixer. A satisfactory method is to insert a suitable filter and, if necessary, a combined power attenuator, between the hf feed and the transverter. The dummy load, if used, should always be well screened from the transverter.

3 Preference should be given to the use of equipment specifically designed for operation on 2m using a high frequency ssb generator. Recommended are 9, 10·7 or 25 MHz as suitable for this purpose.

4 Care must be taken in all amplifier stages following the final mixer to ensure that the operating conditions are such that harmonic distortion does not produce spurious frequency signals in the region of the unwanted sideband of level worse than −40dB relative to the wanted signal.

TECHNICAL TOPICS

By PAT HAWKER, G3VA

THE recent reference to current problems in TVI (*TT*, November, 1968) resulted in a number of useful comments from members that may help others still struggling with this difficult and vital subject. Ian Davies, G3KZR makes a valid point in suggesting that rather too much published information seems to assume that the " ham-in-the-street " has everything at his fingertips: he would like to see an extensive, low-cost book on the lines of *Amateur Radio Techniques* devoted entirely to case histories, digests of what has been already written on the subject, hints and tips, and the like. Back in the 50s, Philip Rand, W1DBM, with his *Television Interference* did this from the American viewpoint, collating a large number of articles on the subject—but I believe these useful editions have long been out of print.

Most of the basic information is, of course, in the various Handbooks but there is no doubt that tackling an intractable case of TVI can often be a daunting matter, in which one grasps at any straw; a study of how others have overcome the problem can be encouraging, provided that the case histories cover all the different mechanisms. For G3KZR, in a weak-signal Channel 1 area, a combination of the G3HLW tobacco tin filter (RSGB BULLETIN, April, 1967) and Post Office type 38A filters have, after a long odyssey, finally given him an all-clear with 50 watts on hf bands.

He also points out that some of the rental companies have receiver filters available for use where they are satisfied that the fault is due to the TV receiver; but a lot still depends on gaining the co-operation of the local Post Office engineers and those of the rental company.

G3KZR would like to see the TCC printed-circuit board for the 38A filters more readily available, perhaps through the Society. Here again, I believe that some of the local PO Telephone Managers are now willing to supply 38A filters with a minimum of red tape. Ian Davies is a great believer in combating TVI complaints with good public relations, conducted by the XYL, and carefully avoiding any attempt to deny the possibility that the transmitter might be the source of interference.

Dealing with "Outer Cable " RF

G3KZR is also convinced of the effectiveness of the PO type 38A filters, and comments that what is needed now is an equally simple solution to vhf or hf signals on the outer screen of the receiver co-ax feeder. The " lossy balun " is one answer, but will not meet all circumstances: for example, such a balun would require some 30 or more turns in order to cope effectively with 1·8 MHz rf.

Alan Gordon, G3XOI, however, relays information on the double Faraday loop technique which some Post Office engineers recommend, and which in his own case proved highly effective in solving a Top Band TVI problem. The single turn loop made out of coax, and forming a Faraday screen, is one of the oldest dodges in tackling transmitter harmonic radiation, but I cannot recall the double loop receiver filter having been described in print; yet it is one of the cheapest forms of filter to make up. By fitting a coax plug and socket on the input and output leads, the device can readily be tried on any TV receiver. Fig 1 shows the basic details of the filter as recommended to G3XOI by his local PO engineer.

G3XOI, however, has also tried a modified technique which also effectively cures his own 1·8 MHz problem,

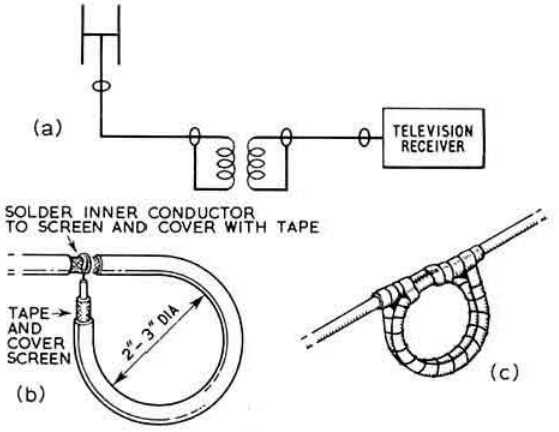


Fig 1. Faraday double loop television receiver filter. (a) Basic arrangement of filter; (b) detail of one loop; (c) two identical loops are put together, taking care to insulate all wires/screens and taped or laced firmly.

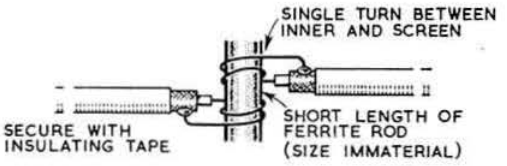


Fig 2. The G3XOI version, using ferrite transformer, has proved effective in curing TVI from 1·8 MHz transmitter.

though it might not prove as good as the Faraday double loop at hf. The 'XOI version comprises just a single-turn coupling transformer using a short scrap of ferrite rod: see Fig 2.

How to be " without it "

Bill Matthews, G2CD, is stirred by the continued problem of TVI to interpose a long-felt plea that, despite the " with it " rush to ssb, the claims of fm and nbfm should not be lightly brushed aside. He notes that from a TVI viewpoint, ssb is still amplitude modulation . . . only rather more so. In the urge to squeeze out extra talk-power that is so often quite unnecessary, he questions the prevailing attitudes of many amateurs who would sooner be "with it" (on ssb) and off the air, than " without it " (on nbfm) and on the air. To be a follower of fashion is not always a wise choice.

There can be little doubt that a very good case can be made for much greater use of fm techniques—certainly on 21 and 28 MHz, and on the vhf bands. One suspects that if every ssb station suddenly began using nbfm, the overall communications efficiency would suffer far less than many ssb enthusiasts would be prepared to admit. Far more impressive might be the effect of such a change on TVI.

Without entering into the current controversy on ssb for the vhf bands, it might be worth noting that a letter in *Electronics* recently pointed out that it is a fallacy to believe that ssb would double the number of channels available to mobile business radio since " it is unfortunately beyond today's state of the art to confine the energy of an ssb signal to its own channel to the degree required in mobile radio systems." In other words, few ssb stations on vhf could hope to suppress the unwanted sidebands to anything like 90 dB.

A policy question on TVI may well become of major importance within a few months when the three British television programmes all become available (at least in some areas) on uhf. The question is whether, when this is the case, will the vhf channels continue to be protected to the same extent as now? What will be the Post Office (or eventually the proposed Ministry of Posts and Telecommunications) attitude to the viewer who insists on viewing on a vhf channel subject to amateur interference when he or she could equally well watch the same programme on a clear uhf channel?

Ideas for HF Receiver Design

The general adoption, over the next decade, of ssb for ship 'phone—even for the smaller vessels using the " trawler band " frequencies—is already leading to some intensive development work by the communications firms. A good deal of this work directly parallels that of the designer of amateur equipment since the same basic problems have to be overcome, and much the same " options " in the choice of components are open to both, even if the overall budgets are different. Some useful ideas can therefore be expected to emerge from the communications firms over the next few years, though often in a form which will require some adaption if they are to be put into amateur equipment.

A notable article in this category: " The design of an mf and hf ssb spot-frequency receiver for mercantile marine use " by K. H. Barratt of Eddystone is published in the Marconi journal *Point-to-point Telecommunications* of October, 1968. This discusses such questions as the pros and cons of bipolar or FET or SIC devices. SICs were ruled out in this design on the grounds that comparable overall cost and reliability could only be obtained by means of a dramatic reduction in circuit complexity.

On FETs versus bipolar transistors, the choice was determined by the fact that although the FET is capable of better large-signal performance, the spread in parameters makes it difficult to take full advantage of this, unless complex circuitry is used to restrict the effect of the variations (this factor is less important for the home-constructor than for quantity production). For this reason, FETs were used in all signal-handling circuits up to the main selectivity (i.e. where strong unwanted signals may be present), and bipolars in the later stages.

Single-stage rf amplifiers use dual-gate MOS FETs on the grounds that they offer large signal handling capability;

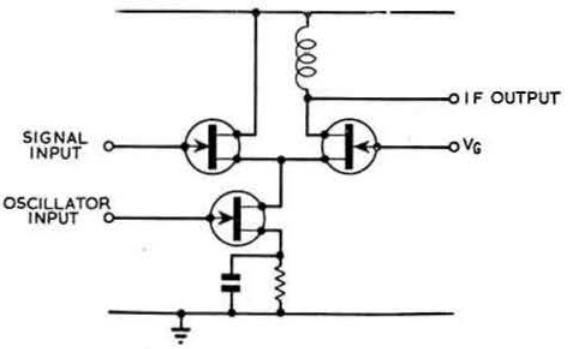


Fig. 3 Simplified circuit diagram of the large signal handling second mixer of transistorized marine ssb receiver.

low internal feedback; and have the second gate available for age. The amplifiers are designed to give the least possible gain consistent with achieving good signal/noise performance and include three tuned circuits between aerial input and mixer. A dual-gate MOS FET has also been chosen for first mixer on the grounds that it is possible to feed both oscillator and signal into separate high-impedance inputs with very little interaction; furthermore, the author points out, mixing is then predominantly multiplicative and does not depend upon the square-law characteristic of the conventional single-gate FET, reducing spurious responses and providing good conversion gains for low-level oscillator drives.

In this design, the first i.f. is 1·2 MHz and after some amplification this is changed down to 100 kHz by a second mixer of unusual design. It is stressed that this second mixer does not need to have good low noise performance, but must be able to accommodate signals of comparatively high level. A simplified circuit is given in Fig 3 from which it will be seen that three single-gate FETs are combined in a long-tailed pair, with one of the FETs used as the common-tail

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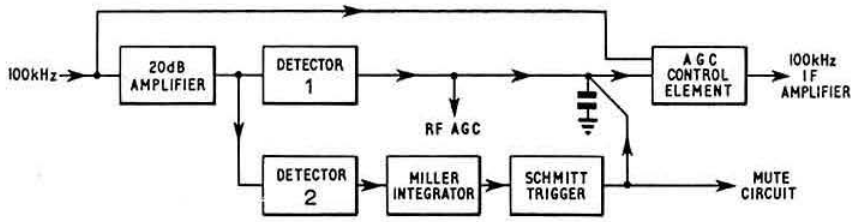


Fig. 4. Block schematic of pedestal (hang) agc system used in the marine receiver.

impedance. The ocillator drive goes to the gate of this FET and the signal to the gate of one of the other FETs.

Pedestal AGC System

The Eddystone designer also discusses in the article a pedestal (hang) agc system which appears to have a number of novel ideas: see Figs. 4 and 5. Detector 1 has fast attack (200 milliseconds) and slow decay time constants (greater than 60 seconds). Detector 2 has fast attack and fast decay constants (about 10 milliseconds each). The following notes on how the system operates are taken directly from the original article:

"On reception of a signal, detector 1 charges C1 rapidly, and agc is produced. The output from detector 2 bottoms the Miller integrator transistor and, since the source impedance is low while signal is present, the bottoming occurs rapidly. The Schmitt trigger is therefore in the off condition and the capacitor C1 is unbypassed. When the signal disappears, C1 starts to discharge, but would take a long time to complete this discharge.

"However, the Miller integrator capacitor C2 is also discharging (since no signal is present the source impedance is high, and the discharge time constant depends upon C2 and the setting of RV1). When the collector of the integrator has risen in potential sufficiently, the Schmitt trigger operates, discharging C1 rapidly. The time taken for the Schmitt to operate from the disappearance of the signal is fixed, by the setting of RV1, and may be adjusted from less than one second to several seconds.

"When agc bias is supplied, the transistor and diode are forward biased, providing low ac impedance paths to ground. The if signal is thus attenuated by R1, R2, the transistor and diode.

"Muting is provided by the connection of the Schmitt trigger output to a circuit, similar to the agc control element, connected between the signal detector and af amplifier. Here, with no signal input, the transistor is biased "on" and the af output attenuated.

"Radio-frequency agc is provided in the rf amplifier only and is taken off the main agc circuit. Separate control of threshold is available in the rf amplifier, to enable the optimum compromise to be obtained."

This appears to be an elegant, if at first sight rather complex, if-derived hang agc system, and it would be interesting to hear if anyone successfully applies this idea to an amateur transistorized receiver. Unfortunately, as in most published accounts of circuits developed for use in specific commercial equipments, full component values etc are not provided in the article; but often these could be estimated, calculated, or arrived at by a little trial and error.

Franklin Uniform Aerial

Over the years, fashions in aerials as well as in systems have changed; today those in widespread use tend to be derived from a relatively few basic types. Many other aerials, including some dating back well over 40 years (but none the worse for that), have become little more than names in old text books to many of the current generation of amateurs.

Recently, going through old *Bulletins*, I was interested in several early references to the Franklin Uniform aerial—one of the first designs to take practical advantage of the fact that, since most radiation takes place from current nodes, sections at high voltage can be folded back with relatively little loss of total radiation. This technique allows in-phase or collinear arrays to be erected in less space than would otherwise be needed, and without phasing stubs.

The original Franklin Uniform was invariably described as a vertical array, though this involved some problems since the sections were not equally balanced to earth, and dimensions were critical. The vertical form of the array has in fact been recently described in the October, 1968 section of a series of articles on vertical aerials in *CQ* by Paul Lee,

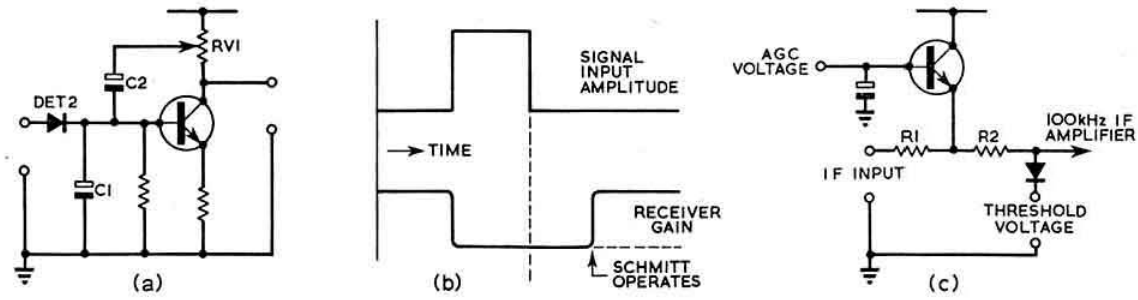


Fig. 5. (a) Simplified circuit of the Miller integrator; (b) operation of pedestal agc system; (c) simplified circuit of control element.

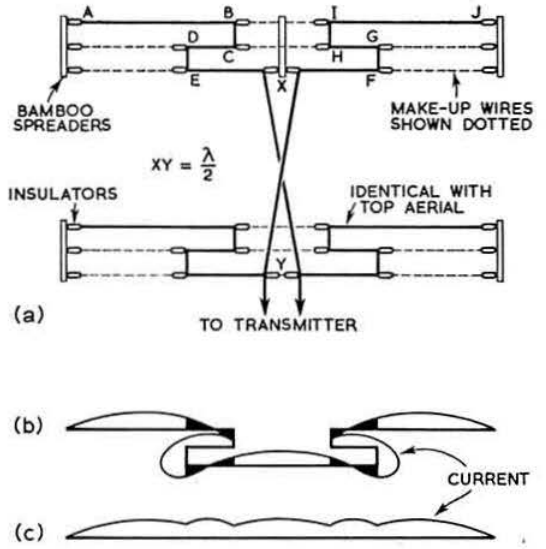


Fig. 6. (a) The 1938 bi-directional ZE1JA fixed beam array for 14 MHz, based on the Franklin Uniform aerial adapted for horizontal polarization. Dimensions (14 MHz)
AB = IJ = (½λ — 2·5%) — 1 foot = 0·609λ — 1 foot
CD = GH = (½λ — 2·5%) — 2 feet = 0·244λ — 2 feet
EF = (½λ — 2·5%) — 2 feet = 0·731 — 2 feet
BC, DE, FG, HI each 2 feet (λ in feet 984/MHz). Bamboo spreaders lying in the horizontal plane (shown in vertical plane for simplification). ½λ spacing between X, Y.
(b) Current distribution in 3λ/2 Franklin uniform array. Radiation from shaded portions cancel.

W3JM. He points up the omnidirectional gain provided by its vertical radiation pattern, and puts forward the suggestion of making vhf and uhf versions by shaping the aerial in stiff wire. In practice, however, few vhf operators are interested in aerials for vertical polarization.

It may not be generally appreciated that this technique can equally be used to form horizontal arrays; indeed it was so used in an impressive fixed bidirectional Lazy-H for 14 MHz described by ZE1JA (*T & R Bulletin*, December, 1938). I seem to remember ZE1JA putting in a whale of a signal despite his location on the wrong side of a large Cable & Wireless point-to-point beam array. Fig 6 shows the array, as described then—a bulky beast on 14 MHz but it could still be attractive if scaled down for higher frequencies, or used without the second lower element. Correct feed-point impedance is not known, though ZE1JA fed it with 600-ohm line. This technique for putting out the maximum radiation from a given span seems too good to be forgotten entirely.

3·5 MHz Mini-Antenna

Folding back arrangements can, of course, often be adopted in order to radiate better signals on 1·8 or 3·5 MHz from sites where only a short span of aerial can be put up. As a rather novel arrangement of this type, R. A. Lowe, ZL1AYN describes a "Mini-Antenna" (*Break-in*, May, 1968) that he has been using on 3·5 MHz (Fig. 7) although he has only 30 ft available from his shack to his aerial support. The 60 ft or so of wire is simply doubled back, spaced about 6 in with Paxolin spacers and the free-end connected to

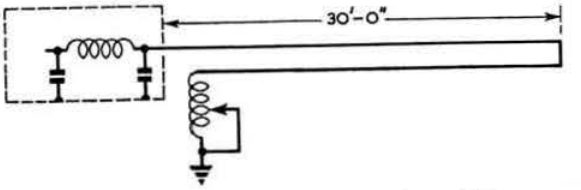


Fig. 7. The ZL1AYN "mini antenna" for 3·5 MHz.

earth via an ex-ZC1 variable inductor. He reports the system as far more effective than just a 30 ft wire, or a fold-back without the variable inductor.

Modifying Receivers

The virtues of the 7360 beam deflection valve for mixers and ssb balanced modulators continue to be reflected in amateur publications. Not many people might be inclined to dig into one of the Drake R4 series of receivers which have clearly proved a popular choice in Europe; but *DL-QTC* (November, 1968) carries a detailed discussion on changing the 6HS6 first mixer for a 7360 in order to further improve cross-modulation performance. The R4 series are double conversion (5645 and 50 kHz fixed i.f.) models with pre-mixer (heterodyne-type) hybrid valve/semiconductor first oscillator. The article also provides a table of cross-modulation characteristics, reported in other articles, for various valve and semiconductor front ends. In semiconductors, that given for the BF173 looks interesting. The table underlines the high performance of the 7360 compared with that of some well-known receivers and transceivers, and makes it look as though a change to a 7360 might be well worth the effort for anyone suffering from cross-modulation or blocking. It may be appropriate to remind readers that in 1960 RCA put out a useful leaflet on the 7360: *RCA Application Note AN-185* "Modulator and Converter circuits using the RCA-7360 beam deflection tube." (RCA Electronic Components, Harrison, NJ, 07029, USA).

For those prepared to tackle extensive modifications to older receivers, F8ZF makes the suggestion that some of the vintage models with separate bandspread tuning (RME69, Super Pro, SX28 etc) can be changed into quite effective double-conversion, tunable first i.f. receivers. This involves improving the basic 450 to 470 kHz if strip, for instance by adding a mechanical or crystal bandpass filter and the fitting of a variable first i.f. section directly on to the bandspread capacitor using miniature valves. Typically this could be 3·5 MHz. An rf stage and first mixer are built on to a small chassis on the band-set capacitor which is separated from the bandspread capacitors. For the first, crystal-controlled hf oscillator, F8ZF notes that a third overtone 10·5 MHz crystal (3·5 MHz fundamental) will oscillate without difficulty on its fifth, seventh and even ninth overtone. This means that, for the RME69 for example, range 6 can tune 28 and 21 MHz with the crystal on 24·5 MHz (seventh overtone) and Range 5, 21 and 14 MHz with oscillator on 17·5 MHz (fifth overtone): the oscillator coil is disconnected from the variable capacitor and the coil padded for 24·5, 17·5 MHz etc. A bandpass transformer has to be included between the first mixer and first (variable) i.f., and the r.f. input circuit (usually 300 to 400 ohms) may require changing to 50 ohms; this can be done by a capacitive divider network in the tuned circuit.

New MOSIC or MOS FET Oscillator

There are signs already that a device which is likely to become of increasing importance in the years ahead is the MOSIC. This is a semiconductor integrated circuit (SIC) in which all the active devices are of FET rather than bipolar form; often with MOS FETs forming not only the active devices but also the resistors and capacitors. The MOS FET requires even less area of chip than the bipolar transistor and at least theoretically, MOSICs should be cheaper than the equivalent SICs.

A new form of rf oscillator which would be highly suitable for use with MOSIC devices, but which may well also be worth investigating for use with three discrete MOS FETs, has been described in *Proc IEEE* (September, 1968) by Hiroaki Ikeda of the Japanese Broadcasting Corporation. This oscillator uses three MOS FETs and no other components whatsoever, apart from the LC tuned circuit which determines the frequency: see Fig. 8.

The oscillator is a modification of the familiar Colpitts circuit, in which TR1 represents an active three-terminal device, while TR2 and TR3 act as voltage dividing capacitors in the Colpitts manner. The oscillator is reported to operate throughout the range 0·7 to 65 MHz.

Ikeda writes: "An important feature of the circuit is that the admittance looking into the circuit from the output terminals, to which the *LC* tank circuit is connected, has a negative conductance component over a wide frequency range. Hence, the oscillator can operate over a wide frequency range by plugging in a suitable *LC* tank circuit without external adjustments of the capacitors, whereas external adjustments of the capacitors are required for the conventional Colpitts circuit to make the output conductance negative."

This factor might well make the circuit extremely attractive for use in some form of gate dipper (gdo). Ikeda also suggests that because the output capacitance is small, it is possible to construct an fm oscillator simply by shunting the tank circuit with a variable capacitance diode.

Altogether this looks a flexible form of wide range oscillator even if it does mean using two MOS FETs in lieu of two capacitors. It is also an indication of the simple circuits which may become fashionable when MOSICs give us almost unlimited supplies of FET devices.

Loop and DDRR Aerial Arrays

Information continues to roll in on various aspects of hf/vhf loop and DDRR aerial arrays. Since my last reference to this subject (*TT*, August and October, 1968) most informative letters have been received from Brian Rose, G3ULR and C. R. Fry, VE2ARO (ex-G3NDI) both enclosing different extracts from *IEEE Transactions on Antennas and Propagation*. In order not to overrun our space, it is necessary, at the moment, to confine remarks to a brief suggestion that those with access to the *IEEE Transactions* are referred by G3ULR in particular to a paper on " Transmission Line Antennas " (November, 1966) describing *inter alia* a DDRR tunable over nearly two octaves, using ¾-in copper pipe at 30–110 MHz; and emphasizing the need for a large area of ground plane and the importance of series-loaded tuning capacitors. Series-shunt and tri-series tuning will be found clearly explained in this reference.

VE2ARO draws attention to a note on " A parasitic end-fire array of circular loop elements " (September, 1967, and

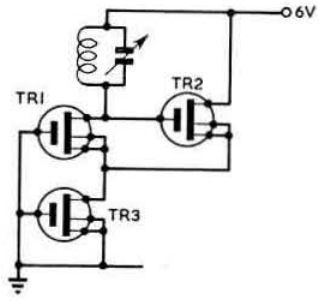


Fig. 8. The Ikeda wide-range MOS transistor oscillator suitable for MOSIC or discrete MOS FETs. In the prototype the oscillator covers 0·7 to 65 MHz with different LC circuits. Devices used by Ikeda are TR1, TR3 Mitsubishi 3SK15; TR2 3UT07.

relating incidentally the broadcasting/amateur development of cubical quads). In addition, both these articles contain useful biographical references to further sources of information on this subject.

Pressure from Broadcasters

It has always seemed advisable for amateurs to keep an eye open to see which other radio services are putting on the pressure for more frequency space.

A recent issue of *IEEE Transactions on Broadcasting* (June 1968) gives a graphic idea of how the up-to-500-kW-output crowd feel hemmed in. There are currently about 1300 h.f. broadcast transmitters in 130 countries. An article by Stanley Leinwoll of Radio Free Europe pays handsome tribute to the pioneer work of amateurs in opening up short wave—but then goes on to show in detail how the broadcast bands are bursting at their seams, and to call for additional channels (another article claims there are some 50-million regular listeners to these broadcasts, which seems a bit optimistic to me). Fortunately, he suggests that the channels should come from the fixed services allocations (i.e. those used for point-to-point communications), on the grounds that many circuits will be transferring to satellite systems (my own opinion is that, even though this may be true, the need for back-up and spur h.f. circuits will remain at a very high level).

His article poses some danger to amateurs in that his breakdown of h.f. allocations puts the broadcast share as 2150 kHz plus 500 kHz shared, against 2800 kHz exclusive and 500 kHz shared for amateurs (without mentioning that the bulk of the amateur allocation is made up of the 1700-kHz-wide 28 MHz band). And although his own affiliation is to European broadcasting, he has chosen for his paper the Region 2 (Western Hemisphere) allocations, which are far more favourable to amateurs than our own Region 1.

It is illuminating to note that there is, he states, already " a considerable amount of illegal broadcasting *outside* officially designated broadcast bands " and he lists Great Britain as one of the prominent " non-conformists." He adds that " these nations justify their out-of-band operations by simply stating that there is no room inside the bands for them " (try that excuse on the Post Office at your peril!). I gather elsewhere that about six of the BBC h.f. channels are

Continued on page 31

A Simple NBFM Detector Module

Ba S. F. WEBER, BMus., ARAM, G8ACC*

THIS NBFM detector is not by any means the last word for quality reception. However, the performance is good enough for most amateur communications. It is small, cheap (about 25s. to 30s.) and easily made, and can be fitted to most receivers, valve or transistor, with an i.f. of between 410 and 500 kHz, without too much trouble. It is reasonably sensitive: a lot more so than the four diode discriminator which I have been using up to fairly recently.[1].

The detector functions off the slope of an m-derived low pass filter. With a reasonable Q in the tuned circuit, the slope becomes steep enough in the region of the null point to make a fairly linear frequency detector possible without the necessity of too much amplification afterwards. Fig 1.

As with most fm detectors, limiting is necessary beforehand, to get a flat top to the if response curve and to avoid any a.m. detection. One stage of limiting is incorporated in this module and it will cope with inputs greater than 0·5 volt rms. If this limiting is insufficient, the age can be turned off in the main receiver. A high impedance input circuit is used (an FET in the common-drain mode—similar to a cathode follower) so that connection can be made to the "live" end of an i.f. tuned circuit (normally the am detector terminal). A small amount of af amplification is used which can be pre-set to give equal output to the am detector. The unit runs off 6 to 15 volts and consumes up to 5 mA. In most valve receivers, this power can be taken off the output valve cathode.

Installing the module

Fix the unit as close to the final i.f. transformer as possible so that the input lead and earth connection are as short as can be arranged. Break the connection to the input of the volume control in the main receiver and insert an am/fm switch, fitting a high value (say, 2 Mohm) resistor across the am leads. Attach the positive power lead from the module to the cathode pin of the output valve having made certain beforehand that the cathode voltage is under 15 volts.

Adjust the module tuned circuit core outwards as far as it will go, adjust the input control RV1 to zero and set the af gain (RV2) to about half way open. Switch on and tune in a signal. Open RV1 until the total current for the module rises to a maximum (about 2 mA more than the normal quiescent current), and then a little bit more. Adjust the tuned circuit core inwards until just before the null point. The RV1 should again be adjusted and RV2 set to give adequate a, output.

All components except the printed circuit board are held at Henry's Radio Ltd., 303 Edgware Road, London, W2.

* 8 Merton Hall Road, Wimbledon, London SW19.

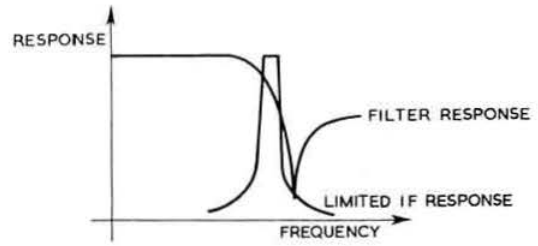
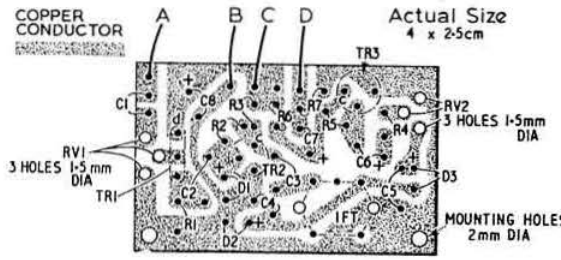


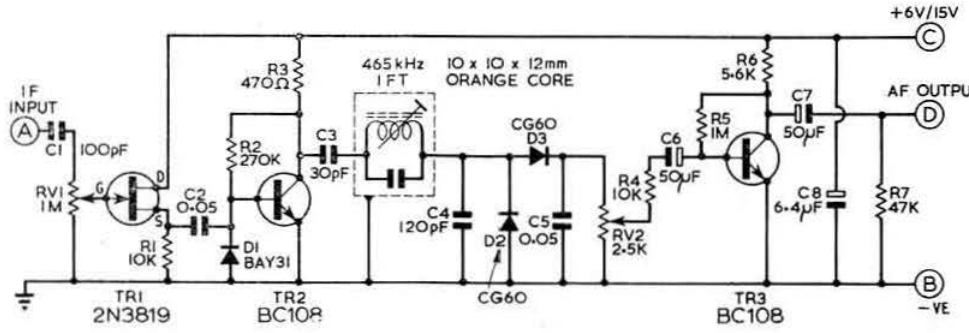
Fig 1. The null point of the lpf.



A full size drawing of the printed circuit board used by G8ACC.

References:

[1] *Amateur Radio Circuits Book* (RSGB). Also *Amateur Radio Techniques* and *Radio Communication Handbook*.



Complete circuit diagram of the NBFM Detector.

Sky Hooks

By G. R. STEELE, GM3SIY

THE appearance of a consignment of tinned balloons in the surplus shops allowed my imagination to run riot for a short period with visions of suspending from them vertical long wire aerials. Sober reflection, however, began to dampen enthusiasm with problems looming such as where to obtain the gas to inflate the balloon. In these days of imported methane and oil gassification, the normal household gas supply is unsuitable for inflating balloons as the amount of lift that can be obtained is very small indeed. Helium is immediately ruled out on grounds of cost as it would have to be obtained from cylinders and so we are left with hydrogen, the problem then becoming how to obtain a cheap source of this gas.

The balloons themselves are US Signal Corps type M278A and came in sealed tins complete with openers, and despite the fact that they were originally packed in 1944 appeared to be quite serviceable. They were presumably intended for use in lifeboats as the instructions on the canister showed the balloon attached to a hydrogen generator which was apparently activated when it was placed in water.

The first step was to calculate the quantity of hydrogen required to fill the balloon to different diameters and assess the approximate lifting power. The weight of each balloon is 10 oz, and the diameter when inflated with no wrinkles is 3 ft.

Diameter (ft.)	Volume Hydrogen (ft.³)	Total Lift (oz.)	Available Lift (oz.)
3·0	14·14	16	6
3·5	22·45	26	16
4·0	33·51	39	29
4·5	47·71	55	45
5·0	65·45	75	65
5·5	87·11	100	90
6·0	113·10	128	118

Data used in the calculation:

Ambient temperature 60°F.
Density of air at 32°F and 1 atm 0·0808 lb/ft.³
Density of hydrogen at 32°F and 1 atm 0·0056 lb/ft.³

In practice the actual lifting power available will be slightly less than quoted in the table for the hydrogen is assumed to be pure and no allowance is made for the increase in pressure inside the balloon as the diameter increases.

Production of Hydrogen

Hydrogen can be produced in a considerable number of ways. If we assume that our hydrogen generator should be reasonably portable only two methods merit investigation. These are:

(1) Acid and metal, usually sulphuric acid and zinc.
(2) Strong alkali and light metal, usually caustic soda and aluminium.

For chemical reasons which are beyond the scope of this article the volume of hydrogen produced by these two reactions starting with the same weight of metal is quite different. As before, calculations are only approximate as pure starting materials are assumed. It has been taken that the pound molecular volume of hydrogen at 60°F occupies 379 ft³.

Reaction 1

The chemical equation for the reaction is:

$$\underset{1\text{ lb}}{Zn} + \underset{1\frac{1}{2}\text{ lb}}{H_2SO_4} \rightarrow \underset{}{ZnSO_4} + \underset{5{\cdot}8\text{ ft}^3}{H_2}\uparrow$$

When calculating the quantity of hydrogen required it must be based on the zinc only (i.e., 1 lb. gives 5·8 ft³). The sulphuric acid must always be in excess of the actual quantity required for if this is not done the time taken for complete reaction will be very long. A suitable quantity of acid would be 25 per cent excess above the calculated amount. In the interests of safety it is best to use not more than a 10 per cent strong solution of sulpuhric acid and so it follows that 1 lb. of zinc will require something like 2 gallons of 10 per cent acid.

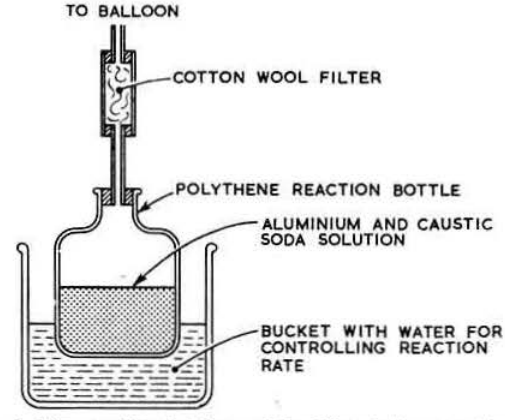


Fig. 1. The reaction bottle used for filling balloons with the aluminium/caustic soda reaction.

The rate of reaction is speeded up if a trace of copper sulphate is added.

Reaction 2

The chemical equation for the reaction is:

$$2Al + 2NaOH + 2H_2O \rightarrow 2NaAlO_2 + 3H_2 \uparrow$$
$$1\text{ lb.} + 1{\cdot}48\text{ lb.} \rightarrow 21\text{ ft}^3$$

It is immediately obvious that in terms of volume of hydrogen liberated for the same weight of starting metal this reaction is much superior to Reaction 1. The other outweighing advantage is that the aluminium and caustic soda can be put into the reaction pot as solids, and the water added later thus keeping down the transported volume. The water, incidently, takes part in the reaction. As before, excess caustic soda must be used, and a suitable reacting brew would be 1 lb. of aluminium plus 1¾ lb. of caustic soda with a gallon of water. A suitable reaction vessel is shown in Fig. 1, which consists of a polythene bottle about 2 gallons capacity fitted with a bung which carries a small filter. The purpose of this filter is to prevent acid or alkali mists getting into the balloon and deteriorating the thin rubber. Both reactions liberate heat as they proceed and develop a form of thermal runaway; if the reaction gets too violent the best way to slow it down is to put the reaction pot into a bucket of cold water. The balloon has a non-return valve built into the base (Fig. 2)

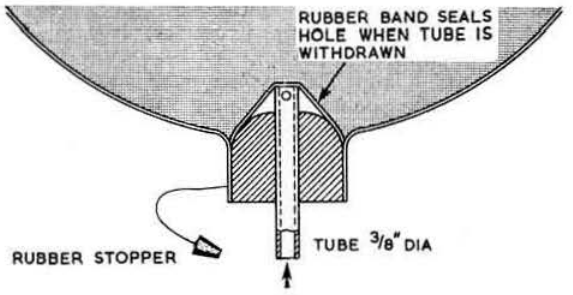


Fig. 2. Construction of the non-return valve to prevent gas escaping from the balloon when the reaction bottle and tube are removed.

and in order to inflate or deflate the balloon it is necessary to use a piece of ⅜ in. diameter tubing about a foot long with a hole drilled through it about ¼ in. from the top. The hydrogen passes into the tube which is gently pushed up into the balloon, the rubber band lifts and the balloon starts to inflate. When the tube is removed the rubber band returns to its original position and seals the hole.

The Aerial

The main problem in using a balloon as an aerial support is of course the wind. If there is no wind the aerial alone can be attached to the balloon but normally there are very few days when this is practicable. It was found that the best procedure was to attach the aerial to the balloon and also attach a mooring and guiding line, the ideal material being nylon fishing line which is both strong and light. With a little manipulation the balloon can then be stationed over the transmitter using the mooring line. It is best to have as much lift from the balloon as practicable in order to keep a tension on the aerial.

First trials were carried out using copper wire and the weight to length ratios for common aerial wire sizes are given in the following table:

Copper Wire (swg)	Length per oz in ft
14	3·2
16	5·1
18	9·0
20	16·0
22	26·0
24	42·6

During the trials an old friend, G3NWO, came up with the excellent suggestion of using aluminium wire instead of the copper wire for the aerial in order to take advantage of its lower weight. The aluminium wire used was originally intended for use in the garden but it proved ideal when used as an aerial. The wire is sold under the trade name of Easytie and is manufactured by the Westbro Aluminium Wire Company Ltd. It is approximately 20 swg and one ounce contains 49·5 ft. The conductivity of aluminium is very similar to that of copper and its use is recommended for this type of experiment.

Conclusions

If you decide to fill balloons with hydrogen, may I point out a few do's and don'ts?

(1) Remember hydrogen is highly inflammable and forms explosive mixtures with air; so a strict no-smoking rule must be enforced. All experiments should be out of doors.
(2) Acid and alkali splashes can cause serious burns, so always have water available to flood any splashes.
(3) Hydrogen will diffuse through thin rubber, especially if there are any minute holes, so do not store an inflated balloon indoors.
(4) When using a vertical aerial it is essential to have an efficient earth to be able to take full advantage of the low angle of radiation.

At the beginning of this article it was stated that the problem was really the cheapest method of producing hydrogen. During the experiments it was found that reaction 2 (caustic soda and aluminium) was by far the cheapest and, incidently, an excellent way to rid the shack of the clutter of small pieces of aluminium which had been saved for a rainy day.

Technical Topics—*continued from page 28*

outside the official broadcasting bands—but their use is justified on the grounds that these frequencies were being used well before the present bands were designated.

It seems a pity that nothing much happens to those countries that fill the world-wide 7 MHz amateur band—or, (and the UK is one of these) use Region 1 broadcast allocations to beam transmissions into North America where the whole band is allocated to amateurs. Recently, thanks to Reg Cole, G6RC, I have been reading through the " T & R Bulletins " of the 1928-40 era and have been struck to find how firmly 7 MHz was established, at least up to about 1934, as the main DX band, before it was gradually taken over first for semi-local 'phone (the old " baby broadcasters ") and then inevitably by quasi-official broadcasting from the period of the Spanish Civil War of 1936.

Adjustment of a Two Metre Converter

by H. R. THORNTON, BSc, G3PKV *

THE author has spent a great many hours searching the two metre band for that mythical weak signal (which always stays at a constant level and never goes QRT at the crucial moment) on which to adjust the front end of his converter. Attempts to borrow a noise generator have been equally unsuccessful. Eventually frustration overcame inertia and a serviceable generator was constructed; a marked improvement in reception soon resulted, and some sacred cows were slain in the process.

The 10dB noise factor of the cascode circuit as originally set up by ear was rather poor but this was improved to give near the best possible performance with the E88CC valve used. The effect of various modifications and adjustments is shown in the tables, which illustrate the points where attention is really needed to achieve good results.

The noise factors quoted may not be accurate in the absolute sense, but care was taken to make the measurements under identical conditions to give reasonably good comparative figures. In some instances the conclusions drawn may not apply to frequencies higher than 144 MHz.

Measuring System

The article by G8AFL [1] gives a useful modification to the noise generator circuit described in the *RSGB Radio Communication Handbook* (19.35) with a much smoother control of the noise diode current. This is achieved by replacing the rheostat used to adjust the filament current with a rectifier and OC35 emitter follower. The supply to the filament is controlled by a relatively high value potentiometer—250 ohms—across the rectified lt supply line, feeding the base of the transistor.

Some difficulty was experienced with measuring the noise output of the HRO receiver owing to random fluctuations. With a lightly damped multimeter this gave a continuous rapid vibration of the needle. With a capacitatively damped meter, noise peaks charge the capacitor and still cause erratic movements, which gives dubious results as some "interpretation" is required. A well damped, 300 mA thermocouple movement, fed in series with a 1·5 ohm resistor from the loudspeaker output, seems to be the best simple method. This was checked for linearity by the method in the *Handbook* and found to be satisfactory.

* 43 Fordwich Road, Welwyn Garden City, Herts.

Except where otherwise stated the tests were made with rf coils peaked at 144·5 MHz, the tuning set to 144·6 MHz, and with a mixer grid current of 10μA.

Converter Circuit

The circuit (Fig 1) is a conventional type using a series cascode rf stage—"old hat" perhaps, but still widely used and justifiably popular due to its stability, high gain and freedom from cross-modulation. The latter statement may seem surprising in the FET age, but there is a high power police transmitter on 146·2 MHz am 500 yards from the writer's QTH. The cross-modulation performance of FET with this level of unwanted input is abysmal.

A pi-tuned network when used with the normal high value of mixer anode resistor gives a good match to the receiver (400 ohms for the HRO) without link winding. This arrangement has been described for a transistor converter [2], but has a particular advantage with triode mixers, as the high value of C8 suppresses the spurious oscillations to which they are prone.

Input Circuit

A major factor controlling the overall performance was found to be the position of the tap on L1, 4½ turns 16 swg, ½ in dia by ⅝ in long.

Tapping Point (from earthy end)	Noise Factor dB
½ turn	11
1 turn	6·0
1½ turn	5·2
1¾ turn	5·4
2½ turn	5·5

It is obvious from these figures that if in doubt as to the best point a considerable amount of overcoupling can be tolerated, but undercoupling can give a rapid reduction in performance. Although the input coil can be tuned solely by the interelectrode capacitance the addition of a small trimmer helps with the final adjustments.

Neutralization

The cascode circuit is normally quite stable, but the inclusion of L2 produces a reduction in noise factor. The inductance required is significantly less than that for mini-

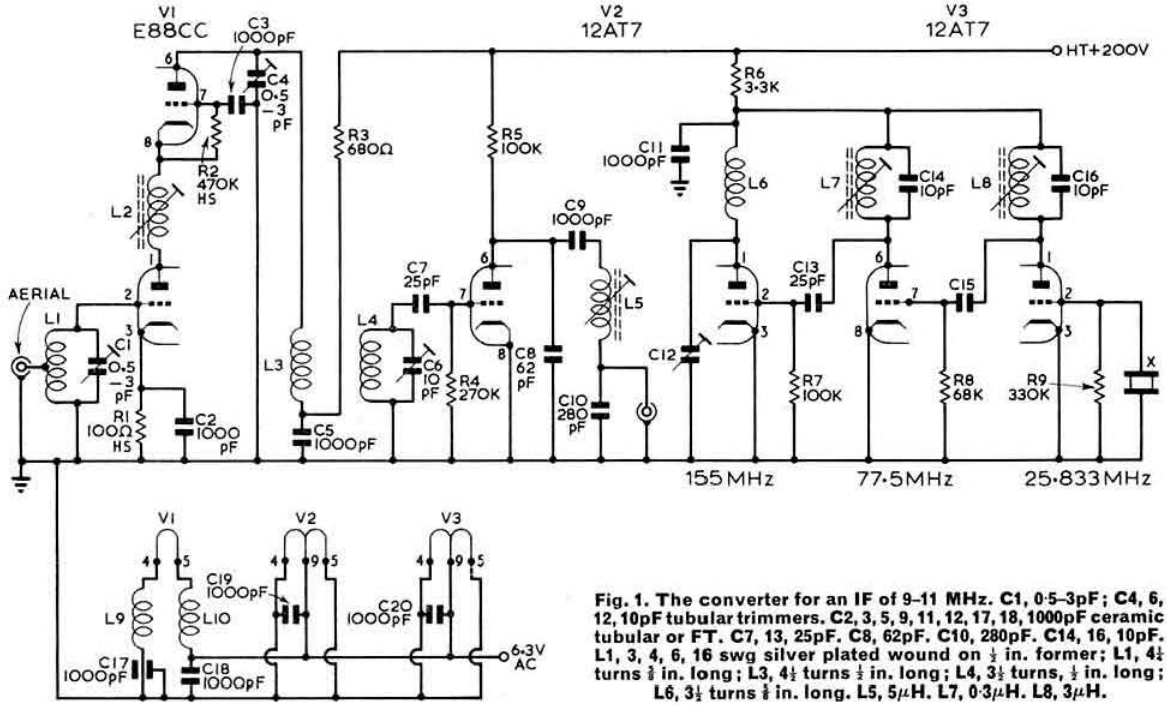


Fig. 1. The converter for an IF of 9–11 MHz. C1, 0·5–3pF; C4, 6, 12, 10pF tubular trimmers. C2, 3, 5, 9, 11, 12, 17, 18, 1000pF ceramic tubular or FT. C7, 13, 25pF. C8, 62pF. C10, 280pF. C14, 16, 10pF. L1, 3, 4, 6, 16 swg silver plated wound on ¼ in. former; L1, 4½ turns ⅜ in. long; L3, 4½ turns ¼ in. long; L4, 3½ turns, ¼ in. long; L6, 3½ turns ⅜ in. long. L5, 5μH. L7, 0·3μH. L8, 3μH.

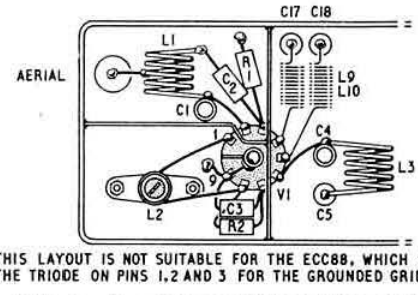
mum feedthrough of a strong signal with no ht applied to V1.

L2. Turns on 0·3 in former 22 swg close wound.	Noise Factor dB
Nil	6·7
2½	6·2
3½	5·2
4½	5·7
5½	6·2
6½	8·4

In some television receiver circuits the neutralizing coil is wired across the valve holder, but the noise factor is degraded by putting this coil in the field of the input coil. The layout of the VQ4EV design [3] is excellent, and is shown rearranged for the E88CC in Fig 2. With a three turn slug tuned coil the minimum noise factor is obtained with the slug roughly two turns out from the minimum breakthrough position.

Bias and HT Voltages

The series cascode circuit is normally described with grid leak bias on the grounded grid section. With an ht of 180 volts this can result in a voltage drop across the grounded grid stage of 50–70 volts and some 100–120 volts across the grounded cathode section. With cathode biasing of the grounded grid stage as shown in Fig 3a it was rather surprising to find a considerable worsening of noise factor. Using a potential divider (Fig 3b) the voltage distribution was improved without affecting the noise factor and this system may well give better cross-modulation performance. As may be expected a reduction of the anode current (by



THIS LAYOUT IS NOT SUITABLE FOR THE ECC88, WHICH SHOULD USE THE TRIODE ON PINS 1,2 AND 3 FOR THE GROUNDED GRID SECTION

Fig. 2. Under-chassis layout for a series cascode amplifier using an E88CC.

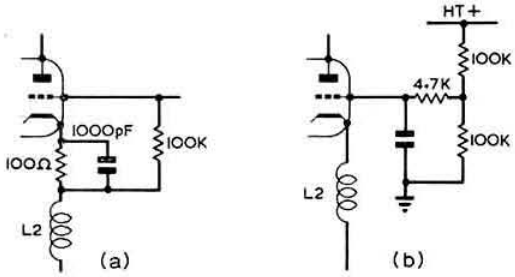


Fig. 3. Alternative bias circuits for the grounded grid section.

reducing the ht) caused a small increase in noise factor.

V1 Ia mA	Noise Factor dB
13	5·2
9	5·8
6	6·8

Component Selection

Replacement of the ptfe valveholder for V1 with a clean ceramic type did not give a detectable worsening of performance. The grounded grid decoupler used for C3 was a 1000pF ceramic tube with very short leads. A 5000pF disc ceramic capacitor appeared to cause some instability, which did not re-appear on a second test; this emphasizes the need for good soldering!

The coils (of unknown Q) were wound with silver plated wire extracted from various surplus units. Replacement of L1, L3 and L4 with clean 20 swg tinned copper and re-tuning increased the noise factor from 5·2 to 5·7dB.

Mixer Stage

The voltage gain of the rf stage was measured at approximately 17dB It is not surprising that adjustments to the mixer (within the normally accepted limits) had only secondary effects on the overall noise factor. The effect of the mixer anode resistor was measured with a grid current (through 270 K ohm) of 7½μA. The effect of grid current was measured with an ht of 200 volts, and an anode resistor of 100 K ohms.

Mixer Anode Resistor K ohms	Noise Factor dB
20	7·1
47	6·9
100	5·7
150	6·3
220	6·3

Mixer Grid Current μA	Noise Factor dB
20	5·7
15	5·4
10	5·2
8	5·4
6	5·7
4 (standing current)	9·8

The mixer grid current was adjusted by detuning L6. No physical coupling to the grid was necessary to obtain currents up to 20μA (the final doubler coil was at right angles to L4, but was not screened from it). It is useful to note that the grid current for best noise factor was the same as that giving the highest noise output with no signal input.

IF Tuning

Two if ranges were tried, 27–29 MHz and 9–11 MHz. No differences were detected between them with link coupling, capacitor coupling or with a pi-tuned output circuit. Deliberately detuning the anode circuit to 5 MHz (from 9·6 MHz) caused a drop in gain and an increase in breakthrough, but did not affect the noise factor. (Whichever method of tuning is used R5 must be included to reduce the anode voltage.)

Heater Voltage and Input Coil Tuning

This may seem an odd combination, but under some circumstances the two are related! The heater voltage was examined in the hope that a lower cathode temperature might give a reduction in noise factor. In fact there was a marked drop in noise factor when the heater voltage was raised from 6·3 to 7·5 volts, but when the test was repeated some time later no change in noise factor could be detected. The noise generator was stripped and rebuilt, and the system re-checked for linearity—still no change with heater voltage! It was found that detuning the input circuit to a lower frequency gives a big improvement, to 4·1dB from the previous best of 5·2dB. (The amount of detuning necessary is given by adding about 2pF to the peaked setting of C1.) When the tests on heater voltage were first carried out the input was peaked at 144·5 MHz, and the increase of cathode temperature would push the space charge electrons nearer to the grid, thus increasing the effective grid-cathode capacitance. In the later tests the input circuit had already been detuned, and an increase in the heater voltage had no effect.

Reducing the heater supply to 5·5 volts gave a noise factor of 7·7dB.

Heater Isolation

The capacitance from the heater to k_2 of the E88CC and similar valves is about 2·5pF, a reactance of 400 ohms at 144 MHz. It would seem that about one fifth of the signal could disappear down the heater line, as the input impedance of the grounded grid section $\left(\frac{1}{g_m}\right)$ is of the order of 80 ohms.

However when the heater chokes L9 and 10 were fitted there was no improvement in noise factor. This may be due to the heater-cathode capacitance being tuned out by the neutralizing coil, but the same result would not be expected with a grounded grid input stage.

Conclusion

The noise factor of the mixer stage was measured at 9·5dB, which for an overall noise factor of 4·1dB implies an rf stage noise factor of 3·8dB, close to a previously reported figure of 3·5dB, for an E88CC (one section) preamplifier [4]. To match, let alone better, these figures with the latest "modern miracle," the FET, is very difficult indeed—the author has been trying for two years, since this article was first written but some progress is being made and a subsequent article will deal with the adjustment of a FET cascode converter.

It is hoped that these results will be useful when making adjustments without a noise generator. They can be summed up facetiously as—"spend your money on a silver input coil, tap it so high up that you lose most of the voltage gain, then tune it way off resonance." Of course the other factors involved, although individually less important, all contribute to the final result and must receive their due share of attention.

References

[1] "Generator for Accurate Noise Measurement" by J. M. Cox, G8AFL, *Short Wave Magazine*, March, 1965.

[2] "Quickstarting with Transistors at VHF" by J. Hum, G5UM, *RSGB Bulletin*, April, 1966.

[3] *RSGB Amateur Radio Handbook*, Third Edition, page 136.

[4] "A Nuvistor Pre-amplifier for 144 MHz" by G. M. C. Stone, G3FZL, *RSGB Bulletin*, March, 1961.

That Handbook Order!

We should have anticipated the vast demand there would be for the *Radio Communication Handbook*. We did expect a big call for it but nothing quite like what happened.

Perhaps it was the continuous delays that produced the incredible influx of orders. Poor Ely in the accounts department was on to her fourth pile of orders by the time the book eventually showed up.

At least it arrived in time for the 1968 exhibition. Needless to say, we practically sold out there,

Finally, at the end of November, we started getting the kind of large deliveries of the books that we wanted. 830 pages of technical print with fold out circuits and a multi-coloured cover are not the easiest things to produce in a hurry. At first we were just getting the Handbooks in a few at a time.

Eventually, two thousand turned up. That was quite a spectacular sight, each book weighing five pounds and measuring two inches deep. Now there was a problem. Headquarters has always been understaffed. Generally there is only one person handling book orders. And by this time, in late November, we were fielding protesting phone calls at the rate of about one every fifteen minutes. Everybody wanted the Handbook yesterday, which is reasonable when you've been waiting six months for it.

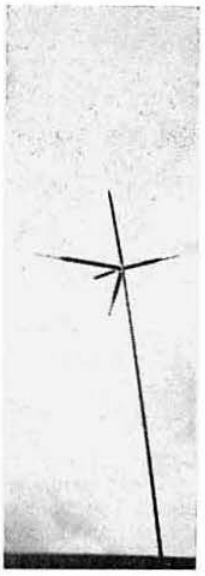
Now never let it be said that the HQ staff are not dedicated. The job was there to be done, to move a thousand handbooks in one weekend before we became totally submerged in overdue post.

So, on a Saturday morning when luckier folks were painting their houses, washing their cars and mowing their lawns, the selfless RSGB workers were packing and dispatching handbooks. Six weeks later, we've still got the blistered fingers to prove it. The carrying cartons are effective protection against malevolent postmen, but after you've folded the second batch of five hundred you need a new set of hands. The girls disapproved strongly. Neither Helena Rubenstein nor Revlon have invented a nail varnish to take this sort of treatment.

Their new council room is voluminous, but the brown boxes of books were spilling out of the doors. The picture explains all.

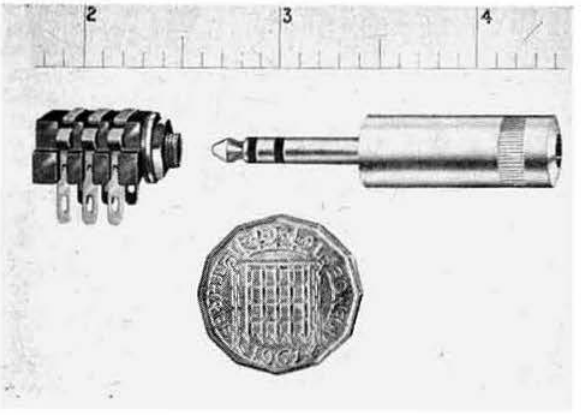
By now, we are nearly back to normal. If perchance, you are still awaiting a book that was ordered in the very distant past, phone us and be really nasty. We're ready for you now!

New Products



"Multimobile" Whip

Frequently seen over North Wales and occasionally in London and Liverpool is this unusual mobile aerial about to be marketed by GW3DZJ in his "G Whip" range. Called the *Multimobile* it features completely self selecting five band coverage, with an swr of less than 1·5:1 on all bands. Top loaded on 10/15/20 and 40m it has the choice of either 80 or 160m in the top centre loaded positions.



Miniature 3-way Jack Plugs and Sockets

Rendar Instruments Ltd are about to commence production of completely new, 3·5 mm components. These miniature jack sockets and plugs are of exceptionally robust construction and are designed to provide the performance characteristics of the standard-sized jack plugs and sockets at present in use.

The only exception is in the breakdown voltage, which is reduced to 1500 volts on their miniature Series. The jack plug R22300 is available in both screened and unscreened forms and is correspondingly reduced in body size.

By B. PRIESTLEY, B.Sc., G3JGO*

SSB and INTERFERENCE

ONE of the early attractions of ssb was the prospect of a considerable reduction of harmonic interference as compared with an A3 transmitter. As harmonic suppression became better understood, this has become less of an attraction and, particularly with the advent of the transceiver, certain types of interference are more likely to occur in ssb than A3. Manufactured equipment is not a guarantee of safety, and so this review of interference as applied to ssb has been written. It is hoped it will serve both as a refresher for the " Lizzie " builders, and as an introduction for the newly licensed.

Harmonics

A typical ssb linear has a third order intermodulation rating of −25 to −40dB at full output. It must produce a third harmonic output of about the same level, which will be reduced by another 30dB or so by the tank circuit. In the typical case of a pair of 6146s producing 100 W(pep) the third harmonic would thus be about −60dB or 0·1 mW. This does not sound much, but as a television receiver works on say 1 mV in 75 ohms, or 0·000013 mW, the result can be disastrous over a wide area. Consequently a low pass filter is necessary on s.s.b. The reduction in third harmonic output by going from Class C to AB1 in fact will be about 6dB, but this could in some circumstances reduce the number of complaints by 75 per cent!

Certain harmonics may be relatively low, in a perfect class B stage there should be no third harmonic, but even if this were so the second harmonic could beat with the fundamental and produce it in the next stage. For this reason it may be better to have a (second) low pass filter between the exciter and linear rather than just one on the output. When doing this with grounded grid linears it is important to allow for the transforming effect of the filter which acts like $206n$ feet of coax where n is the number of sections and f_c is the cut-off frequency in MHz. Depending on the circuit design this could possibly cause noticeable distortion.

As with A3 transmitters, harmonics can be produced anywhere in the transmitter, and TVI has been caused by the production of harmonics in the balanced modulator.

Parasitics

Taking the manufacturer's figures, a 6146 in class C A3 service gives 52 W output with a drive of 0·4 W so that the power gain is 52 ÷ 0·4 = 130 times. The same valve in class AB1 gives 60 W and needs 35V (rms) of drive. If this is across the 30 k ohms maximum grid leak this represents a drive power of 41 mW, so the power gain is now 1460 times.

It is obvious that a parasitic is much more likely in the AB1 condition, so that parasitic stoppers and neutralization must be incorporated. Incidentally, in the popular capacitance bridge circuit (Fig. 1) any stray inductance in C2 will unbalance the bridge at higher frequencies, so a vhf type of feedthrough bypass capacitor gives the best results.

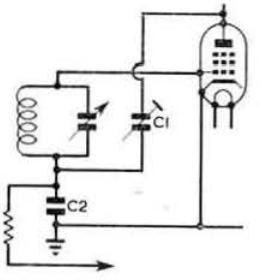


Fig 1. Capacitance bridge neutralizing circuit.

The exciter too is also prone to parasitics when high gm valves of the 6AM6 or 6CL6 types are used. Damping the input and output circuits can reduce the trouble at the working frequency, but v.h.f. parasitics are still possible and should be treated in the textbook way. Ferrite beads can be used for anode or grid stoppers in confined spaces.

Spurious Mixer Outputs

A perfect mixer would be one which produces only the sum and difference of its inputs. With such a mixer it would be possible to heterodyne 3·7 MHz ssb to 1·9 MHz with a 5·6 MHz crystal. The sum product at 9·3 MHz and the unwanted 5·6 and 3·7 MHz could be easily filtered off. However in practice there is another output at 1·8 MHz since 2 × 3·7 − 5·6 = 1·8 MHz which is typically about 30dB down. Shifting frequency to 1·867 MHz will cause the image to " cross-over " i.e. it will come up on the same frequency, but it is too close to filter out even at 100 kHz off. Note that there is no need for a 7·4 MHz harmonic from the 3·7 MHz ssb; the 1·8 MHz component is produced in the mixer direct from 3·7 and 5·6 MHz.

The effect of spurious mixer outputs can be reduced in two ways, (*a*) make them fall far enough away from the operating frequency to filter out to a negligible level (having done this guard against an accidental tuned circuit bringing them back again) (*b*) minimize the generation in the mixer by choice of

* 43 Raymond Road, Langley, Slough, Bucks.

bias and drive levels and, where possible, also by balancing.

(*a*) is accomplished by avoiding frequencies in a simple ratio. In our example the frequencies are in a 2 : 3 ratio and the result is bad. 1 : 2 (3·7 and 1·75 MHz) would be worse still whilst 14 : 15 (say 28 MHz ssb and 30 MHz crystals) would be excellent. The offending output occurs at 26 MHz, but it is much easier to reduce by a filter.

(*b*) is an enormous subject, but in amateur circles squeezing a mixer for too much output is probably the commonest fault. It is far better to cut the drive and add a following amplifier. Most receiver mixers are specified for maximum small signal gain, and the best condition for exciter use will have less bias and less injection. Reference [1] contains some practical details and can be thoroughly recommended.

Overloading

It is sometimes claimed that ssb causes widespread splatter, often this is due to carrier operated agc not preventing overload, as the receiver is tuned across the ssb signal. Television receivers show a similar tendency, which is why an unmodulated carrier, or fm may cause negligible TVI whilst A3 or ssb, by modulating the gain of the first stage causes noticeable interference. A suitable rejection filter at the television receiver is of course the cure, or the device shown in Fig. 2 (due to G3BA) can be used when interference is picked up on the outer sheath of the coaxial feeder.

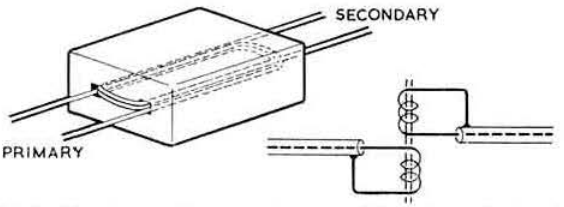


Fig. 2. Transformer for removing current from the outer braid of coaxial cable feeder. The primary and secondary are two turns of 24 swg enamelled wire on a TV balun core.

Reference

[1] "Single Sideband Principles and Circuits" by Pappenfus; Bruene and Schoenike, Chap. 7.

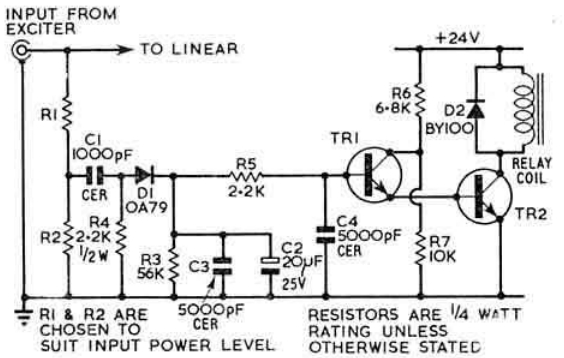
An Automatic Change/Over System for Linears

BY M. G. HARRIS, G3PSB*

A GROUNDED grid linear amplifier was recently constructed by the writer. In aid of simple operation, it was decided to adopt a system to make change-over automatic without the need for alterations to the exciter or additional cabling. This may be a necessity when using an exciter, lacking the necessary auxiliary contacts on its transmit/receive relay.

Because of the relatively large amount of rf power available to drive the linear some of this was utilized to operate the linear amplifier's aerial change-over system. This method can be adopted with almost any exciter capable of delivering slightly more than the necessary drive required by the linear.

* c/o 26 Renown Road, Raumati South, near Wellington, New Zealand.



Complete circuit of the Automatic Change Over Unit. TR1 is a 2N706 and TR2 a 2S501.

Operation

The circuit operates in the following way:

On switching the exciter to transmit, D1 detects any r.f. voltage present at the junction of R1/R2, which charges C2 positively. TR1, an n-p-n transistor, proceeds to conduct, which causes a positive current to flow in TR2 base-emitter junction. TR2 conducts, energising the relay coil and changing the aerial from receiver to transmit and removing the p.a. standby biasing voltage.

R1/R2 should be adjusted so that even when the exciter is transmitting, but off resonance, enough r.f. voltage is present to turn on TR1/TR2 fully. The combination of R3/C2 will hold TR1/TR2 on for approximately $\frac{1}{3}$ second after the disappearance of the exciter signal; if Rz is made variable it can be adjusted in step with the VOX system of the exciter.

The transistors used are types that were to hand and were not specially chosen. They could equally well be p-n-p types, similary rated with reversal of D1/D2 and the supply polarity.

Conclusions

This system has been in use for several weeks and operates satisfactorily on cw at 150 watts input. The aerial change-over relay (a Londex 7026) has not suffered any ill effects from this heavy duty-cycle.

REGULAR FEATURE

THE MONTH ON THE AIR

By JOHN ALLAWAY, G3FKM*

ONCE again the calendar has changed, this time to herald a year which should see a great deal of interest taking place on our DX bands. A correspondent in Scotland suggests that the more civilized nations take less interest in the HF bands and more interest in the VHF part of the spectrum. Your scribe would certainly agree with him that some of the less civilized *behaviour* seems to take place on the former! However it is surely the international aspect of our hobby which can do so much to bring friendship and understanding between at least the radio amateurs of different nations. Many friendships between people of quite different nationalities result from contacts made on the HF bands and this would appear to be a most desirable thing.

The start of a new year is accompanied by some experimental changes in the layout of *MOTA*. It is hoped that the *Awards* and *Contests* sections will be more easily referred to, and that the *Band Reports* will be found to be more useful. Suggestions concerning possible changes in or additions to this feature are always welcome, and will be followed up wherever possible.

Photographs of amateur radio interest (preferably showing people as well as radio gear!) would be greatly appreciated. Every effort will be made to return them to their owners, but unfortunately occasional prints do get lost and no guarantee can be given. Pictures from overseas readers, and also any items of amateur radio news from abroad would be particularly welcomed.

G3WSH (Frank Hattemore, ex-6Y5FH) wishes to point out that he is not the QSL manager for " PX1GS." The latter appears to have been active on 80m ssb recently and gives his name as Mario.

Apologies for the small amount of material available this month. This is largely due to the fact that there has only been a three week gap since *MOTA* last went to press.

Top Band News

The **CQ WW 160 DX Competition** will take place between 00.00, 25 January and 15.00, 26 January. This is a cw only affair, and contacts with other stations in the entrant's own country count two points. Contacts with other countries count five points, except those with W/VE which are worth ten points. A multiplier of one is counted for every state, Canadian province or foreign country worked (however W, VE/VO do not also count separately as country multipliers). Contest exchanges consist of RST followed by QSO number starting from 001. W/VE stations also send their state/province. Violations of the regulations in a contestant's country, unsportsmanlike conduct, or taking credit for more than three per cent of duplicate contacts, will cause disqualification. Logs should be sent before 28 February to: CQ 160 Contest, 14 Vanderventer Avenue, Port Washington, LI, NY, USA, 11050. The new regulations relating to 160m operation in the US should mean that better signals are heard in Europe with some Eastern seaboard areas being allowed 500 watts input during daylight and 100 watts at night. Other slightly more inland areas are permitted 1kW and 200 watts respectively. As mentioned in last month's *MOTA* however the section 1825 to 1830 kHz which was formerly clear of QRM in the USA and Canada will now be open to W's and 1850 to 1860 (or even 1875 kHz) may be found to be more useful to European stations. Log sheets may be obtained from the address given above in exchange for an addressed envelope and return postage.

Some lists of most wanted 160m UK counties have already been received, but your scribe would very much appreciate hearing from all Top Band county hunters concerning the counties they still need and find hardest to hear. As stated previously a list will be published in a future *MOTA* for the guidance of county expeditions.

The recent trip by GM3NVU to Kinross was made in the midst of a gale, and it proved impossible to put up masts of any kind. However a dipole was slung between two trees and although this was found to be only 12 ft off the ground when the storm stopped, 60 UK, five OK and one PA0 stations were contacted. GM3's BXL, CAN and NVU wish to thank all those who worked them.

Conditions on the band appear to have been quite good. KV4FZ was RST 569 at 02.35 one morning, and W1BB/1 and W2RAA have been heard peaking 549 at late as 08.15 which was half an hour after sunrise. Other interesting signals, many RST 579 or better, include WA1KAM, WA1IOY, W1IBU, W2IU, K2ANR, W2GGL, W2RAA, VE3QU, VO1FB (peaking 599 at 05.50), and PJ0CC. G6LK wonders how many UK stations have now worked " across the pond " on seven bands—1·8 to 50 MHz?

The Transatlantic Tests on 5, 12 January, 2, 16 February, and 2 March will take place between 05.00 and 07.30 GMT. The 2 February morning is for European stations who have so far not had a transatlantic contact and other Europeans are asked to QRX. Likewise the 5 January and 2 March mornings are for " first time " US/VE stations. Europeans should call " CQ DX Test " during the second, fourth, etc, five minutes of each hour, and listen during the intervening periods. These periods should be adhered to *exactly* unless a QSO is established. European stations will be expected to be found between 1823 and 1830 kHz and 1851 and 1861 kHz, and W/VE replies can be expected between 1800 and 1820 kHz (E Coast) or 1975 and 2000 kHz (W Coast). Please send all details of contacts to Stewart Perry, W1BB, 36 Pleasant

*10 Knightlow Road, Birmingham 17. Closing date for the February issue is 14 January, for the March issue 11 February and for the April issue, 11 March.

Street, Winthrop, Mass, 02152, USA, and also to your scribe. The recent increases in power permitted to most US stations should result in better signals from them being received in Europe, it seems a pity that similar reconsideration of European power levels cannot be undertaken.

The Science Museum Demonstration Station GB2SM

The following announcement has been received from W. K. E. Geddes, Assistant Keeper of the Radio Collection at the Science Museum: "An RTTY installation has recently been added as a permanent feature to GB2SM and has proved very popular with our visitors. We are anxious to bring our interest in RTTY to the notice of all radio amateurs, in the hope of encouraging them to make contact with us. Our normal demonstration times are Monday to Friday between 10.30–11.00 and 15.00–15.30 GMT, and we would welcome reasonably short QSO's during these times. If any station can offer us regular short contacts on any of the HF bands (3·5 to 28 MHz) during these times we should be especially pleased but as we understand the difficulties involved we shall be pleased to co-operate with any station calling us casually or on occasional skeds. It may be possible for us to operate sometimes during week-ends or in the evenings, and if you would like to make a sked, no matter where you are located, please contact us either during our normal demonstrations, by QSL via the bureau or direct" GB2SM's address is: Science Museum, South Kensington, London SW7.

News from Overseas

David Appleton, G3NRA, will be operational from Tarawa Atoll, Gilbert Islands, for a two year spell commencing in February or March 1969. He will be using a KW2000A transceiver which will feed a folded rhombic antenna for the hf bands, and a 200 ft wire for 160m operation, if experiments on that band seem worthwhile. He hopes to put in a lot of operating time on 14, 21 and 28 MHz, and is fortunate in the fact that there is a 24 hour 240 volts ac supply available on Betio Is. All stations worked will receive a QSL in due course and these will be handled by a QSL manager at the address given in *QTH Corner*. David's VR1 call is not yet known.

Steve, VQ8CC, is being credited with at least two QSL managers neither of whom is in fact supposed to be acting in that capacity! VQ8CC cards have always been, and will continue to be dealt with by Steve himself and no QSL manager exists. See *QTH Corner* for address. Peter, VQ8CG, was on holiday in the UK in the autumn but has now returned. He is still waiting for confirmations from 20 or so countries for his own DXCC and asks for cards via G3APA.

Mike Farmer, 9V1OE, is now active again after a year of rig trouble. He is using a 14 MHz ground plane made from 44 beer cans! A TA33Jr beam is expected shortly and operation on 21 and 28 MHz will then take place. Operations will continue until October 1969 and skeds will willingly be arranged with anyone who contacts Mike at the address in *QTH Corner* or via his G3VAO address.

G3HZG, who will also be remembered as ex-5N2ABL (incidentally the only station located in, but not operational from, Biafra) departed for Fiji on 29 November. Les has a KW2000A with him, but at departure time had no idea what his VR2 call-sign would be. Another G—this time G3BAA (ex-SU1SB/VK2AHO/9M2BR) is scheduled to move to Hong Kong and has an NCX3 transceiver with him.

As mentioned last month, G3HSR has now departed for Singapore for a stay of several years and therefore has had to relinquish his job as QSL manager for MP4MBC and MP4TCE. He has sent out over 3000 QSL's for these two stations and is up to date to the end of October on all cards received and all log entries to hand. Jim has sent the remainder of his stock of blank QSL's to the MP4's, and pending the appointment of new QSL managers further applications should be sent direct to MP4's MBC and TCE. He would like to thank all the DX gang for loads of fun and says he hopes to be able to cause a few pile ups from 9V1. Jim has previously operated from Singapore (as VS1BQ) and his wife was also licenced.

Awards

The **International DX Organization** has been set up by IARC, Geneva for the purpose of sponsoring an international award which will promote and stimulate friendly and skilful DX operation on all bands 1·8 to 28 MHz. The award will be called the **International Call Areas Award (ICAA)** and will require a stipulated number of confirmed contacts with a stated minimum number of countries on at least five different bands. Although this would appear to resemble the new 5BDXCC the similarity is not too great since an additional 150 or so official call areas will be used for 12 "expanded" countries on the list (e.g. it is believed that all 50 US states will be counted separately). The IDXO will strictly adhere to ITU regulations and will not recognize call-signs which are not in line with ITU regulations. It will also be a general principle that normally uninhabited islands or places, and neutral or demilitarized zones will not be recognized. Record books will be available in due course for those working for the award. As for the 5BDXCC credits for this award will start from 1 January, 1969. Fuller details will be given in the earliest possible issue of *MOTA*.

The Blackpool and Fylde ARS is awarding the **Fylde Coast Award** for confirmed contacts as below:

Class 3 UK stations 5 Fylde stations.
European stations 4 Fylde stations.
DX stations 3 Fylde stations.

Class 2 UK stations 6 Fylde stations plus 25 other Lancashire stations.
European stations 4 Fylde stations plus 15 other Lancashire stations.
DX stations 3 Fylde stations plus 10 other Lancashire stations.

Class 1 UK stations 7 Fylde stations plus 35 other Lancashire stations.
European stations 5 Fylde stations plus 25 other Lancashire stations.
DX stations 4 Fylde stations plus 15 other Lancashire stations.

Stations in the Fylde to work an extra 5 Fylde and 15 more Lancs stations. A certified list plus eight IRC's or 5s should be sent to Mrs Ruth Sinclair, G3TNN, 18 Clarendon Road, North, St Annes, Lytham St Annes, Lancs. Towns in the Fylde are Blackpool, Fleetwood, Freckelton, Garstang, Kirkham, Lytham St Annes, Preesall, Poulton le Fylde, Thornton Cleveleys, and Warton. (For this certificate all CHC rules apply.)

In connection with the REF contest a mention of the **DUF** award may be made:

The **Diploma de l'Union Francaise** is issued by:

REF, BP 42-01, Paris RP, France.

DUF 1 requires QSO's, since 1 April 1946, with five DUF countries on three continents, DUF 2 eight countries on four continents, DUF 3 ten countries on five continents, and DUF 4 16 countries on six continents. Certificates may be endorsed all cw, all phone, or mixed.

QSL cards (plus any REF contest references) should be sent with six IRC's (18 IRC's for DUF 4 with silver medal) to the address above.

Another French award mentioned in connection with the REF contest was the **DDFM:**

The **French Departments Award (DDFM)** also issued by REF, BP 42-01, Paris RP, France.

Contacts (exclusively cw or phone) since 1 July 1957. European applicants need 50 different departments—on 40 and 80, 20 on one band and 30 on the other. Non European applicants may use two other bands. DDFM2 issued for 75 depts (50 and 25), and DDFM-3 for all 90 depts (60 and 30).

Applications as above for DUF award.

Lastly the **French Provinces Award (DPF)** is issued for all cw or phone contacts with 16 of the 17 French provinces since 1 January, 1951. Applications as for the DUF.

DXpeditions

The projected trip to **Chatham Is** by a group of New Zeaand amateurs has now materialized. The operators will be ZL1DS, ZL1IL, ZL1TU, ZL2AFZ and possibly ZL3JO, and activity will commence on 2 or 5 January and will last for up to a month. All bands will be used, both cw and ssb, and frequencies used will be: 3525, 3825, 7015, 7090, 14,025, 14,125, 14,250, 21,025, 21,350, 28,025 and 28,550 kHz. Each operator will use his own callsign /C and it is hoped that multiple operation will cater for all who need this country. The QSL manager for all calls will be ZL2AFZ. Two transmitters (a Swan 500 and KWM 1) plus a trap vertical and a mini-beam are on the list of equipment being taken. Power will be available from a fishing factory for 24 hours a day. IRC's and sae will be required for direct QSL's, otherwise all contacts will be confirmed via the bureau.

KH6GLU is reported to be intending to visit **Wallis Is** (FW8), **W. Samoa** (5W1), and **U.S. Samoa** (KS6). The trip should start on 29 January with the first stops KS6 and 5W1, and ten days operation is expected. All bands 10 to 80m will be used and all QSL's will be dealt with by KH6GLU himself.

W4YHB will be active from the island of **Grenada** starting 22 January. His callsign will be VP2GRN, and another operator will be with him using the call VP2GRS. They will be there for four to five weeks. QSL's should be sent via W4YHB (see *QTH Corner*).

W7ZFY, aboard the USCC cutter " South Wind " in the Pacific says that his ship will be joining an Australian scientific expedition to **Heard Is** in March. The team expect to be ashore for about a week.

It is believed that W4WS and W6BPO will be on the air from **Norfolk Is** using the call VK2BRJ/9 during the first half of the ARRL DX contest (15–16 February), and from **Cocos Keeling Is** as VK2BPO/9 during the second weekend (15–16 March) if a licence is obtained. Mention is also made of a visit to **Tonga** (VR5) during the return trip to the USA.

The Cambridge University Wireless Society (G6UW) will once again be making a trip to the **Isle of Man** at Easter. The party will set out from Cambridge on 14 March and should be active on all hf bands on cw and ssb (and on 160m with cw and am) from 17–24 March. The callsign will be GD6UW. As permission has not been received to operate from the top of Snaefell there will not be any serious attempt to work on the VHF bands this year.

Contests

The 1969 **French Contest.**

14.00 25 January to 22.00 26 January (cw).

14.00 22 February to 22.00 23 February (phone).

All bands 3·5 to 28 MHz.

Exchange RS(T) plus serial QSO number, starting from 001.

Three points per QSO. Multiplier of one per band for French departments, DUF countries, Swiss cantons, Belgian provinces or LX, 9Q, 9U and 9X (all of whom will also be running a contest).

Logs to REF, BP 42.01, Paris RP, France.

Contacts in this contest may be used as credit towards the DUF, DDFM, DPF, and DTA awards provided that application is made within two years. In this 1968 event UK scores were as follows: (cw) **G3ESF** (47,424 points), G2DC (33,080 points), G2WQ (27,216 points) and G3EPO (270 points). (Phone) **G3RAA** (17,298 points), G3EPO (9504 points), G3TOK (2484 points), and G3XCO (2439 points).

The **34th ARRL International DX Competition.**

00.01 1 February–24.00 2 February and 00.01 1 March–24.00 2 March (phone)

00.01 15 February–24.00 16 February and 00.01 15 March–24.00 16 March (cw)

All bands 3·5 to 28 MHz.

Exchanges consist of RS(T) plus input power, US/Canadian stations send RS(T) followed by state or province.

Complete QSO's three points, incomplete two points. Multiplier of total number of states/provinces worked on each band totalled together.

Logs should show date, time, band, exchanges, and points claimed, and should be sent to: ARRL International DX Competition, 225 Main Street, Newington, Conn, USA. 06111, Free log forms and summary sheets may be obtained from this address.

The **Arkansas QSO Party.**

22.00 11 January to 04.00 13 January.

All bands 3·5 to 28 MHz. Especially 3525, 7025, 14025, 14,225, 14,325, 21,025, 21,220, 21,425, 28,025, 28,560 and 28,650 kHz. Stations may be worked on different modes on the same band for credit.

Exchanges consist of RS(T) and QSO number. Ark stations send county.

Contacts count five points, multiplier is number of Ark counties worked (maximum 75).

Logs (before 30 January) to: North Arkansas ARS, PO Box 333, Harrison, Ark., USA, 72601.

The **Louisiana QSO Party**

18.00 18 January to 22.00 19 January.

All bands 3·5 to 28 MHz. Especially around 3600, 7075, 14,075, 14,300, 21,075, 21,400, 28,100 and 28,700 kHz. Stations may be worked on each band on each mode for credit.

Exchanges consist of RS(T) and QSO number. La stations send parish.

A group of well known Brazilian amateurs—rear row, left to right, PY2BKO, PY2CRJ, PY2CMS, PY2ASO, PY2SO, PY2ENI, PY2PA, PY2ELG, front row, left to right, PY2DVH, PY7AKW, PY2DYI, PY2AQQ and PY2CWF.

Contacts count one point, multiplier is number of La parishes worked. To qualify for a certificate a minimum of 25 points is needed by non-US stations.

Logs (before 28 January go to: Lafayette ARC, 123 Normandy Road, Lafayette, La, USA. 70501.

Results of the **1967 CHC Party** have now been received and show **G3TIF** to be top European score, top UK and world second in the HTH section with 24,750 points. He was also top world score in the HTH-CW only category with 17,756 points. G scores in the CHC section were **G3ABG** (14,960 points), G5GH (8800 points) and G3GHE (8670 points).

The **First " Giant " RTTY Flash Contest.**

14.00 to 22.00 15/22 February.

All bands 3·5 to 28 MHz RTTY only.

Exchange RST and Zone number (UK is Zone 14).

QSO's with one's own zone count three points. Outside own zone " points listed on the exchange point table "—suggest writing sponsor for this as well as log sheets. Multiplier consists of DXCC countries per band totalled together.

Logs should be sent to sponsor: (before 20 March) CQ Elettronica, via C. Boldrini 22, 40121 Bologna, Italy. Awards of free subscriptions to CQ Elettronica and also a gold medal will be made. SWL's may participate.

Results of the **1967 TOPS CW Club** contest have now been received. Overall winner was DM2CZL with 75,696 points. The only UK entrant in 169 single operator totals listed was **G3LP** in 27th overall position with 15,232 points. In the multi-operator section **G3KMI** was fifth with 24,840 points. The 1969 event will take place next December and details will be given in a later *MOTA*.

DX News

VQ9GA is likely to be active from Mahe, Seychelles Is, for the next six months or so. During his four and a half hours on the air from Chagos Is. he managed to have 450 contacts.

Reciprocal licencing has now been arranged between the USA and Norway.

Over 50 licences have now been issued in Thailand although the Thai government has still not notified ITU that its amateurs may communicate with the outside world.

PY7AKW of recent PY0SP fame together with Eva PY2PE, PY2DYE, and Alex PY2PA.

HS3RB is ex-VP5RB, and the call HS1GB has been reserved in case W4BPD visits there during his forthcoming expedition! It appears that the use of cw is not permitted at present in Thailand as monitoring officials are unable to copy it.

KH6BZF's projected visit to Kure Is was cancelled due to the fact that only US Government employees on official business are given permission to go there. The situation would seem to resemble that relating to Navassa Is (KC4).

CR8AH (Portuguese Timor) is currently very active on 21 MHz ssb. A new station, CR8AI, has now appeared and is also using ssb. QSL cards are being handled by VK3AHO who is believed to be able to fix skeds.

A spate of activity from the Solomon Is seems to have been taking place recently. VK4ZK/VK9 has been active from Bougainville, which although administered by Australia is actually in VR4. Another ssb stations has been VR4BA, and two am stations have been heard in the UK—VR4EL and VR4EZ.

Indonesia has now notified ITU of the withdrawal of its objection to Indonesian amateurs working stations in other countries. This means that all YB contacts will now count for DXCC and other awards.

VE1ASJ (G. A. McLellan, PO Box 41, E Riverside, Kings, New Brunswick, Canada) is now QSL manager for ET3RB, HR1KAS, HQ2GK, HR2GK, ex-MP4TBO, VP7NF, VP8JT and 4X4VL.

VE6AJT and VE6APV were still on the air from British Phoenix Is as VR1P at the time of writing. Signals appeared to peak around 18.00, although VR1P was RST 599 at 04.00 on one occasion. Transport is awaited to take the expeditioners to Tonga, the Tokelau Is and Samoa. Over 8000 contacts had already been made with 142 countries.

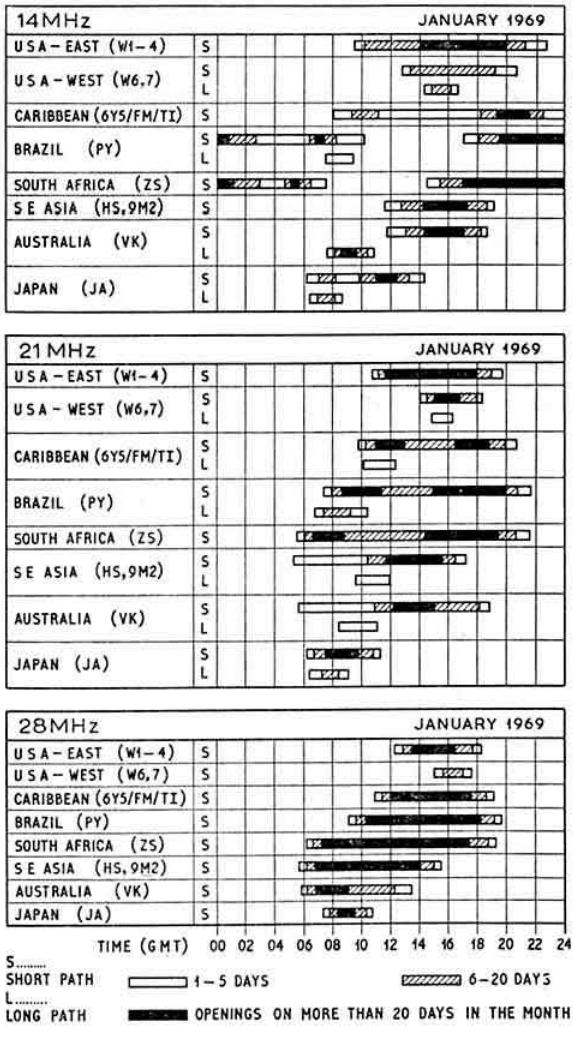
It has been reported that Italian stations will shortly start to use a different prefix, according to their location. They will be as follows: I1—special services and islands (IS1, IT1, etc.), I2—Milan, I3—Venice, I4—Bologna, I5—Florence, I6—Bari, I7—Naples, I8—Reggio Calabria, I9—Piedmont, and I0—Rome.

CR3KD (Portugese Guinea) is at present off the air on account of trouble with his equipment. He will be moving to a new QTH soon.

VR2FS, who was putting an excellent signal into the UK during the CQ WW DX contest (cw) weekend, is 9V1OS. QSL cards should be sent to his 9V1 QTH.

Band Reports

As is usual, the number of reports received this month has dropped off very considerably, largely due to the short period which has elapsed since the last MOTA went to press. However the quality of logs received greatly made up for the lack of quantity and much gratitude is due to the following for their contributions: G2BOZ, GW3AX, G3HCT,



PROPAGATION PREDICTIONS

The period of maximum sunspot activity has passed but the rate of decline of activity is much slower than the increase towards the maximum. For this reason the predictions for this month will be almost the same as those for January 1968.

In this, the first contribution of 1969, it is pointed out that all times in the predictions are given in GMT. This is to facilitate conversion into the local times of other regions.

On undisturbed days both 28 and 21 MHz should be open to most parts of the world, although contacts with the Western USA on 28 MHz will only be possible on days with above average F2 muf's. The midwinter conditions will enable contacts to be made via the long path particularly when the signal path coincides with the twilight zone. 14 MHz will not be a night time DX band and no improvement will be noticeable before the beginning of March.

The provisional sunspot number for November 1968 from the Swiss Federal Observatory was 88·3 with activity evenly distributed throughout the month. Predicted smoothed sunspot numbers for March, April and May 1969 are 96, 94 and 92 respectively.

The Society would like to express sincere thanks to Dr G. Lange-Hesse of the Max-Planck Institute for Aeronomie at Lindau in the German Federal Republic for having made available the propagation predictions. Correspondence has shown that this is a valuable service appreciated by many members.

G3HDA, G3LNS, G3NKQ, G3OLY, G3TBK, G3URX, G3UYM, G3WTJ, G8VG, A5489, and A5662. As usual cw stations are printed in italics, the remainder are ssb unless otherwise stated, and times are given to the nearest hour.

3·5 MHz. **01.00** *UH8AA*. **02.00** *SM5MX/OH0, OY6FRA*. **03.00** *PJ2VD, UA9KCE*. **04.00** W0VXO/KV4. **07.00** *KV4FZ, PJ0CC, W6's ANN, DQ, GP* and *NA*. **19.00** VK2NN. **20.00** VS6DO, VS9MB, ZB2A. **21.00** CN8AW, MP4BEU, OD5LX, TF3HS, VQ9CC, VQ9L, 5N2ABG, 5Z4KL, 9V1NF. **22.00** CR4BB, CT2AA, HS1AP, 5A1TK, 9M2DQ. **23.00** W1FZJ/KP4, W's, VE's.

7 MHz. **01.00** ET3USA, FG7TT/FS7. **02.00** EP2BQ, PJ0CC, ZD8Z, ZS1JA, 4X4CJ, 5A1TY, **03.00** 8R1J. **04.00** *KV4FZ, ZD8J*. **06.00** *PY0DX, TI2PZ, UA0KQU* (Zone 19). **07.00** *XE1XQ, 4A1EK*. **17.00** *AP5HQ*, VK6JV. **18.00** *JA3GZN, XW8CS*. **19.00** CR6NK, *DU1AT*, VK2FK, VK3BM, VQ8CC, 5Z4KL, 9J2BC. **20.00** DU1FH, *JA1EUV*, KR6KN, MP4BEU, TA3AB, *VK6OV*, VU2DKZ, YA5KO, ZD8Z. **21.00** FP8CY, *JA3GNZ*, MP4BEA, OD5FA, SV1AE, YA1KO. **22.00** *CR4BB*, ET3USA. **23.00** PJ2MM.

14MHz. **04.00** *VR1P*. **06.00** PY0OM. **07.00** TR8AG, *UA0YT* (Zone 23), VK9RJ (Nauru Is.). **08.00** *HL9US, HM0B, KW6EJ, LG5LG, TJ1QQ, VK2BKM* Lord Howe Is., *VR2's EK, FS*. **09.00** FY7YK, YK1AA (Often to be found on Fridays). **10.00** *KG6AGQ*. **12.00** *VP9GG* (ex-G3DLM). **14.00** *AP5HQ, XE0GEN, XW8CS*. **15.00** *VS6AA*, 9V1PB (ex-G3NAC, VS9AAA, etc). **16.00** FB8WW, *VR2FS*. **17.00** KH6GLY, *VQ8CJ, UI1A* (Special prefix in use by Leningrad group for contest). **18.00** *FB8XX, KH6COB, KL7EWA, OX3LP, PY0DX*, TU2BX, *UA0KAE* (Polar Ice Station, Chelyabinsk), VR1P, VU2MD, *ZD9BK*. (Gough Is), *ZS1ANT* (S. African Antarctic Base), *7P8AR*. **19.00** A2CAQ, HV3SJ, *VK2BKM*/Lord Howe Is. **20.00** *PJ5MO, 5Z4KO*. **22.00** *HC2RZ, HP1BR, 9Y4DS, 9Y4KK*. **23.00** *CE1AD*.

21MHz. **06.00** *5R8AM*. **07.00** *VQ8CJ, ZD5X*. **08.00** JA's, *ZD8J*, ZL's, *XW8CR*. **09.00** *HL9US*, JA's, *VU2OLK*, ZL's. **10.00** *CR4BB, CX3BH*, FH8CD, HS3AL, JA's, *TJ1QQ, 6W8AW*. **11.00** CR8AH, *K1FNA/KG6, UA0SL, VK2BKM*/Lord Howe, *VS6AA, ZD8J, 9Y4LA*. **12.00** *DU1AT, UP, FG7XX, HP1XHG*, VQ9GA, *6Y5JB*. **13.00** VK's. **15.00** *OA4PF, VQ8CC*. **16.00** CE0AE, *XE2AAG*. **17.00** PY0OK. **18.00** *HK3RQ, KH6TD*, ZD3D. **20.00** *CM1AR*. **21.00** *CE1DF*.

28MHz. **08.00** VK5FM, *VQ8CC*, VU2KX, *UA0BX, 4S7DA*. **09.00** HS3RF, KR6TAB, VS6FZ, VU2JM, *XW8CS, ZD5X, 9M2LN*. **10.00** *MP4BEU*, VK's, VS6AD, ZL3JO. **11.00** *HZ1AB, SV0WN* (Crete), *UM8AP, ZD8J*. **12.00** *CX3BH*, HC2HM, OA4ED, PJ0CC, *TJ1QQ*, VP2LX, *VP8HJ*, 6Y5NY, 9X5AA. **13.00** *MP4BFO, OY6FRA, 8R1J*. **14.00** FP8CY, KV4AD, W1-W6, *XW8BP*. **15.00** *CR4BB, HH9L*, W1-W0. **16.00** *CE1AD*, W1-W0, *XE0GIR*. **17.00** *ZD9BE*. **18.00** HK0BMO (St. Andres Is).

Very many thanks are expressed to all correspondents, and also to the following for permission to reproduce items from their publications: *CQ DX* (ARI), NARS *News* (5N2AAF), *Long Skip* (VE3HJ), *QUAX* (SM4DXL), the *DX'er* (K6QCF), *DX News Sheet* (Geoff Watts), the *Ex-G Radio Club Bulletin* (W3HQO), the *DX'ers Magazine* (W4BPD), and the *Florida DX Report* (W4BRS). Apologies to 5N2AAF who was accidentally credited with writing the HKARTS Newsletter last month.

Please send all correspondence concerning the **February** issue to reach G3FKM **no later than January 14,** for the **March** issue by **February 11,** and for the **April** issue by **March 11.** Items received after these dates cannot be included until the following issue.

QTH Corner

CR8AH Fernando J. B. Santos Leite, PO Box 435, Dili, Portuguese Timor.
CR8AI via VK3AHO, Bill Hempel, Rural Delivery, Kyvalley, Vic, Australia.
ex-DL5YY A. Smyth, 93 Trenchard Road, Ashby-de-la-Launde, Lincoln.
EP2BQ Dr Harry McQuillan, c/o Dept of Geology, Pahavi University, Shira, Iran.
FM7WV BP 111, Grenoble, France.
KH6GLU Ed de Young, PO Box 762, Kaunakakai, Molokai, Hawaii, 96748.
KV4FZ Box 310, Christiansted, St Criox, US Virgin Is.
ex-MP4BGU/MP4TCI/MP4QBY T. Robinson, 53 Trenchard Road, Ashby-de-la-Launde, Lincoln.
MP4MPJ via G3POA, N. F. Addison, 17 Wilberforce House, York Road, London, SW11.
OR4ES via ON4VL,, 22 rue de la Tonne, Ans, Lge, Belgium.
VK4ZK/VK9 via VK4 QSL Bureau, Box 638J, GPO, Brisbane, Queensland, 4001, Australia.
VP1NC, VP1TC, VP2GRN, VP2GRS 800 North 35th Street, Fort Smith, Ark, USA. 72901. via W4YHB, PO Box 1090, Hendersonville, NC, USA. 28739.
VP5AR via WA6BOU, A. M. Rogozinski, 1718 S. Church St. Lodi, Calif, USA.
VP8KO via Eric Chilvers, 1 Grove Road, Lydney, Glos.
VQ8CC **Direct only** to Steven Gibbs, Box 14, Curepipe, Mauritius.
VQ8CG via G3APA, 48 Westhill Road, Coundon, Coventry, Warwicks.
VQ9GA/8C, VQ9GA via WA6AHF, Rubin Hughes, 17494 Via Alamitos, San Lorenzo, Calif, USA. 94580.
G3NRA/VR1 D. Appleton, c/o 22 Maldon Road, Goldhanger, Nr Maldon, Essex.
ZL1DS/C, ZL1IL/C, ZL1TU/C, ZL2AFZ/C via George Studd, 48 Nuffield Avenue, Napier, New Zealand.
3A2CL Dr Kurt Lamm, 13 Boulevard Suisse, Monaco.
3A0AV Mauro Monti, Via Terraglio 115, Preganziol, Treviso, Italy.
7Q7WW Box 453, Blantyre, Malawi.
8QALK PO Box 53, Bangalore 1, India.
9K2CB, K92CC via K9CSM, Ben Piller, 9238 S. Kingston Avenue, Chicago, Ill, USA. 60617.
9N1BG via VE4OX (sae plus IRC), 447 Academy Road, Winnipeg, 9, Manitoba, Canada.
9V1OE Cpl. Mike Farmer, GRSF, RAF Changi, Singapore.
9Y4DS via K9KLR, Nick Lash, Box 1816, Gary, Indiana, USA 46409.
RSGB QSL Bureau, G2MI, Bromley, Kent.

1968 COUNTRIES TABLE

	160m	80m	40m	20m	15m	10m	Total
G3IAR	9	51	41	126	102	74	403
G3VPS	13	27	18	73	13	13	157
G3PQF	10	26	38	65	12	64	215
G3TXZ	5	30	9	25	68	92	229
G3XBY	4	30	40	75	90	54	293
G3ING	12	16	22	21	20	14	105
G3XDV	15	10	17	38	1	18	99
G8VG	5	17	28	46	58	66	220
SM2BYD	—	16	16	58	25	11	126
G3TBK	3	6	34	48	34	28	153
G3OLY	—	5	18	143	107	104	377
G3VJG	—	2	10	18	22	59	111
G8JM	—	—	8	200	116	81	405
9J2BC	—	—	17	106	54	64	241
A5620	10	71	17	35	25	31	191
A4886	14	56	50	187	103	89	489
BRS25429	3	57	80	176	141	114	568
A5662	14	39	63	155	145	146	562
A5943	10	42	30	53	65	33	233
A3942	14	38	36	58	60	50	213
BRS30094	10	33	29	157	150	111	490
BRS28198	2	32	46	66	32	92	270
A5126	2	31	31	81	53	44	242
A5459	8	25	34	84	37	22	210
A5154	3	29	30	153	127	84	426
BRS27806	4	27	17	168	136	78	473
A5950	7	23	20	66	73	68	257
A5135	5	24	37	115	81	56	318
A5437	4	24	14	42	25	8	117
A5390	4	22	35	161	163	92	477
A5466	5	21	23	106	38	28	216
A6015	6	16	30	65	53	43	213
A5852	5	15	11	110	114	1	256
A5489	—	18	20	121	112	72	343
A6081	—	16	12	57	62	—	147
ORS30694	—	—	11	80	84	56	231
A5805	—	—	42	—	—	—	42

(This month's table is in order of 160 plus 80m totals).

February *MOTA* will contain the final scores in the 1968 table. In order to encourage multi-band operation the leading transmitting amateur and leading SWL in the 1969 table will receive a prize the nature of which will be announced later.

FOUR METRES AND DOWN

By JACK HUM, G5UM*

The Metre-wave Man's Code

When operating his station the vhf and uhf metre-wave man—

1. Before transmitting, senses the band for conditions, level of activity and occupancy of his intended channel;

2. When sending CQ announces his location (if he is a newcomer his callsign may not be in the book, if he is an old hand he will not be egotistical enough to assume everyone knows where he is). He will also state beam-heading and intended direction of tuning, for cw using the accepted abbreviations (QLH, QML, QLF, and so on);

3. When engaging in a QSO will give the other man's callsign first followed by his own; in net operation will call stations in " Callbook order " and will use the minimum power consistent with solid copy;

4. Will keep within his geographic-frequency area unless calling a station on the latter's own frequency;

5. Remembers never to use phone in cw areas, though resorts to cw in any area when communication is difficult;

6. Observes gentlemanly microphone manners by avoiding irrelevant back-chat, refusing to allow " funny men " near the microphone (especially during contests), and abjuring all facetious callsign phonetics, having noted the recommendations written into the Licence;

7. Avoids the pitfalls of duplex operation by announcing his and his correspondent's callsigns often, together with frequencies in use, not allowing the intimacy of the mode to tempt him to transgress code 6 above;

8. At all times is considerate of others, especially of the man in the next street or town, by avoiding over-modulation, key-clicks or single sideband overspill;

9. At the end of a QSO always pronounces his callsign distinctly for the benefit of distant listeners, and—

10. Takes a last look round before closing lest others may be calling. If they are and time is short he suggests times for subsequent meetings.

* Houghton-on-the-Hill, Leicester LE7 9JJ. Send reports for the February issue by 13 January and for the March issue by 13 February.

The " How " of Operating

One of the final duties of the outgoing 1968 VHF Committee was to discuss operating standards in the vhf and uhf allocations. Were these standards good enough? Did they give any cause for criticism? How could they be improved?

To many readers of this page the questions might almost seem to be superfluous, remembering that the metre wavebands have earned over the years an enviable reputation as the place where the amateur radio spirit flourishes, where the rat race doesn't, and good manners prevail.

Now although all of this remains true it doesn't do to imagine that the situation will continue to be self perpetuating. Alien habits can all too easily infiltrate either by reason of their use on other bands or through individuals' sheer ignorance of how to operate. It would, thought the VHF Committee, be a good thing to head off any possible malpractices before they got a hold.

Each member of the Committee has done a little " thinking out loud " on this point, and the conductor of " Four Metres and Down " has assembled the resultant thoughts in the panel at the left of this page, in the form of a " Metre Wave Man's Code." These represent guidelines to good operating in 1969 and beyond.

To members with experience of vhf and uhf activity the code will tell little that is not already known. To newcomers it may help a great deal: that is the intention, at any rate. We believe that those who follow it will not go far wrong.

On to '69

Two further items in addition to the operating code (above) which the VHF Committee had before it in a three-hour-long agenda at its final meeting in '68 were the spin-off from the IEE single sideband symposium, and the Fifteenth VHF/UHF Convention.

The subject of single sideband at vhf has had a very good airing in these pages over the last few months. It is likely to continue to do so over the next few years as the mode attracts increasing numbers of adherents. What has been said so far emphasizes the need (when embarking on ssb at vhf) to start off with "clean" rigs if life on the vhf wavebands is to remain as pleasant in the future as it has been in the past. This emphasis will receive further underlining in this journal as time goes by.

Picking up the G3DAH suggestion at the IEE meeting that there could usefully be more ssb-to-am intercommunication, it seems to us that this will readily be accomplished if more sideband men learn to tune beyond 145·41 MHz, and *say* they are going to do so; and if A3 operators switch receiver bfo's in and announce in turn that *they* are going to monitor 145·41. This would lead to more intermingling of the

modes and fewer allegations of clique behaviour. Life is too short and vhf amateur radio too interesting to admit any sort of apartheid in our methods of operating.

* * *

In little more than three months' time the Fifteenth International VHF/UHF Convention will be here. Members' new 1969 diaries no doubt have had the date of 26 April already written in. As last year, the venue will be the Winning Post Hotel, at Whitton near Twickenham, Middlesex. Not the least of its advantages is its good accessibility from most parts of the country.

Preliminary plans for the Convention were laid during the life of the 1968 VHF Committee, and will be taken up by the 1969 Committee when it is duly constituted by the incoming Council at its first meeting due about now.

* * *

Returning to the theme of single sideband, on now to the next item . . .

Around the Groups

On paper there are probably as many as a dozen VHF/UHF Groups over the length and breadth of the country. Some of them exist specifically to provide stations to enter portable contests. Others seem neither to do this nor to hold meetings. Most do both.

Among the outstandingly " positive going " groups is the South East, which under the benevolent guidance of G3DAH has just concluded a highly successful lecture-season year (complete with fixture card issued to all interested, and three-figure attendances at the alternate Ashford and Canterbury venues by no means unknown). The final meeting of 1968, just too late to be reported in detail here, was scheduled to have Geoff Stone, G3FZL, to develop the theme of single sideband at vhf, subject of the IEE meeting earlier in the month, with special attention not just to the reduction of spurious responses but also to knowing *by how much* they have been reduced. Geoff now has available the means to demonstrate this on an instrument capable of showing a minus 120 dB reduction at frequencies as high as 1 GHz.

At the same South East meeting G3OOU was billed to talk about transistor transmitters, the application of dual gate IGFETs and frequency counting. Altogether a fitting close to a memorable meeting-year.

* * *

Further westwards the South Coast VHF Group have adopted the device that never fails to promote the sense of belonging, and that is a newsletter. Circuitry and personalia are admirably juxtaposed in the first number. The Group's next meeting is down for 8 January at the QTH of G3JHM, 4 Newling Way, Worthing, Sussex: Don Hayter can supply all info about activities.

* * *

The Leicestershire VHF/UHF Group is fortunate in being able to call on the talents of speakers from one or other of the electronic establishments small and large which abound in the Midlands, and these include suppliers of vhf equipment to the amateur market. Its last meeting of 1968 had Brian Sandall, G3LGK, to give a talk on dc to dc inverters which mixed theory with a lot of sound practice, including the examination of waveforms on a scope to show the " goodness " or otherwise of inverter designs and the transformers which were used in them.

This month they welcome once again Dave Dryden, G3BKQ, who has recently developed a design of 70cm aerial much praised by those who have so far tried it. On Thursday, 16 January he will describe it in detail. The meeting place as usual is the Regional College of Technology in The Newarke, Leicester, where Room 45 opens at 7 pm to enable members to enjoy a get-together before the lecture begins at 7.30 pm. All vhf and uhf enthusiasts who are within travelling distance of the city will be welcome: there is a " bob a knob " collection to defray expenses, but that is all.

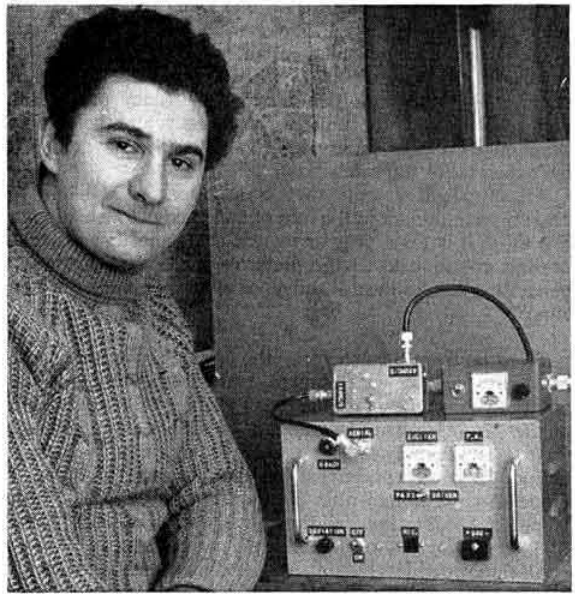
Crystals and Zones

The time is rapidly approaching when it will no longer be possible to rely on a supply of " surplus " crystals for getting started on vhf. Although ex-Government crystals still appear in advertisements it is a matter of chance whether or not one will be available for one's local frequency zone.

This produces the state of mind in some instances that " any old crystal will do so long as it gets me started on 2m " —and the chap having bought one then proceeds to call his head off hundreds of kilohertz away from where anyone is searching.

Inevitably, contacts come thin and slow, a sense of disillusionment about vhf sets in, and displeasure is induced in neighbours, who upon searching the frequency area for remote stations derive no pleasure from finding a fat local signal sitting in it.

Okay, surplus crystals are cheap, we all know, and to the younger member with little cash to spare they offer a quick way in. And we suppose there must be even today a few new licensees around who don't read the literature, remain



First place in the Constructors' Competition organized by the Dunstable Downs Radio Club was secured by Ian Gurton, G8ASP, with this transistor 2m transmitter with add-on varactor diode tripler for 70cm. The 2m rig runs a conservative 12 watts to a 2N3632 pa and the 70cm section uses a BAY96 followed by a high-Q break, without which, says Ian, " the output looked on a spectrum analyser just like a hedgehog." A good example to other varactor users!

BEACON STATIONS

Call-sign	Location	Nominal Frequency	Emission	Aerial Direction
GB3ANG	Craigowl Hill, Dundee	145·950 MHz	A1	S
GB3CTC	Redruth, Cornwall	144·13 MHz	A1	NE
GB3GW	Swansea	144·250 MHz	A1	E.N.E.
GB3GM	Thurso	144·995 MHz	A1	N'S
GB3GM	Thurso	70·305 MHz	A1	N'S
GB3GM	Thurso	29·005 MHz	A1	Omni
GB3GEC	W. London	434·000 MHz	F1	N/W
GB3SX	Crowborough,Sussex*	28·185 MHz	A1	E/Omni
GB3VHF	Wrotham, Kent	144·500 MHz	F1	North-West

* Not operational

GB3VHF

The Society's v.h.f. beacon transmitter frequency at Wrotham, Kent, measured by the BBC Frequency Checking Station (nominal frequency 144·50 MHz):

Date	Time	Error
21 - 11 - 68	0915	128 Hz high
28 - 11 - 68	0830	1090 Hz high
5 - 12 - 68	0844	1170 Hz high
11 - 12 - 68	0845	1260 Hz high

ignorant that such things as geographic-frequency zones exist until someone tells them over the air, and will use any old crystal that puts them on.

Even so, crystals cut to order are cheap enough when compared with the sort of outlay on radio equipment which many people are cheerfully prepared to indulge in nowadays. They come out more cheaply still if several are bought at once on a group basis. If as a result all the locals appear on a common frequency this is no bad thing for regional net operation; and anyway a 35pf variable across the crystal socket can work wonders in enabling an operator to slide off the co-channel—especially when 8 MHz is used: a shift of half a kilohertz at this starting frequency provides a change of 9 kHz at the multiplied frequency, and that should be enough to clear most people's adjacent sidebands (if it isn't then tailor the sidebands).

All of which accepts that crystal control is likely to remain predominant in the face of advancing vfo techniques. We think it is for a year or two or three ahead; and while crystals continue to be the preferred method of frequency generation it is to the advantage of all if they come out " in zone."

* * *

To move from the general to the particular we now quote Bill Scarr, G2WS, who writes: " Are we powerless to do anything about the wilful disregard of the cw/phone division of the 144 MHz band? Although the G8xxx's often offend, they are not entirely to blame. One evening recently during a period of good conditions for long-distance working, I found three stations within 30 miles of this QTH in North Somerset holding long phone conversations, all on 144·05 MHz", that is, well (or ill) inside the cw segment.

All three offenders judging from their callsigns were licence holders of 12 to 15 years standing, and as Bill puts it " old enough to know better." One of them was actually heterodyning the French beacon station F3THF.

We have heard a counter argument to the above complaint. It is to the effect that " . . . the cw bit was carved out of the South-West Zone and I'm not jolly well going to buy new crystals to put me *above* 144·1 . . ." and so on. The answer is that many cw operators would be glad to accept any such crystals if their availability should be made known through " Xtal Xchange." A further thought is that if more hefty cw signals appeared regularly in the bottom 100 kHz then the intruders would be compelled to move in short order.

Today's 2m bandplan, updated from the admirable G3CYY/SWM plan expounded in 1949, was the subject of simultaneous announcement in this journal and *Short Wave Magazine* in July 1966, puts cw at the bottom, sideband on 145·41MHz and encourages spot frequency working. It has been detailed (with map) in the last three editions of *The RSGB Amateur Radio Callbook*. The 2MHz of the communication sector of 70cm are planned identically.

Contest News

Knowing the enthusiasm of the 23cm fraternity we wouldn't be surprised to hear that several of them had taken the trouble to compare last month's billing of the October 1296 MHz Open Contest with the results turned in from previous events. They would have discovered that the October line-up of fifteen stations compared with thirteen for the May event, and seven for the October 1967 contest.

Thus " 23 " progresses—though it must be added that the October 1968 event was favoured by the sort of pleasant weather that encourages the portables to hit the hills.

Had it been otherwise no one could have been blamed for staying at home rather than try to erect wind-resistant paraboloids in the half-gale that so often seems to afflict vhf/uhf contests.

A look at last month's 23cm results shows Ron Dabbs, G2RD, back in top place in Section A, and that famed multi-operator team of G3OXD/A heading Section B, to repeat their success in getting there during the May event. In Section C Les Sharrock gave pleasure to many in search of a second country on 23cm by offering GW3BNL/P during the contest. He notched top place, hotly pursued by another renowned " 23 centimetric ", G3NNG/P. All of these are well known callsigns on the band—but the event attracted many new ones, notably G8AUE, whose 23cm activity dates only from the May contest. In the ensuing six months he has worked 17 counties and two countries on the band. He puts 8 watts of rf into a 5ft dish.

One of the many things G8AUE likes about " 23 " is its capacity to throw up unexpected results. During the slight lift early in November he worked G3GWL at 75 miles at S8 both ways when signals between them were virtually inaudible on the 70cm talkback band. And this despite the fact that system gain was greater on the lower frequency band.

* * *

What is rather mystifying about the 1296 MHz results for October is the absence from the table of sixteen callsigns of stations known to have been active at the time; the 15 logs received by the VHF Committee disclosed that 31 stations exchanged points during this contest. Allowing for the fact that many people either don't have time to make contest entry logs, or forget for one reason or another, it seems a pity that at least some of the missing 16 couldn't have appeared in that table.

Certainly an example was set by G8AUF, Dick Alton, whose QTH at Belper deep in a Derbyshire valley is just about the end as a uhf site. Knowing that he could hardly hope for more than one contact during the October contest he nevertheless turned in an entry undeterred by the possi-

bility that he would be at the foot of the table. He must have heeded the observation made in " Four Metres and Down " more than once that it's the size of the contest results tables that gives the true measure of activity on any band at any given time. Perhaps the missing 16 will not be averse from going into print after next May's event.

* * *

Last month's telegraphy contest on " Four " was expected to demonstrate the effect of the new bandplan, ie, that activity would be confined to the bottom 75 kHz. In the event it wasn't; and although numerous operators were clearly enjoying the freedom of this newly won area, contest signals were heard well up the band. Clearly crystal control is in widespread use; the expected advent of vfo's on " Four " has not materialized to any marked extent.

Now for the next telegraphy contest, that on 2m on 26 January. Last year's event, with " QLF " as the rule and rarely a " QLM " to be heard, showed a marked concentration within the 144·0 to 144·1 MHz segment, and it is a safe bet that few contacts will be had this time outside it. Another safe bet is that cw will once again demonstrate its nationwide penetrative power on " Two "irrespective of conditions.

A couple of weeks earlier single sideband will do the same. If almost a hundred sidebanders appear on or around 145·41 MHz on 13 January as they did during last year's Monday Nighters a contest log from each one of them will demonstrate more effectively than any comment here how the mode is catching on.

* * *

The great news for the 70cm men is that the Cumulatives re-start this month. Many declare that it was a pity they weren't put on earlier in the present winter season. No matter; they're back again—and here emphatically, if they are to be proved useful, it is important that plenty of logs shall be turned in to the VHF Contests Committee when the series finishes. The rules are on page 56 this month.

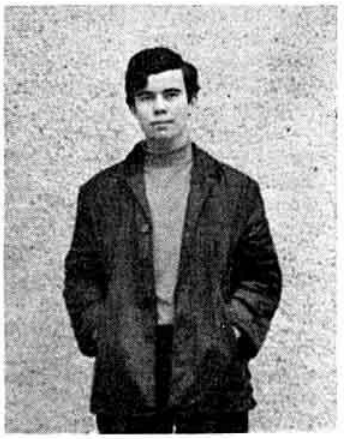
Moonbounce Project at Keele

From G3RPG comes news of the proposed formation of a Moonbounce Project Group at Keele University. It is understood that the Group if formed would be permitted to use the University's radio telescope, consisting of an interferometer system using two 15-ft diameter parabolic reflectors.

All interested—and it seems likely that help from members outside the University would be gratefully received—should get in touch with Vic Reynolds, G3COY, 25 Yoxall Avenue, Hartshill, Stoke on Trent. *continued over*

VHF Personalities: No 5

Chris Tran, GM3WOJ



Personalities previously featured have been people with years of amateur radio experience behind them. GM3WOJ, second son of the minister for the parish of Glenluce in Wigtownshire, was licensed in July 1967, is not yet 18, is in his sixth and final year at school and hopes to be studying electrical engineering at Glasgow University by next October.

What brought Chris Tran on to vhf? In his listening days he wondered where all the locals had got to, was told " On to 4m " and was prompted to buy an R220 receiver which, with the help of GM3RYO nearby, was modified to tune to 70 MHz. When a home-built 3 element Yagi was erected in the loft of the manse " Four " came alive.

When the licence came no transmitter was ready: " Funds were at an all time low 'cos of the GPO getting £2 and the RSGB £2 10s! So GM3WOJ did not get off to a flying start," says Chris. It was not long before helpful friends rallied round to loan first a B44 (not very good, but it *did* produce the very first contact for GM3WOJ: with old-timer GM2UU at Stranraer ten miles away); and secondly a rather higher power rig to give GM, GD and GI in quick succession.

After a brief flirtation with the hf bands to see if the Antipodes could be worked (they could), GM3WOJ returned to " Four " in mid-1968 with a new and heavily modified B44 and a J-beam 4 element well in the clear outdoors. With 8 watts input six of the seven British Isles prefixes were soon worked from the little upstairs radio room.

Over the ensuing months the limitations of the site (125 ft asl) became apparent with a 300 ft hill overlooking it on the southerly bearing. This may preclude success on 2m and 70cm when the time (and finance!) comes to try them out. Chris was very impressed with the results obtained on the nearby Mull of Galloway by GM5PI/P in one of the 1968 contests on 144 MHz, and this confirmed the desirability to further plans already laid to see what could be done " Stroke P " from well elevated sites locally.

By now, with his driving test duly passed, GM3WOJ installed the B44 in the car, working into a ground-plane mounted on the roofrack (" rather large but guaranteed to impress SWL's with the radials drooping over the car roof!"). This set-up is available for use if ever RAEN should be called out.

In spite of the limitations of the home site plans are in line for improving the vhf equipment by means of G3HBW type FET converters for 2m and 4m, and a maximum-power 4m transmitter donated by GM2CHN (who is by coincidence an old university colleague of Chris's father). Then it will be possible to make maximum use of future Auroral openings. Meteor Scatter is another form of propagation which is of great interest to GM3WOJ, and he is at all times glad to accept offers of cw schedules on " Four " from operators at a distance.

Another E-M-E Record
G3LTF to WB6IOM

On 9 November G3LTF worked WB6IOM on 23cm by moon-bounce. This bettered the existing 1296 MHz E-M-E record (W1BU-KH6UK) by 400 miles. At the Californian end 500 watts fed a 10-ft dish. At Chelmsford G3LTF had a 150 watt transmitter and a 15-ft dish. Parametric amplifiers were used for reception at both ends.

The contact took an hour to complete with signals just detectable above noise in an if bandwidth as sharp as 75 Hz and transmitter frequencies held within 500 Hz at 1295·980 MHz. It was the product of several patient tests beforehand, and deserves congratulations to both operators for what is an outstanding break-through in uhf communication.

Parchment Corner

A further sixteen " Four Metres and Down " Operating Awards were approved at the last meeting of the Society's VHF Committee (the complete table of holders of the certificate appeared in *Raido Communication* for December).

Among the new ratifications was G8ATK, who becomes the second Class B licensee to be granted the award for 2m operation. His certificate will be numbered 115. Other new recipients are G3EHR (No 114) and G3WW (No 116).

In the 4m category the following applications have been endorsed, and certificates issued to GI3VJS/P (No 56), G3EKP (No 57), G3JHM (No 58), G3VOF (No 59), ZB2BO (No 60—and the second Gib-man to get it for " Four "), and G3JHM/P (No 61).

There was a welcome renewal of applications in the 70cm bracket, and the additions here are G3FIJ (No 44), G3XEB (No 45), GW8AHI (No 46—which will especially please the many members who in turn have had him to thank for giving them GW in their quest for three-countries-worked-and-QSLed on " 70 ").

That tough assignment, to secure a 2m Senior Transmitting Award, has been successfully dealt with by G3MRA of Southampton: to him Certificate No 18.

And among the receiving members three more claim certificates in the 2m category. They are BRS24550 (who gets No 15), BRS30352 (No 16), and A5032 (No 17).

* * *

Holders of Class B licences who pass the morse test need have no fear that QSLs amassed under their old G8-plus-three callsign will be nullified when they assume the G3-plus-three mantle. The point has been discussed by the VHF Committee. A recommendation put forward to Council was duly approved to the effect that Class B licensees becoming Class A and operating from the same QTH should be allowed to use their contacts confirmed as Class B holders to be carried forward towards the appropriate " Four Metres and Down " Certificate.

This covers the point, which arises from time to time, when an operator changes his callsign when he is about half way through collecting the verifications for his certificate.

It does *not* mean that a G8-plus-three man who has already obtained an award can start all over again and make claim for another under his new G3 callsign. Definitely one certificate per QTH!

Why the Old Timer Joined

A well known Midlands vhf enthusiast and old timer who for various reasons had not belonged to the RSGB has now joined, and he has told us why:

" The RSGB is a highly unified Society with a Council that functions as a Council and not as a collection of individuals . . . it is progressive and recognized nationally and internationally.

" The very active support which it has given, in print and in person, to Midlands vhf functions made it clear to me that the RSGB policy certainly contributes to amateurs' interests as a whole. . . .

" Thirdly, only the RSGB has the experience, the recognition and the facilities to represent the amateur in whatever capacity it may be required to do so. To this I must add that the Society owes much of its enhanced status to the work of members at committee level, who are present at so many amateur functions held in so many different parts of the country."

All of which is so true as to call for no embellishment, except just to say that the Society in turn cannot do without the expertize and organizing experience of people like our correspondent. So if you meet any such on the metre wave bands don't tell them what *they* are missing by not being with us; remind them what *we* are missing while they remain outside.

Countries, Counties, Certificates

The appearance in the December number of *Radio Communication* of the list of holders of " Four Metres and Down " certificates has prompted several members to ask: " How do I go about obtaining one of these certificates?" Here is the required information:

Four Metre Award
Four Metre Listener Award
QUALIFICATION: production of QSL cards from 20 British counties and three countries.
Four Metre Senior Award
QUALIFICATION: 60 British counties and six countries.
Two Metre Award
Two Metre Listener Award
QUALIFICATION: production of QSL cards from 30 British counties and five countries.
Two Metre Senior Award
Two Metre Senior Listener Award
QUALIFICATION: 60 British counties and 15 countries.
Seventy Centimetre Award
Seventy Centimetre Listener Award
Twenty-three Centimetre Award
QUALIFICATION: 20 British counties and three countries.
Seventy Centimetre Senior Award
QUALIFICATION: 40 British counties and nine countries.

Stations eligible for these awards are (*a*) fixed stations; (*b*) alternative address stations operating " Stroke A " from any address; (*c*) portable stations operating " Stroke P " from any location; and (*d*) mobile—but categories cannot be mixed.

All claims, fully supported by QSL cards relating to contacts made after 1 January, 1961, and with a check sheet, should be sent to Frank Green, G3GMY, 48 Borough Way, Potters Bar, Herts, enclosing a large SAE for the return of the cards.

Supreme Award: For fixed stations and alternative address stations only.
QUALIFICATION: the holding of three Senior Awards or two Senior Awards plus the 23cm Ordinary Award. There have been no claimants to date.

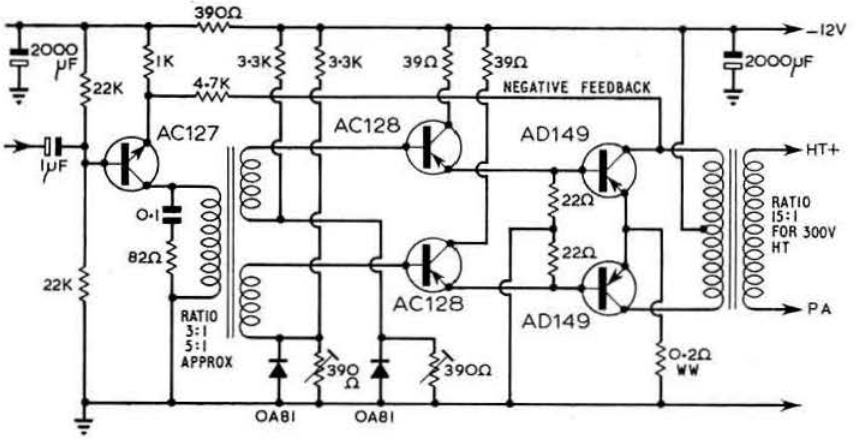


Fig. 1. The output stage of the transistor modulator used by G8ACE

Tech Corner

From G3AHB (Les Coote of Slough):

On the question of TVI and especially of sound breakthrough from vhf transmitters touched on by G2CUZ in "Tech Corner," one method of suppression is to use a low-Q choke, which has been found effective when a quarter-wave stub did not provide a cure.

This choke consists of 9 to 12 turns of cheap, small diameter co-ax toroidally wound round a ferrite ring, Mullard core grade FX1588. One end is plugged into the television input, and the TV aerial is plugged into the other end of the choke. A minor adjustment of the number of turns or their spacing may be necessary to achieve full rejection.

A similar device has proved very effective on the hf bands when a 120 watt pep transmitter was operated into various aerials only a few feet away from the television aerials in the roof space.

I hope this suggestion may be of some interest for adaptation in those cases where the transmitter rf is getting into the television set via the braiding of the TV downlead.

From G8ANZ (Bob Wilson of Portishead):

After experience in recent contests G3TND and myself decided that a vfo would be ideal in order to provide us with a clear space in the 2m band. However many crystals one has, somebody else seems to have the same frequency.

Consequently I have been working on the BRS25769 Vackar/Seiler oscillator. After a disappointing start I now have a very stable device which I can use even on the 70cm rig simply by replacing the 8 MHz crystal. Reports on the stability say that it is as good as a crystal oscillator.

The heart of the device is a 2N706 oscillator which together with its associated components are mounted in a small diecast box. The coil, which is of 16 swg copper, is wound on a ceramic former mounted inside another larger diecast box. The tuning drive for the capacitor is provided by the mechanical components of a scrapped BC221.

Both diecast boxes are mounted on a $\frac{1}{4}$ in aluminium screen which in turn is bolted to a $\frac{1}{4}$ in aluminium front panel. By enclosing the entire assembly in a box built in $\frac{1}{8}$ aluminium with aluminium stiffeners a very rigid structure results. The vfo can be knocked quite violently while in use on 70cm and no drift is detectable.

Following the 2N706 are two buffer amplifiers on 8 MHz, each a 2N706. All capacitors in the tuned circuit are mixed positive and negative temperature co-efficient and silver mica. Selecting the appropriate values to achieve good stability is perhaps the most time consuming part of the operation.

From G8ACE (John Hazell of Hatfield):

In the search for adequate output from the audio power transistors used in the 70/23cm modulator it seemed likely that the driver transformer might need to be almost as big as the output transformer, due to its high current and high inductance requirements.

It was therefore decided to interpose two emitter followers after the driver transistor and use these as current amplifiers for the push-pull output pair. This greatly reduced the driver requirements, the driver transistor now taking only 5mA instead of about 100, and working into quite a tiny driver transformer. This gives a total of five transistors in the output stage.

The circuit diagram of the complete output unit is shown in Fig. 1. The AC127 driver transistor has negative feedback from the output side applied to its emitter. The driver transformer requires split secondaries: it is a readily obtained component. Each leg goes to a 390 ohm variable resistor which is adjusted to set the collector current of each AD149 to 70mA quiescent. The OA81 diodes stabilize the base operating point against voltage and temperature changes.

The 39 ohm resistors in the collector leads of the AC128 emitter-followers are there to reduce dissipation. A further precaution against thermal run-away is to have each of the AC128 transistors in a small clip clamped to chassis by way of a heat sink.

Operationally, the modulator in which this output stage is used has been hammered during the course of many portable contests. It operates from anything between 11 and 14 volts without complaint.

Here and There

" Many thanks to G3CZZ for his work on the Cornish 2m beacon. I think I speak for many in the Somerset area when I say: please let us have a 70cm one "—G8ANZ.

* * *

" . . . just to say thank you to all who arranged and lectured at the IEE on ssb at vhf. Interesting, informative and responsible "—G3WBQ.

SOCIETY AFFAIRS AND NEWS SUPPLEMENT

RSGB Public Relations Officer, Sylvia Margolis, with 1968 RSGB President, John Graham, G3TR signing a copy of the Radio Communication Handbook which he then presented to Cesar " Chick " Pavelescu, YO3GK.

A Brief Report of the RSGB Council Meeting held on Friday, 1 November, 1968

Present: The President (Mr J. C. Graham in the chair), Messrs B. Armstrong, B. Caws, J. Etherington, R. J. Hughes, A. F. Hunter, L. E. Newnham, A. D. Patterson, J. Petty, R. F. Stevens, G. M. C. Stone, J. W. Swinnerton, G. Twist, E. W. Yeomanson, (Members of Council), C. P. Pope (Secretary), A. E. Dowdeswell (General Manager) and J. Adey (Editorial Staff).

Apologies for absence were recevied from Messrs E. G. Ingram, H. E. McNally and D. M. Thomas.

Mr J. Adey of the Editorial Staff was introduced to the Council members.

Membership and Affiliation

It was resolved to elect (i) 42 Corporate and 12 Associate members.
(ii) to grant Corporate membership to two Associates.

The subscriptions of six members were waived owing to blindness or other disabilities.

Applications for Affiliation

The following applications for affiliation were received and approved by Council.

Bexhill Grammar School Radio Club. Sec: J. A. King.

Ardeer Recreation Club Amateur Radio Section. Sec: J. F. McCreight, GM3DJS.

Presidential Installation

Mr J. W. Swinnerton reported that arrangements for the Installation were well advanced and it would be held at the Bonnington Hotel, London, WC1 on 10 January, 1969.

Region 1 ORM

The report of this meeting was fully discussed. A vote of thanks was given to Mr A. D. Patterson for his work in compiling the report.

Radio Communication—Club News

It was suggested that there was room for improvement in the production of Club News in " Radio Communication."

IARU

It was reported that the Vereniging Van Radio Amateurs in Surinam and the Mauritius ARS had applied for Membership of the IARU.

After discussion Council agreed to register an " Aye " vote.

Braaten Trophy

Council approved the award of the Braaten Trophy to Mr W. A. Roberts, G2RO. This Trophy is awarded to the leading G station in the ARRL DX CW Contest.

Milne Trophy

Council approved the award of the Milne Trophy to Mr R. Gibson GI3OQR. This Trophy is awarded to the winner, other than an English station, in the ARRL DX Contest.

Regional and Area Representatives

Nominations for Regional and Area Representatives were considered by Council; as certain regions were not represented, Council decided to consider late nominations.

John Rouse Memorial Cup

It was suggested, after discussion, that this cup, presented by his daughter Sarah, should be awarded annually at the RSGB Exhibition for the best piece of home-constructed equipment by a junior member. (Terms of reference to be published later).

Minutes of Meetings of Committees

Council accepted the Minutes of the following Committee Meetings:

Education Committee, (21.9.68); Exhibition Committee, (27.9.68); VHF Committee, (9.10.68); VHF Contests Committee, (29.10.68).

Council was in session for 4¼ hours.

Dr E. Savundra

At a special Meeting of the Council of the Society convened on 1 November, 1968, in accordance with article 25 of the Society's Articles of Association, a motion was carried, in accordance with the said Article, to expel Dr E. Savundra from the Society.

RSGB QSL Bureau Sub-Managers

It is regretted that several errors occurred in the list of sub managers published last month. The following list is now correct and includes the sub-manager for the G3YAA series.

G2:	J. W. Russell, G2ZR, 45 Shakespeare Avenue, Bath.
G3, 4 and 5 two-letter calls and GC:	E. G. Allen, G3DRN, 65a Melbury Gardens, London, SW20.
G6 and G8:	A. J. Mathews, G6QM, 62 Ashlands Road, Hesters Way Estate, Cheltenham.
G3AAA-BZZ:	C. C. Olley, G3AIZ, 157 Wanstead Park Road, Ilford, Essex.
G3CAA-DZZ:	C. A. Bradbury, BRS1066, 13 Salisbury Avenue, Cheltenham.
G3EAA-HZZ:	W. J. Green, G3FBA, "Meadway," Links Avenue, Brundall, Norfolk, NOR 86Z.
G3IAA-KZZ, BRS and A numbers:	G. L. V. Butler, G2BUL, 9 The Heath, Chaldon, Caterham, Surrey.
G3LAA-NZZ:	F. Bliss, G3IFB, Coppalex, North Road The Reddings, Cheltenham, Glos.
G3OAA-PZZ:	J. H. Brazzill, G3WP, 43 Forest Drive, Chelmsford, Essex.
G3RAA-RZZ:	K. Walden, G3OLN, 250 Gloucester Road, Cheltenham, Gloucestershire.
G3SAA-TZZ:	E. G. Allen, G3DRN, 65a Melbury Gardens, London, SW20.
G3UAA-VZZ:	P. R. Cox, G3RYV, 20 Allenby Road, Maidenhead Berks.
G3WAA-G3XZZ:	R. W. Martin G3RWM, 76 St Paul's Crescent, Coleshill, Warks.
G3YAA series:	P. R. Cheesman, G3KDE, 10 Nursery Road, Hook End, Brentwood, Essex.
G8AAA series, all prefixes:	E. G. Allen, G3DRN, 65a Melbury Gardens London, SW20.
GD:	T. R. Moore, GD3ENK, "Glyn Moar," St John's, Isle of Man.
GI:	R. R. Parsons, GI3HXV, 45 Erinvale Avenue, Finaghy, Belfast.
GM:	D. Macadie, GM6MD, 154 Kingsacre Road, Glasgow, S4.
GW:	J. L. Reid, GW3ANU, 28 Waterston Road, Gabalfa, Cardiff.

The address of the QSL Bureau Manager (Mr A. O. Milne, G2MI) is 29 Kechill Gardens, Bromley, Kent.

Cards must be sent to G2MI but envelopes may be sent to the appropriate Sub-Manager or to G2MI. Printed, gummed labels are obtainable from G2MI by sending an sae.

Affiliated Societies

The following Societies are now affiliated to RSGB:

Ardeer Recreation Club Amateur Radio Section

Honorary Secretary: J. F. McCreight, GM3DJS, 40 Auchenharvie Road, Saltcoats, Ayrshire.

Bexhill Grammar School Amateur Radio Club

Honorary Secretary: J. A. King, c/o Bexhill Grammar School for Boys, Turkey Road, Bexhill on Sea, Sussex.

Scottish Mobile Rally

The Scottish Mobile Rally took place on 22 September at the Cartland Bridge Hotel in Lanark. The weather was dry if not sunny and an attendance of 250 indicates a successful event.

Numerous attractions at the rally included an exhibition of police equipment courtesy of GM3OZI, several trade exhibits, a flower arranging demonstration for the ladies and also an RTTY link organized by the Lowland Radio Signals of the Territorial Army.

Another interesting item was a stand run by the Lanark Grammar School Radio Club displaying a whole range of equipment from the school laboratories. The school club also exhibited its new receiver. They are looking for some more receiving and transmitting apparatus for the club. Can anyone assist perhaps?

The Radio Amateur Emergency Network were present in the form of the Ayr Group. A Bring and Buy sale was well patronized and the whole event received excellent local press coverage.

Distinguished visitors included the President of the RSGB, John Graham, G3TR and also several Council and Committee members. The day culminated in the prize draw and the presentation of the Scottish NFD trophy to the Lowland Royal Signals.

As a final note, the organizers add that they look forward to next year's rally, as (they hope) visitors!

Book Review

PRACTICAL TELEVISION CIRCUITS

Edited by R. E. F. Street and published by George Newnes Ltd. at 30s.

The first half of this publication has a direct relevance to television, the remainder comprising a miscellany of circuits ranging from a baby alarm to oscilloscopes and test equipment. Most of these items are described with mechanical and constructional details following the style of the similarly titled periodical.

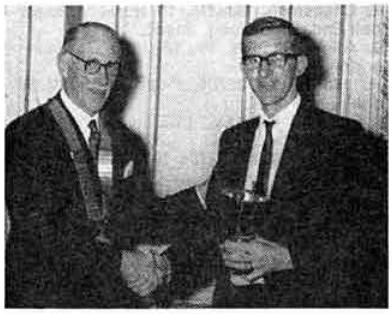
The television sections of the book include several simple rf preamplifier circuits (one for uhf) which are described with emphasis on mechanical detail and data for construction of a number of simple aerials for vhf and uhf.

The hub of the book is the chapter describing in full the necessary circuits for the construction of a transistorized TV receiver with an 11 in. display tube. This receiver is definitely 405 lines, bands I and III only, the only mention of 625 line working being concluded by a clear warning not to "have a go." The individual components of the receiver are all very rudimentary yielding a basic receiver with no agc and which will not quite scan the entire picture. The construction exercise afforded by this receiver should, however, give an insight into the "building blocks" of television and will enable an enthusiast to tackle fault finding on more advanced receivers with some confidence.

G. D. Roe, G3NGS

The Presentation of Trophies at the Society's AGM

The AGM was held on Friday, 6 December 1968 at the Royal Society of Arts in London, Mr. J. C. Graham, G3TR, the President for 1968 made the presentations.



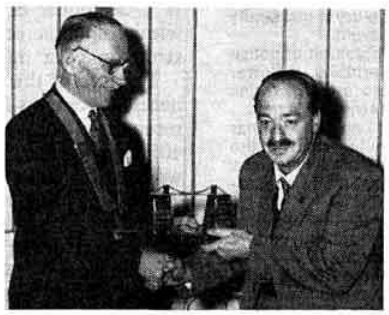
Peter Blair G3LTF, receiving the Surrey Trophy for the Mid-Essex Group, winners of VHF NFD.

The 21 MHz NFD shield awarded to the Surrey Radio Contact Club, G3BFP

The Col Thomas Rose Bowl, awarded to the leading UK station in the BERU contest, being received by David Courtier-Dutton, G3FPQ.

The Cannock Chase ARS receiving the NFD shield.

G3ABG, for the Cannock Chase ARS, receiving the 3·5 MHz NFD shield.



The Bristol Trophy awarded to the Stourbridge ARS for being the leading single entry station in NFD.

R. Glaisher, G6LX, receiving the 28 MHz NFD shield for the Surrey Radio Contact Club.

From Stock

RSGB

RADIO DATA REFERENCE BOOK

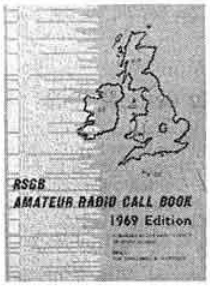
12/6
postage 1/- extra

SECOND EDITION

By G. R. JESSOP, AMIERE, G6JP

The new edition of this comprehensive reference manual has undergone considerable revision and expansion, and also bears a new look. There is new data on power rectification, rf cables, TV standards and channels, including overseas countries, transmitter ratings, waveguide, formulae etc. This book is now even better able to provide a single source of data vital to amateurs and professionals who are designing radio transmitting and receiving equipment. Much of the data appears in chart and table form for simplicity.

AMATEUR RADIO CALL BOOK



6/6
postage 9d. extra

1969 EDITION

112 pages provide a complete guide to the owners of call signs in the UK. Calls for "A" licences now finish at G3XOU, uhf phone-only licences reach G8BQZ, and the list of reciprocal licences stops at GM5AKN. Eire calls and amateur TV licence holders are included. The *Call Book* is also a useful source of information on band plans, call-sign prefixes, the *Q*-code, beam headings, RSGB affiliated Societies, Zonal and regional boundaries.

RADIO SOCIETY OF GREAT BRITAIN
35 DOUGHTY STREET, LONDON, WC1

CONTEST NEWS

80m Field Day 1968

Only eight entries have been received for this year's 80m Field Day held on Sunday, 15 September. However, there can be no doubt that the torrential deluge which caused havoc in many parts of the South-East detered a number of prospective participants. Even that stalwart field-dayer G3JKY (" all gear carried on bicycle ") has since admitted that it was too damp for his customary spin into the Kent countryside!

Posn	Call-sign	QSOs	Score	QTH
1	G3OLB	46	318	Bristol
2	G3VW	51	294	Watford
3	GW3HGL	42	282	Colwyn Bay
4	G3WTP	46	261	Bedford
5	G3KLH	43	253	Reading
6	G3NEO	37	240	Sheffield
7	G3DOP	15	191	Huntley
8	G3UJG	22	135	Dorchester

The winner was Tom Boucher, G3OLB, from Bristol. Tom ran 7 watts to a 5763 pa, an inverted vee aerial at 20 ft and a receiver described as " a car radio with converter." The runner-up was G3VW, who was assisted by G3BZG, while GW3HGL took third place.

Two transistorized transmitters were featured: G3DOP had a " four transistor half-watt," while G3KLH ran 10 watts to a 2N3632—but he comments, "... a short in the atu wrecked the output transistor ... took 2 hours to find a replacement ... will fit a valve for next year's event !" A variety of receiver types were used, including an 888A (G3WTP), an RA217 (G3KLH), a KW76 (G3NEO), a home-brew 11 transistor superhet (G3DOP), and a No 22 Set (G3UJG).

Awards—G3OLB will receive the Houston Fergus Trophy, and G3VW a certificate of merit. Mr F. Day, BRS30033, of Lincoln, will receive a certificate of merit for his most comprehensive and useful check log. G5DZ also forwarded a check log—many thanks.

First 1·8 MHz Contest 1969

1 The **General Rules** for RSGB HF Contests, published in January 1969 edition of *Radio Communication*, will apply.
2 **When** 21.00 GMT on Saturday, 15 February, 1969, to 02.00 GMT on Sunday, 16 February, 1969.
3 **Contacts** Cw (A1) only in the 1·8–2·0 MHz band. County code letters, as published on page 58 of the January 1969 edition of *Radio Communication*, must be sent after the report-serial number group, e.g. for a contact from Sussex 599001 SX.
4 **Scoring** Six points for each of the first 6 contacts with stations in any one county; three points for the seventh and subsequent contacts. Six points for each contact with a station outside the British Isles.
5 **Logs** Column (5) must be headed " County Code letters received." Entries must be addressed to the HF Contests Committee, c/o R. Biggs (G2FLG), 29 Lord Avenue, Clayhall, Ilford, Essex.
6 **Trophies** The Somerset Trophy will be awarded to the winning station. The Maitland Trophy will be awarded to the Scottish Member with the highest aggregate number of points in this contest combined with the Second 1·8 MHz Contest 1968.

First 70 MHz (Fixed Station) Contest 1969

This contest, as its title implies is only open to single operator, fixed stations. There has always been some demand for this type of contest, if it appears to be popular it will be kept as a regular feature and the idea will probably be introduced on to the other bands. If it is not popular the idea will be dropped.
1. **Date and Time:** 16 February, from 10.00 to 16.00 GMT.
2. All entries *must* be sent to the adjudicator at: VHF Contests Committee, 60 Merlin Grove, Beckenham, Kent.

In addition the following **General Rules** as published in this issue of *Radio Communication* will apply: 3b, 4a, 5a, 6a, 7b, 8a, 9b, 10a, 11 to 18, 20, 23, 27 to 28.

First 144 MHz (SSB) Contest 1969

1. **Date and Time:** 13 January from 19.00 to 21.00 GMT.
2. All entries *must* be sent to the adjudicator at: VHF Contests Committee, 32 Harbour Avenue, Comberton, Cambridge.

In addition the following **General Rules** as published in this issue of *Radio Communication* will apply: 3b, 4a, 5a, 6a, 7b, 8c, 9c, 10a, 11 to 18, 20, 23, 26 to 28,

Second 144 MHz (CW) Contest 1969

1. **Date and Time:** 26 January from 10.00 to 18.00 GMT.
2. All entries *must* be sent to the adjudicator at: VHF Contests Committee, 39 Angle End, Great Wilbraham, Cambridgeshire.

In addition the following **General Rules** as published in this issue of *Radio Communication* will apply: 3a, 4a, 5a, 6a, 7a, 8b, 9a, 10a, 11 to 28.

First 432 MHz Cumulative Activity Contest 1969

Many members have expressed a desire to see the Cumulative Activity Contests reintroduced, especially on the 70cm band. This has been done and the rules appear below. If you operate in this contest please send in your log to the VHF Contests Committee. Although the committee have reintroduced this contest simply to promote activity it is always pleasing to see a large results table.
1. **Date and Time:** 18 January, 1 February, 22 February, 8 March, 22 March, 5 April, from 19.00 to 21.00 GMT.
2. All entries *must* be sent to the adjudicator at: VHF Contests Committee, 60 Merlin Grove, Beckenham, Kent.

In addition the following **General Rules** as published in this issue of *Radio Communication* will applly: 3b, 4a, 5a, 6a, 7b, 8a, 9a, 10b, 11 to 18, 20, 23, 26 to 28.

Third 432 MHz (Open) Contest 1968

Two late entries were received for this contest; from PA0PCR/P and G8APX. Both these entries were received by the adjudicator of the contest, too late to include in the table of results. Both are thanked for their entries.

General Rules for RSGB HF Contests

"The Old Order Changeth"

The present rules for RSGB HF Contests have evolved over many years, and close examination will reveal many duplications and anomalies. With the constant pressure on space in this journal it has been thought desirable to re-examine the rules for all HF Contests and attempt to rationalize them.

Accordingly, the General Rules for HF Contests have been revised and are given below. For each HF Contest throughout the year, a short supplementary set of rules will be published.

Reprints of the General Rules will be available from HQ upon request.

1 Entrants must operate in accordance with the terms of their licence

2 Contacts with unlicensed stations will not count for points.

3 Only one contact on each band may be claimed with a specific station whether fixed, portable, mobile or alternative address. Duplicate contacts must be logged and clearly marked as duplicates without claim for points. Cross-band contacts may not be claimed. Proof of contact may be required.

4 a A **Fixed Station** must operate from the address shown on the licence.

b A **Portable Station** must operate from the same site for the duration of the contest and may not be located in a permanent building or use public supply mains. Power for all equipment may only be derived from a portable generator on the site, accumulators, or batteries. No equipment or aerials may be installed or erected on the site prior to 24 hours before the start of the contest. This does not apply to the storage of equipment.

c A **Mobile Station** is a station installed in a motor vehicle, or vessel on an inland waterway, so equipped that the station may be operated in motion without alteration.

d An **Alternative Address Station** is a station at a location not named on the licence, other than a portable or mobile station.

5 Unless otherwise stated, single operator entries only will be accepted.

a A **Single Operator Station** is one manned by an individual operator who receives no assistance in operating, log keeping, or checking etc., from other persons during the contest period.

b A **Multi-operator Station** is one which does not conform to the definition of a single operator station given above. In those contests where multi-operator entries are allowed, such entries will only be accepted provided that:

i The declaration is signed by only one operator who will be regarded as the entrant,

ii The call-sign of the operator concerned is indicated for each contact,

iii The names and call-signs of all operators are listed on the cover sheet, and

iv For stations located in the British Isles, all operators must be fully paid-up members of the RSGB.

6 Eligible Entrants Unless otherwise stated, only fully paid-up members of the RSGB resident in G, GC, GD, GI, GM, and GW may enter. Entries from GB stations will not be accepted.

7 A **Contact** consists of an exchange and acknowledgement of contest information. This consists of an RS report on telephony, or an RST report on telegraphy, and a three figure serial number starting with 001 for the first contact and increasing by one for each successive contact throughout the contest, irrespective of the band or mode, in use. The supplementary rules for specific contests may call for additional information to be exchanged.

8 Form of Entry a Entries must be clearly written or typed on one side only of RSGB Contest Log Sheets or international A4 paper. Columns must be headed as shown in the example below.

b *Separate log sheets must be used for each band.*

c Logs must be kept, and entries submitted in GMT.

d Each entry must include a cover sheet in the form shown below, incorporating a signed declaration.

Contest Entry Cover Sheet

Contest ..... Date ..... Score .....
Section (if any) ..... Call-sign .....
Name .....
Home Address .....
.....
Name of club or group (if applicable) .....
.....
Address of station or Portable Location .....
(if other than home address above)
.....
QTH as transmitted .....
National Grid Six Figure Reference, County Code Letters, or other co-ordinates (see contest details) .....
Transmitter(s) ..... Input Power .....
Receiver(s) .....
Aerial(s) .....

DECLARATION

I declare that this station was operated strictly in accordance with the rules and the spirit of the contest, and I agree that the decision of the Council of the RSGB shall be final in all cases of dispute. I certify that the maximum input to the final stage of the transmitter was ..... watt(s).

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

Failure to sign the declaration will involve disqualification of the entry.

RSGB Contest Log Sheets and Cover Sheets may be obtained from HQ upon request accompanied by a large sae.

e All entries become the property of the Radio Society of Great Britain. In the event of any dispute the ruling of the Council of the RSGB shall be final.

f All entries must be postmarked not later than 15 days following the contest. If acknowledgement of receipt is required, British Isles entrants should include a stamped addressed postcard which will be returned to the sender. Overseas entries will not normally be acknowledged.

g Unless otherwise stated, entries must be addressed to the HF Contests Committee, Radio Society of Great Britain, 35 Doughty Street, London, WC1.

9 Awards a Awards are made at the discretion of the Council of the RSGB and may consist of trophies, plaques, or certificates. Awards are, where possible, presented at the Annual General Meeting following the contest. It should be noted that trophies are kept at RSGB Headquarters, but winners are presented with a commemorative plaque for retention.

b The standard award format for contests is as follows:

All winners and section leaders will receive a plaque. In addition some will be the formal holders of particular trophies. Certificates of Merit will also be awarded to the entrants placed first, second and third in each section of the contest, from (i) the British Isles. and (ii) overseas.

10 Automatic Disqualification Entrants will be automatically disqualified on any one of the following counts:

a Failure to complete and sign the declaration,

b Frequent tone reports of T8 or less,

c Failure to record operators' call-signs against log entries (Multi-operator entries only).

d Failure to use separate log sheets for each band.

e Failure to observe the terms of the entrant's licence.

Failure to observe and comply with other rules may also entail disqualification.

RSGB CONTEST LOG SHEET

Band .....

Contest..... Sheet No. ..... Call-sign .....

Date & Time (GMT)	Call-sign of Station Worked	My report on his signals and Serial No SENT	His report on my signals and Serial No RECEIVED	(5)	(6)	(7)	Points Claimed
					Total from	previous sheet	.....

General Rules for VHF-UHF Contests 1969

The following are the General Rules for all RSGB vhf-uhf contests for 1969, with the exception of VHF NFD (The rules for VHF NFD will be published separately). The rules for any vhf or uhf contest will be made up from these General Rules, which will be referred to by number. The results of all vhf and uhf contests will normally be announced on GB2RS, three to four weeks after the contest. Copies of these General Rules will be available on request from RSGB HQ.

Entrants should always use RSGB Log Sheets and VHF-UHF Contest Cover Sheets. These are available from RSGB HQ upon receipt of a *large* stamped addressed envelope. The VHF-UHF Contest Cover Sheet goes under the name of " Form 427," ask for this when writing to HQ.

A particular point which the VHF Contests Committee would like to stress is that no phone operation should take place in the recognized CW Zones in the vhf bands.

1 **Date and Time.** (see individual contest details).

2 All entries must be sent to the **adjudicator** of the contest at the address given with the rules of the contest. *Entries that are not sent to the address given with the rules will be disqualified.*

Awards

3a In each section of the contest there will be an award to the highest scoring station. An award will be made to the runner-up in each section in which there are ten or more entries in the section.

3b An award will be made to the highest scoring station and runner-up.

N.B. All awards are certificates. In addition Trophies will be awarded to the stations with the highest score in the following contests.

Trophy	*Contest*
VHF Managers Trophy	*Second 70 MHz (Open) Contest*
Mitchell Milling Trophy	*Third 144 MHz (Open) Contest*
The Council Cup	*First 432 MHz (Open) Contest*

Scoring System

4a Contracts made between the distances shown below will score as indicated. Contacts on borders (between scoring rings) score low.

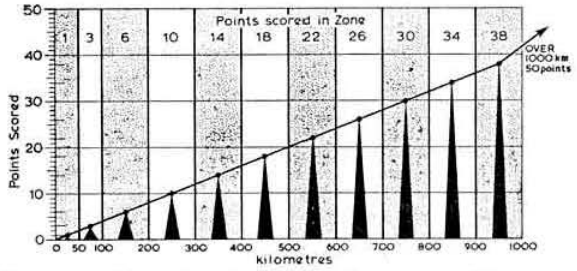
Miles	km	Points
00–31·25	0–50	1
31·25–62·5	50–100	3
62·5–125	100–200	6
125–187·5	200–300	10
187·5–250	300–400	14
250–312·5	400–500	18
312·5–375	500–600	22
375–437·5	600–700	26
437·5–500	700–800	30
500–562·5	800–900	34
562·5–625	900–1000	38
Over 625	Over 1000	50

4b Contacts will be scored at 1 point per kilometre

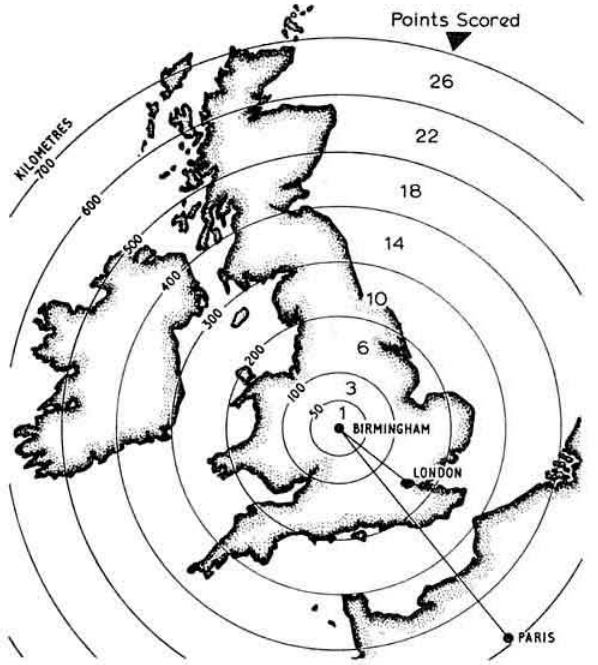
Location

5a Entrants may not change the location of their station during the contest.

5b Entrants may change the location of their station during the contest on *one* occasion, provided that only the highest scoring contact with a given station is claimed in the event of a repeat contact. Repeat contacts must be clearly marked as such on the contest log.



This graph shows that if you take the average distance in each scoring ring, the scoring graph is linear. A detailed explanation of this new scoring system and its conception appeared on page 766 in the November 1968 issue of *Radio Communication.*



This specimen map shows the radius scoring system in use centred on a station in Birmingham. The contact with the station in London scores 6 points while that with the one in Paris 18 points.

Crossband Contacts

6a Cross band contacts do not count for points.

6b Cross band contacts where one station is transmitting on the band named in the title of the contest will count for half points. Only one cross band contact may be made with a given station. Cross band contacts must be clearly marked as such on the contest log.

Sections

7a There are three sections as follows:
Section A—Single operator, fixed stations.
Section B—Club, /A and multi-operator fixed stations.
Section C—Portable stations.

7b Single operator, fixed stations only.

7c Portable stations only.

Modes

8a Contacts may be made on all permitted modes except A2 (mcw).

8b Entrants must make two-way A1 (cw) or F1 (fsk) contacts only. Stations worked may transmit on either A1 or F1.

8c Entrants must make two-way A3j (ssb) contacts only.

Contest Exchanges

9a The contest exchange shall consist of the following:
(i) RS or RST report followed by serial number.
(ii) Both QRA locator and QTH (must be sent).

9b The contest exchange shall consist of the following:
(i) RS or RST report followed by serial number.
(ii) QTH (only the QTH must be sent).

9c The contest exchange shall consist of the followjng:
(i) RS or RST report followed by serial number.
(ii) QRA (only the QRA must be sent).

Repeat Contacts

10a Only one scoring contact may be made with a given station (i.e. call-signs that are fixed, /P, /A, or /M all count as one station). If a station that has moved location is contacted for a second time, only the highest scoring contact may be claimed.

10b One contact may be made with a given station during each activity period. Only four out of the six activity periods will count towards the final score. However logs for all activity periods should be sent to the adjudicator for the purposes of checking. Entrants must take part in a minimum of four activity periods. (Please note rule 28.)

11 An entrant must operate within the terms of his (or her) licence. Special event call-signs (e.g. GB) may not be used by entrants in these contacts. Failure to comply with any of the rules given for a particular contest will result in disqualification. In addition stations that persistently overmodulate, radiate key clicks or poor quality signals, render themselves liable to disqualification.

12 Contacts with unlicensed stations will not count for points.

13 Proof of contact may be required.

14 All entries become the property of the RSGB and will not be returned. Entrants must keep their own log records in accordance with licence requirements.

15 Contacts made by EME reflection man-made satellites (active or passive) or any relaying device will not count for points.

16 The ruling of the Council of the RSGB shall be final in all cases of dispute.

17 **Logs** must be made out on RSGB Contest Log Sheets and tabulated as follows:
(i) Date and Time (GMT).
(ii) Call-sign of station worked.
(iii) My report on his signals and serial number sent.
(iv) His report on my signals and serial number received.
(v) QRA received.
(vi and vii) QTH received.
(viii) Points claimed.

18 (i) **Entries** must be postmarked not later than 15 days following the contest.
(ii) The **RSGB VHF-UHF Contest Cover Sheet** (Form 427) must be correctly made out and the declaration must be signed.

Definitions

19 **Portable Stations** may not be located in a permanent fixed building or use public supply mains. Power for all equipment may only be derived from an on site portable generator or battery. All equipment including aerials must be installed on the " portable site " within the 24 hours preceeding the contest or during the contest. This does not apply to the storage of equipment.

20 **Fixed stations** must operate from the address given on the operator's licence.

21 **/A stations** are stations located at an alternative address or at a location not named on the operator's licence.

22 **Club stations** may not enter section A of these contests. When a Club station is operated from a portable site, the entry must be in section C.

23 **Single operator stations** may be operated only by the licencee, receiving no assistance.

24 **Multi-operator stations** are those stations operated by more than one operator or one operator receiving assistance.

25 **Site** (i.e. "portable site") is defined as a circle drawn with a radius of 1 km from the operating position during the contest.

26 **QRA** is the standard five symbol location fixing system.

27 **QTH** must be given either as a town or a bearing and distance (in km) from a town. The town *must* be identifiable on the Ordnance Survey Ten-mile Map.

28 **Serial numbers** must start at 001 and advance by one for each contact. In the Cumulative Activity Contests the serial number commences at 001 in each activity period.

FORM 427

RSGB VHF/UHF Contest Cover Sheet

Title of contest..... *Date*.....

Band (VHF NFD only) ..... *MHz*,

Call-sign (used in contest).....

Section entered..... *County Code letters*.....

Claimed score .....

Address for correspondence.....

.....

Name or name of group.....

Location information as sent.....

Total number of contacts.....

Height of location above sea level .....*ft.*

Longest distance qso, Station....., *distance*.....*km*

Comments on conditions during contest.....

.....

Transmitter pa stage..... *Transmitter power*.....*Watts.*

Receiver first rf stage..... *Receiver first mixer*.....

Aerial..... *Height of aerial above ground*.....*ft*

Please make all comments on the rules of this contest on the reverse side of this cover sheet.

I declare that I have read the rules pertaining to the above named contest and that I have operated in accordance with these rules and the spirit of the contest. I agree that the decision of the council of the RSGB shall be final in cases of dispute.

Signed.....*Call-sign*..... *Date*.....

Failure to sign the declaration will result in disqualification.

For entrants use (*delete where applicable)

I require more RSGB Contest LOG/COVER sheets and enclose a* **large** *sae, YES/NO.* Please confirm that my entry has been received, I enclose a stamped addressed postcard, YES/NO.**

The entry for the above named contest must be sent to the adjudicator at the address given with the rules.

List of County Code Letters for RSGB Contests

County Code Letters	County
AD	Alderney
AG	Anglesey
AL	Argyllshire
AM	Antrim
AN	Aberdeen
AR	Armagh
AS	Angus
AY	Ayrshire
BD	Bedfordshire
BE	Berkshire
BF	Banff
BR	Becknock
BS	Buckingham
BU	Bute
BW	Berwick
CA	Cardigan
CD	Cumberland
CE	Cambridge
CH	Cheshire
CL	Cornwall
CN	Clackmannan
CR	Carmarthen
CT	Caithness
CV	Caernarvon
DB	Denbighshire
DF	Dumfries
DH	Durham
KS	Kinross
KT	Kent
LD	London (Postal District)
LE	Lancashire
LK	Lanark
LN	Lincoln
LR	Leicester
LY	Londonderry
MG	Montgomery
MH	Monmouth
MN	Midlothian
MR	Merioneth
MX	Middlesex
MY	Moray
ND	Northumberland
NK	Norfolk
NM	Nottingham
NN	Nairn
NR	Northants
OX	Oxford
OY	Orkney
PB	Peebles
PH	Perth
PK	Pembroke
DN	Devon
DT	Dorset
DU	Dunbarton
DW	Down
DY	Derby
EL	East Lothian
EX	Essex
FE	Fife
FH	Fermanagh
FT	Flintshire
GN	Glamorgan
GR	Gloucester
GY	Guernsey
HD	Hereford
HE	Hampshire
HF	Hertford
HN	Huntingdon
IM	Isle of Man
IS	Inverness
JY	Jersey
KB	Kirkcudbright
KE	Kincardine
RD	Rutland
RH	Roxburgh
RN	Radnor
RW	Renfrew
RY	Ross & Cromarty
SD	Stafford
SE	Shropshire
SF	Suffolk
SG	Stirling
SK	Selkirk
SL	Shetland
SR	Sark
ST	Somerset
SU	Sutherland
SX	Sussex
SY	Surrey
TE	Tyrone
WD	Westmorland
WE	Wiltshire
WG	Wigtown
WK	Warwick
WN	West Lothian
WR	Worcester
YS	Yorkshire

The 1969 VHF-UHF Listeners' Championship

The main alterations to the rules of the Championship involve the multipliers to be applied to the scores on the uhf bands. As entrants have been in doubt as to where to send their logs, this has been clarified.

1. Eligible Entrants. The Championship is open to all non-licensed fully paid-up members of the RSGB. Only the entrant may operate his receiving station. Entries will be accepted from newly licensed members provided that the entrant was unlicensed at the time of his first entry in 1969 and that no transmitter is used during any period for which he submits a listener log.

2. Location of Stations. The same site need not be used for each contest in the Championship but the station may not be moved during a contest with the exception that in events on 1296 MHz or higher frequencies the station may be moved within a 10 km radius. Portable operation is permitted.

3. Duration. The Championship will run throughout 1969 on those dates and times when RSGB vhf and uhf contests occur. Cumulative Activity Contests will not count towards the Championship.

4. Entries. Entrants may submit logs for any or all of the RSGB vhf and uhf contests with the exception noted above. The scores of the best six logs from each entrant will be totalled at the end of the year. Not more than four of these logs will be for vhf (70 and 144 MHz). For this purpose, VHF NFD will be treated as two separate contests, one vhf and one uhf. Entries must be set out on one side only of foolscap paper or RSGB Contest Log Sheets (available from HQ or adjudicators on receipt of an sae). Entries must be sent to the adjudicator for the appropriate transmitting contest at the address given in the rules for that contest, and must be postmarked not later than 15 days after the date of the contest. Entries for the 70 MHz and 144 MHz Listeners Contest will be automatically credited to the Championship.

5. Logs. Logs must show in columns: (*a*) Date/time (GMT). (*b*) Call-sign of station heard. (*c*) My report on his signals (including any defects such as overmodulation etc). (*d*) Report and serial number sent by station heard. (*e*) Call-sign of station being worked. (*f*) Location given by station heard. (*g*) Points claimed. A given call-sign may only be logged in column (*b*) on one occasion during each contest. In the case of multi-band events such as VHF NFD, separate logs are required for each band and stations may be logged once on each band. CQ or test calls will not count for points and should not be logged.

6. Scoring. Points are to be scored as shown in Rule 4a of General Rules for vhf-uhf Contests for 1969, published in this issue Scoring on 1296 MHz and higher frequencies will be at the rate of 1 point per kilometre. The score on 432 MHz will be multiplied by 3 and that on 1296 MHz by 8. The score on any higher frequency bands will be multiplied by 25.

7. Awards. At the discretion of the Council the Hanson Trophy will be awarded to the leader of the Championship and Certificates of Merit will be awarded to the runner-up and for particularly meritorious logs for individual events. These awards are in addition to the awards for the Listener Contests.

YOUR OPINION

Armchair Critics

From: G. R. Jessop, G6JP, Pinner, Middx.

From time to time while listening to amateurs critical of our National Society and *Radio Communication*, it became obvious that a reply is needed for various misinformed comment.

Recently one was heard leading off about authors of *Radio Communication* articles saying that the only articles that were published were those written by people with letters after their name! As might be expected, this same fellow went on to gripe about a number of other things all of which have no foundation in fact.

What do these armchair critics do apart from sit in their little ivory towers and bellyache? Apparently the last thing they will do, although many of them are known to be professionally engaged in receiver and transmitter design, is to offer a descriptive or any other article for publication in our journal!

The editor will publish articles that have something to offer whether it comes from the butcher, the baker, etc. or even a qualified engineer. Stop griping and do something about it.

Another fellow in contact with this first one was taken to task on this and was later told that the articles in *Radcom* were vetted by the Technical Committee to ensure that they were factually accurate, not on their professional status. Whereupon he replied he did not know that the technical committee did that kind of thing, where do you find the terms of reference of the society's committees? The same chap also says some other club than the Crawley crowd should be given the chance to run the Exhibition station.

If only he knew what he was talking about—Crawley would be delighted to let someone else have a go. Ask Ron and the rest how much effort goes into this exhibit. Any offers?

Stop griping and take your view to the Editor or the General Manager or better, come to the AGM and say your piece and find out just how far out of touch you really are.

Now these illustrations may or may not be typical but the writer feels they are a sign of the general lack of knowledge of what goes on at Headquarters. This is further illustrated by the comment " you find the same old gang getting into everything "—yes, chum you are right because it is only the old gang who are prepared to put their shoulder to the wheel and keep it rolling. Mr Critic *you'd* better get started, the old gang can't carry on for ever. It's your society. Why don't you take part in it? If only one per cent of the members offered articles, the Editor would be flooded out with over 100 articles to choose from—if only one per cent of the members turned up at the AGM that would be more than double the usual attendance.

Come down out of your ivory tower or get out of that armchair and do something to help. Destructive criticism never helped any organization. Be constructive.

Dummy Loads

From: J. E. Swayne, G3BLE, Beadnell, Northumberland.

In Four Metres and Down recently a method has been described to reduce the output power of transceivers and transmitters, by means of an oil filled dummy load when used in conjunction with an up converter for the 2 metre band.

This method of power control is wasteful and could be dangerous, as most oil vapours are inflammable above 90 degrees also oil expands when heated, therefore a pressure vent should be provided.

I suggest an output could be taken from the driver stages, by disconnecting the lead to the pa and taking it into the driver via the rear panel using coax and BNC panel jacks. For normal operation on the hf bands the panel jacks are connected via a short BNC link coax.

This method will result in a lower power to be dissipated, which can be reduced using half watt resistors in a *Pi* or a *T* network within the up converter unit. As well as power reduction, the attenuator pad will give the side band generator a better load to work into.

Unwanted mixer products can be reduced by better decoupling between stages, to prevent rf leaking into other stages via the dc wiring. The use of inductive coupling instead of capacitive coupling, that is tuned circuits with or without links from the input to the balanced mixer will assist in reducing spurii content.

70·26 MHz

From: J. A. Porter, GI3GGY, Londonderry, N.I.

I would like to believe that we in North-West Ireland were the pioneers of mobile vhf operation on this frequency and we have a very strong case in so presuming. As I recall, four metre activity on a national scale was non-existent until the emergence of the famous B44 Mk II early in 1964.

A few of us, namely, GI3HJA, EI7A, EI6AI and myself purchased these transceivers. At the same time, perusing the lists for surplus FT243 crystals to suit a 4m net, the ideal combination of 7806·66 kHz and 6073·33 kHz for transmitter and receiver respectively were purchased. This put us on a frequency of 70,259·99 kHz or for convenience 70·26.

Realizing the versatility of the B44, we immediately purchased a few dozen of these sets and a supply of suitable crystals. These were distributed among amateurs in counties Donegal, Derry and Tyrone. By the end of 1964, we had our first Mobile Rally, using 70·26 kHz as our frequency.

Finally, before 1964 I am not aware that 70·26 had any significance or was used by amateurs at all and I would attribute the popularity of this frequency to the event of the B44 and the availability of the only cheap crystals to suit this set at that time. I would also like to point out in passing that the only occupants on 70·26 when we started operations were the local Police Force. There was some misunderstanding until they were eventually persuaded with the help of the GPO to QSY to a higher frequency, but that is another story.

Knowing of the use of 70·26 on the South Coast for some years, Don Hayter, G3JHM was invited to reply to the letter from GI3GGY—Ed.

From D. T. Hayter, AMIEE, G3JHM, Worthing, Sussex.

With reference to the above topic may I place on record the origin of 70·26 MHz mobile operation within the UK.

In 1962 G3GVM, Worthing, purchased two B44 transceivers and ordered two 11·710 MHz FT243 crystals intending to operate on 70·25 MHz. However due to the " rounding off " of the crystal frequency to the nearest kHz the resultant frequency was 70·26 MHz. In a short period of time there were 20 fixed and mobile stations operational within the Sussex/East Hampshire area using B44s Pye Reporters and BCC69Ds.

In 1963 I met G3PLX at the Radio Show and he agreed to encourage the use of 70·26 MHz working within the Lancashire area. He helped many stations to QSY by grinding up to frequency their off channel crystals, and within a short space of time there were many stations in the Lancs. region on 70·26. May I also state that the specified transmitter crystal frequency for the B44 is within the frequency range 11·680–11·783 MHz for the recently extended band.

Valves—and Transistors

From: Eric Goodwin, G3MNQ, Pealling Parva, Rugby.

A word about the letter (September, *RadCom*) from G5LH complaining about the publication of too much transistor material. Whether G5LH and his compatriots like it or not, transistors are here to stay, and I hope *Radio Communication* will continue to provide as much up to date information as possible about these devices, as there are plenty of old books still around with valve circuits in them.

If gentlemen with pre-war callsigns wish to remain in the 1930s let them do so, but let them not decry progress in the way of techniques and devices, nor the people who wish to use them or read about them.

RADIO AMATEUR EMERGENCY NETWORK

By S. W. LAW, G3PAZ*

OURS is a rather curious branch of the art; whilst wishing each and every member a happy and prosperous New Year, we are bound by our sense of civic duty to wish all Groups a year completely free from any disaster operations! Having thus skirted around this knotty point, we nevertheless present our best wishes both to the well-established groups and to those newly fledged. May all reach the targets they have set for 1969 successfully. There is much to be done to bring our service up to a standard compatible with the developments of modern communications systems, yet (as we have pointed out before) our very strength lies in our amateur status and our consequent empirical approach to problems as they arise. Those Groups who have actively engaged in disaster operations will know just how much re-thinking is engendered by the experience and will be only too pleased to pass on the conclusions to others. Rest assured that this year will see a number of interesting and long-desired developments in connection with RAEN, although this is not the time to make positive pronouncements. The membership curve shows a steady rise and the RAEN Committee are well to the fore in all matters affecting our future spheres of activity.

A Fine Distinction

Whilst we stress our usefulness in disaster operations, it must not be overlooked that there is still a great deal to be done in alleviating human distress arising out of, and subsequent to, the actual disaster itself. For example, both during and after a period of flood a number of people will need to be temporarily rehoused, often at a considerable distance from their normal home. In this connection an exercise held by the Surrey Group last December may be of interest. It was known that a high tide was due at London Bridge on the night of the exercise and it was assumed that, in the unfortunate event of a strong easterly wind, some extensive flooding could occur leading to the necessity for quite considerable evacuation in low-lying areas. Attention was therefore concentrated on the problem of billetting a large number of people in the area of the exercise. The local police held a watching brief and with the enthusiastic co-operation of a local voluntary organization, who efficiently dealt with message handling and routeing, the exercise went swimmingly (if the expression may be allowed in this context!). A local municipal premises was placed at the disposal of the participants and served as a message-handling centre with both 2m and 4m base stations. Contact was successfully maintained with the mobiles passing information and with outstations at fixed sites on both 70·365 MHz and 145·15 MHz.

Maximum Smoke?

Who was the Controller who had six mobiles netting up their crystals outside his window—all with loudspeakers? (No prizes for an answer to this one—our mind boggles!).

Sussex Resuscitated

We are delighted to enlarge on the wave of interest in the Sussex area (hinted at in the December issue). G3LQI is now in the process of getting out a programme of exercises for the West Sussex Group which cover the Brighton/Worthing/Eastbourne area. Not only has this enterprising Group managed to get a mention on Southern TV and Radio Brighton but they have already acquired a caravan to be fitted up as a mobile operations room. Furthermore, a petrol-driven generator is available, so it is obvious that this is a Group that means business. Traffic will be handled on both two and four metres which will allow the G8 members to participate freely. We understand that the membership is about 20 at the time of writing, but we hope that those interested in the area will get in touch with G3LQI (QTHR) in order to expand this Group to the size it deserves. Incidentally, this was *not* the group referred to in our satirical comment in the December issue—quite another school of fish!

Tapes

Secretaries of Groups (and interested Clubs) are asked to note that a tape on the Manchester Group will shortly be available, made by the Controller G3MBQ. We hardly need to repeat the reputation that Manchester has earned in the last few years as a recommendation.

Group Control

We note with interest a tendency of late for Group control to be carried out by a committee of members rather than depending on the sole efforts of the (often overworked) Group Controller. This is naturally an internal matter within the framework of the individual Group, but we mention it as a matter of general interest as food for thought in cases where administration may be a headache.

Still Unattached?

The lists of registrations still show a number of unattached members. As we are unable for reasons of space to issue complete lists of existing Groups, it is suggested that members unattached for some time might like to send a sae to the Registrations Secretary asking if a Group has yet been formed in their area. In any case, if six such members can get together in one area and can propose one of their number to the RAEN Committee as Controller a new Group comes into existence.

Knowledge is Power

If you are a Controller have you made sure that the Committee know of the activities of your Group, its size and the area covered? Don't hide your light under a bushel—even the smallest Group may have pride in itself and may well prove to be in the right place at the right time if its capabilities are known.

RAEN International?

It is possible that a number of similar organizations in other countries may get together with representatives from the UK for an exchange of ideas on the subject of Emergency Communications as they affect the Radio Amateur. The organization of such a project involves a great deal of work, but it is not a job that will be shirked by the RAEN Committee and we hope to see such a meeting take place in the foreseeable future.

Making Light Of It?

Can you read code from a lamp? Your scribe can remember at least one occasion in the past when it got somebody out of difficulty on an exercise. The humble electric torch can be seen at a really surprising distance at night and even the slowest Morse gets the message over. Keep it in mind—you never know!

Lectures

Volunteers are still needed to cope with the requests for lectures from various parts of the country. Willing as the RAEN Committee members are to voluntarily give of their time for this purpose, the travelling involved may well preclude the giving of an evening lecture at some location which is not easily accessible to a responsible member in the area concerned. If you feel that the occasional lecture is within your capabilities and you would like to spread the word, please drop a line to the Hon Secretary (address below) stating preferred evenings.

* 11 Chisholm Road, Croydon, Surrey, CRO 6UQ.

Honorary Registrations Secretary : **Mr R. A. Ledgerton, G2ABC 1 Latchingdon Gardens, Woodford Bridge, Essex.**

Honorary Secretary, RAEN Committee : **Mr E. R. L. Bassett, BRS10075, 57 Upper St. Helens Road, Hedge End, Southampton, SO3 4LG.**

LOOKING AHEAD

10 January—Presidential Installation Bonnington Hotel, Southampton Row, WC1.
28 March—RSGB London Lecture Meeting.
27 April —Bellevue Convention, Manchester.

CONTESTS

11–12 January—Affiliated Societies' Contest.
13 January—First 144 MHz (SSB) Contest.
26 January—Second 144 MHz (CW) Contest.
15–16 February—First 1·8 MHz Contest.
16 February—First 70 MHz Fixed Station Contest.
22–23 February—YL-OM Contest (Phone). 18.00 Sat–18.00 Sun.
1–2 March—Third 144 MHz (Open) Contest.*
8–9 March—BERU Contest.
8–9 March—YL-OM Contest (CW) 18.00 Sat–18.00 Sun.
30 March —Low power 3·5 MHz Contest.
12–13 April—Second 70 MHz (Open) Contest.
3–4 May—Fourth 144 MHz (Portable- Contest.*
24–25 May—First 432 MHz (Open) Contest.*
24–25 May—First 1296 MHz Contest.*
7–8 June—HF National Field Day.
22 June—Second 432 MHz (Portable) Contest
5–6 July—Summer 1·8 MHz Contest.
5–6 July—Fifth 144 MHz (Open) Contest.
12–13 July—High Power HF Field Day.
27 July—Third 70 MHz (Portable) Contest.
4 August—Sixth 144 MHz (SSB) Contest.
17 August—Fourth 70 MHz (CW) Contest.
6–7 September—VHF National Field Day.*
14 September—3·5 MHz Field Day.
21 September—Seventh 144 MHz (CW) Contest.
5 October—Second 1296 MHz (Open) Contest.*
11–12 October—28 MHz Telephony Contest.
25–26 October—7 MHz (CW) Contest.
3 November—Eighth 144 MHz (SSB) Contest.
8–9 November—7 MHz (Phone) Contest.
15–16 November—Second 1·8 MHz Contest.
6–7 December—Tops CW Club 80m Contest.
7 December—Fifth 70 MHz (CW) Contest.
*To coincide with region 1 IARU Contest

MOBILE RALLIES

20 April—North Midlands Mobile Rally, Drayton Manor Park, near Tamworth, Staffs.
18 May—Northern Mobile Rally.
1 June—ARMS Rally.
29 June—Longleat Mobile Rally, Longleat Park, near Warminster, Wiltshire. Organized by the Bristol RSGB Group, assisted by the Bristol ARC.
6 July —South Shields Mobile Rally.
10 August —RSGB National Mobile Rally, Woburn Abbey.
17 August—Derby and District Mobile Rally.
24 August—Torbay ARS Mobile Rally.

CLUB NEWS

Please send all information direct to Regional Representatives, giving full details of future meetings, and any snippets of activities which would be interesting in print. When listing meetings, please be sure to include the date and time, the meeting place, the lecturer's full name and the call-sign to whom prospective members can refer. The last day on which Regional Representatives can accept letters for inclusion is the first of the previous month.

Region 1

Merseyside Luncheon Club—The first meeting for lunch has now been arranged for Monday, 6 January. Further details may be obtained from G2AMV.

Ainsdale (ARC)—1, 15 and 29 January, 8 pm, " Morris Dancers" Scarisbrick.

Allerton (Liverpool) (SRHS)—Thursdays, 8 pm, 3rd Allerton Scout Group Headquarters, Church Road, Woolton, Liverpool.

Ashton under Lyme (AUL & DARS)—Fridays, 7.30 pm, 6 Stamford Street, Stalybridge.

Blackburn (ELARC)—2 January (Surplus Equipment Sale), 6 February (Demonstration and Talk " RF Distribution " by R. Isherwood), 7.30 pm, YMCA, Limbrick, Blackburn.

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

Bury (B & RRS)—14 January (" Nuclear Energy " by J. Shepherd), 8 pm, George Hotel (Private Room), Market Street, Bury. Club Secretary G3VVQ, 411 Holcombe Road, Greenmount, Bury.

Cheshire (Mid Cheshire ARC)—Wednesdays, 7.30 pm. Technical Activities Centre, Winsford Verdin Grammar School, Winsford, Cheshire. 7.30 pm–8 pm Morse Tuition. The Technical Activities Centre is specially set up to promote interest in electronics by the County Council, the Computer Factory and the Amateur Radio Society. There is a lecture room, workshop, film and slide projectors and all the basic equipment, benches, irons, meters, etc to accommodate 24 simultaneous practical projects. The lecture room will hold 45 persons with cloakroom and storage facilities. The entrance is in the centre block at the Winsford Verdin Grammar School, High Street, Winsford. Secretary, G3SIQ, 83 Ash Road, Cuddington, Northwich.

Chester (C & DARS)—Tuesdays, 8 pm, YMCA.

Crewe & District—No meetings will be held for the time being as no accommodation is available. However, the Area Representative, Mr R. Owen, 10 Circle Avenue, Willaston, Nantwich, will welcome visitors at his home.

Eccles (E & DRC)—Tuesdays, 8 pm, Patricroft Congregational School, Shakespeare Crescent, Patricroft. Every Thursday Club Top Band net 20.30 hours.

Leyland Hundred Amateur Radio Group—Thursday night net at 20.00 GMT on 1915 MHz.

Liverpool (L & DARS)—Tuesdays, 8 pm, Conservative Association Rooms, Church Road, Wavertree. 26 January (Top Band contest—rules may be obtained from G3KOR). Club Secretary, Philip Storey, 29 Chalfont Road, Liverpool 18.

(NLRC)—3, 17, 31 January 8 pm, Landsbury House 13 Crosby Road South, Liverpool 22. Secretary R. Simmons, G3PNS, 62 Daneville Road Liverpool, L4 2RG.

Macclesfield (M & DRS)—14 and 28 January 8 pm, The George Hotel, Jordangate.

Manchester (M & DARS)—Wednesday, 7.30 pm, 203 Droylsden Road, Newton Heath, Manchester 10. Hon. Secretary, G. Tillson, G3TJX, 95 Kelverlow Street, Oldham, Lancs.

(SMRC)—Fridays, 8 pm, Conservative Association Divisional Office, 449 Palatine Road, Northenden, Manchester 22.

North West VHF Group—Tuesdays at 8 pm, 26 Cannell Street, Manchester 4. Club Secretary, G3FNM, 141 Norris Road, Sale. Telephone 061-973 1472.

Preston (PARS)—9, 23 January, 6 February 7.30 pm, Private Room, " Windsor Castle," St Paul's Square.

St Helens (SES)—Meetings temporarily discontinued. Local enthusiasts should keep in touch with B. Hardy, 198 Knowsley Road, St Helens, Lancs.

Southport (SRS)—Wednesday, 8 pm and Sundays, 2.30 pm, The Esplanade. Secretary, S. Miller, 72 Station Road, Banks, Southport.

(73 SSB Society)—Tuesdays, 8 pm (all commencing with a talk on part of RAE Syllabus), 73 Avondale Road North, Southport.

Stockport (SRS)—8 and 22 January, 5 February, 8 pm, Royal Oak Hotel, Castle Street, Edgeley; new members are always welcome. Further details from G3FYE.

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

Westmorland—Fridays, 7.30 pm, 24 Park Road, Milnthorpe. Additionally there is an RAE class on Mondays and Thursdays at the same time.

Wirral (WARS)—First and third Wednesdays each month 8 pm, former Civil Defence Headquarters, Upton Road, Bidston, Birkenhead. *G3FOO*.

REGION 2

Barnsley (B & DARC)—10 January (" Electronic Keyer & Reflectometer " by K. Robinson), 18 January (Annual Dinner), 24 January (NFD—To be or not to be!), 7.30 pm, King George Hotel, Peel Street Barnsley. *G3LRP*.

Hull (H & DARS)—3 January (" Mathematics for the RAE " by G3LNH), 10 January (Annual Dinner at Dorchester Hotel, Beverley Road, Hull), 17 January (" Trials of an XYL " by Mary & Vera), 24 January (" Modern Radar Systems " by G3PQY), 31 January (AGM), 7.45 pm, 592, Hessle Road, Hull. Tickets for Annual Dinner from G3AGX Micasa Ferry Road, Wawne, near Hull. *G3MVO*.

Northern Heights—16 January (" SSB " by A. W. Walmsley G3ADQ), 29 January (Film Show), 7.45 pm, Sportsman Inn, Ogden near Halifax. *G3MDW*.

Scarborough (SARS)—Thursdays, 7.30 pm, c/o RAF Association, Fulbeck House, 3 Westover Road, Scarborough. *G8KU*.

South Shields (SS & DARC)—18 January (Annual Dinner) Meetings Fridays, 8 pm, Trinity House Social Centre, Laygate, South Shields. *G3KZZ*.

Spen Valley (SVARS)—9 January (" Aircraft Radio & Navigational Aids" by W. Longhurst, G3AAO), 16 January (Quiz Night), 23 January (" Thyrotrons & Timebases " by L. W. Burkitt), 30 January (" Modern Reproduction of Music " by Richard Allan Radio Ltd), 6 February (" Transistors at RF " by A. B. Yarker, G3TAY) 7.30 pm, The Grammar School, High Street, Heckmondwike. *G8BSC*.

REGION 3

Birmingham (MARS)—21 January (" An Introduction to Basic Logic " by G3KPT), 7.30 pm, Midland Institute, Margaret Street, Birmingham 3.

(Solihull)—16 January (Aeronautical Communication Techniques). Meetings third Thursday in each month at 7.30 pm at Masons Arms Hotel, High Street, Solihull. (Private room but visitors welcome.) The Society is now well off the ground with money in the bank after a very successful " junk " sale in October.

(South)—1 January (Transistor Transmitters by G3XGP), 8 pm, The Scout Hut, Pershore Road, Selly Oak, Birmingham.

Coventry (CARS)—3 January (Annual Dinner, Dilke Arms, Ryton on Dunsmore) 10 January (Night on the Air), 17 January (4m FET Converter by A.P. Electronics), 24 January (Night on the Air),

31 January (Satellites and Space Probes by H. G. Miles), Scout HQ, 121 St Nicholas Road, Radford, Coventry.
Dudley (DARC)—14, 28 January 8 pm, Central Library, St James's Road, Dudley. *G3PWJ.*
East Worc's (EWARG)—9 January (Members assessment of their Commercial Gear also Final details regarding AGM and Dinner at the Calthorpe Suite, Warwickshire County Cricket Ground, Edgbaston).
Mid-Warwickshire (ARS)—Mondays, 8 pm, 28 Hamilton Terrace Leamington Spa.
Nuneaton (ARC)—9 January (Planning for the RSGB Affiliated Societies Contest), 23 January (Not fixed but it is hoped to have a leading Top Band exponent to talk on 160 Contest working), 8 pm Anchor Inn, Hartshill, Nuneaton.
Rugby (RADARAEC)—Tuesday and Thursday each week. RAE and Morse practice Wednesday, RAEN Group last Tuesday of each month, 10 Drury Lane. *G3IKL.*
Salop (SARS)—9 January (Film Show, Mr Harris), 23 January (Simple Side Band by G. Roberts, G3ENY), 7.30 pm, Old Post Office Hotel, Milk Street, Shrewsbury.
Stourbridge (STARS)—First Tuesday of the month, 7.30 pm, The Longlands School, Stourbridge.
Stoke (SoTARS)—Thursday, 7.30 pm, 2 Racecourse Road Oakhill, SoT.
Sutton Coldfield (SCRC)—13 January (AGM and presentation of Cup for Home built equipment only), 27 January (Natter and Projects evening), HQ SCTFC Clubhouse, Coles Lane, Sutton Coldfield.
Wolverhampton (WARS)—6 January (New Years Party), 13 January (Natter and Operating Night), 20 January (Receiver Evening), 27 January (Committee Meeting), 3 February (Electronic Control in Industry), 8 pm, Neachells Cottage, Stockwell Road, Tettenhall.
Worcester (W & CARC)—3 January (MSV RAEN Net), 24 January (Skittles, return match v Worcester 20's Club), normal club nights Wednesday and Saturday evening, 7.45 pm, 35 Periswell Park, Droitwich Road, Worcester. *G3TQD.*

REGION 4

Derby (D & DARS)—1 January (Surplus Sale), 8 January (Valve Quiz), 15 January (RSGB tape-recorded lecture—" Electronic Music and Music Concrete " by F. C. Judd, AInstE), 22 January (Ultrasonics and its uses in Industry "—lecture and demonstration by P. C. Johnson, BSc, LIM, GradInstP), 29 January (Demonstration of Early Transmitters and Receivers from the Society's Archives), 5 February (Surplus Sale). Tickets will be available shortly for the Society's Annual Dinner and Dance to be held on Saturday 15 February, at The Derbyshire Yeoman, Kingsway, Derby. *G2CVV.*
(DSWES)—The Derby Short Wave Experimental Society has been reformed as part of the Alvaston Community Centre and will be known as The Alvaston Community Centre (Amateur Radio Group). Meetings are held on Friday evenings, commencing 7.30 pm, in Nunsfield House, Boulton Lane, Alvaston, Derby. Further details *G3LCV.*
Grimsby (GARS)—Thursday, 8 pm, North Lincs Photographic Society's Rooms, back of 50 Welholme Road, Grimsby. *G3RSD.*
Heanor (TSEDRS)—Tuesdays, 7.30 pm, The South East Derbyshire College of Further Education, Ilkeston Road, Heanor. *G3LGK.*
Leicester (LRS)—Mondays, 7.30 pm, Sundays, 10.30 am, The Club Rooms, Gilroes Estate Cottage, Groby Road, Leicester. *G3UQX.*
Lincoln (LSWC)—Tuesdays 7.30 pm, No 2 Guardroom, Sobroan Barracks, Breedon Drive, Lincoln. *G8BSS.*
Mansfield (MARS)—First Friday in each month, 7.45 pm, New Inn, Westgate, Mansfield. *G8HX.*
Melton Mowbray (MMARS)—17 January (10,000 MHz—Lecture by K. Melton), 7.30 pm, St John's Ambulance Hall, Holwell Works, Asfordby Hill. *G3NVK.*
Newark (NSWC)—Mondays, Thursdays, 7.30 pm, Guildhall, Guildhall Street, Newark. *G3TWV.*
Nottingham (ARCN)—Tuesdays, Thursdays, 7.30 pm, Room No 3 Sherwood Community Centre, Woodthorpe House, Mansfield Road, Sherwood, Nottingham. *G3SRX.*
Peterborough (P & DARS)—First Friday in month, lecture or demonstration in the Electronics Section at Peterborough Technical College, Eastfield Road, 7.30 pm. Other Fridays, meet at the Club HQ in the Old Windmill, behind the Peacock Inn, London Road, 8 pm onwards. *G3KPO.*
Worksop (NNARS)—Tuesdays, Thursdays, 7.30 pm, Club Room, 13 Gateford Road, Worksop, Notts.

REGION 5

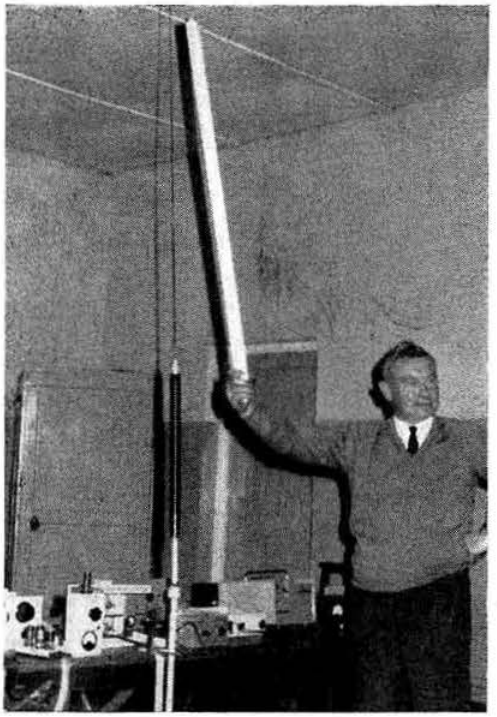
Bedford (B & DARC)—Club meets on Thursdays at the Dolphin Inn, Broadway, Bedford. (Morse class at 7.30 pm).

Smiling happily as they cut their wedding cake after being married at Gedney parish church, on 12 November, are John Bellamy, G3PRD, and his charming bride, Wendy Waterfall, of Gedney. John is the only son of Frank Bellamy, G3ARD, and Mrs Bellamy, of Spalding. Best man was Mr Gordon Lacey, a keen short-wave listener. *Photo by G3KPO.*

Bishop's Stortford (BS & DARC)—20 January (AGM, to be followed by demonstration of G3RGA's KW2000A transceiver) 8 pm, British Legion Club, Windhill, Bishop's Stortford, Herts.
Cambridge (C & DARC)—Meetings on Fridays at 7.30 pm, Club Headquarters, Corporation Yard, Victoria Road, Cambridge. Morse Classes on Tuesday evenings, and junior members meet on Saturday afternoons.
Cambridge University (CUWS)—Meets in the Psychology Department Lecture Rooms, Downing Site on Tuesdays at 8.15 during term.
Dunstable Downs (DDRC)—3 January (Arthur Milne G2MI—subject to be arranged). Will SWLs please bring QSL's collected for the Listening Contest? 10 January (Closing date for SWL Contest and usual " In between " Week), 17 January (First Annual Dinner, to be held at " The Winston Churchill," Luton Road, Dunstable. Tickets at 25s each available from the Treasurer. Everybody welcome), 24 January (" In between " week), 31 January (RSGB Tape Lecture "World Wide Telecommunication " by L. Parnell, G8PP). Please note that the club now meets at " Chew's House," High Street South, Dunstable, Bedfordshire.
Shefford (S & DARC)—2 January (Radio for beginners—G3VMI), 16 January (Ancient Modulation Reports—G2DPQ), 23 January (Demonstration of SWR—G3EUS), 30 January (NFD Planing), Thursdays 8 pm, Church Hall, High Street, Shefford Bedfordshire.
Stevenage (S & DARS)—First and third Tuesdays, 8 pm, Hawker-Siddeley Dynamics Ltd, Gunnels Wood Road, Stevenage, Hertfordshire.

REGION 6

Cheltenham (RSGB Group)—First Thursday in each month, 8 pm, Great Western Hotel, Clarence Street, Cheltenham, *G3TVW.*
Chiltern (CARC)—Last Thursday in each month, 8 pm, British Legion, St. Mary's Street, High Wycombe, Bucks.
Gloucester (GRC)—Second and fourth Thursdays in each month, 7.30 pm, Lamb Inn, Market Parade, Gloucester.



Bob Palmer, G5PP, holding a four foot, 40 watt fluorescent tube alight from a demonstration mobile whip. *Photo by G8BHE.*

REGION 7

Acton, Brentford and Chiswick (ABCRC)—12 January (AGM), 7.30 pm, Chiswick Trades and Social Club, 66 High Road, Chiswick.
Addiscombe (AARC)—Second and fourth Tuesdays, 7.30 pm, 158 Addiscombe Road (Toc H Hall).
Ashford (Mddx), Echelford (ARS)—30 January, 7.30 pm, St Martin's Court, Kingston Crescent, Ashford.
Barking (B & DREC)—Tuesdays and Thursdays, 7.30 pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking, Essex.
Bexleyheath (NKRS)—9 January (TVI/BCI discussion), 25 January (Group project), 7.30 pm, Congregational Church Hall, Chapel Road, Bexleyheath.
Chingford Group—Fridays. Tel. 524-0308.
Chingford (SRC)—Fridays, 8 pm, Friday Hill House, Simmons Lane, Chingford, E4.
Civil Service (CVRS)—21 January (" USA Holiday " by Arthur Milne, G2MI), 7 pm, meetings first and third Tuesdays, Civil Service Sports Centre, Monck Street, SW1.
Croydon (SRCC)—21 January, 7.30 pm, Blue Anchor, South End.
Crystal Palace (CP & DRC)—18 January (Junk sale), 8 pm, Emmanuel Church Hall, Barry Road, SE22.
Dorking (DR & DRS)—14 January, Wheatsheaf, Dorking, Surrey.
Ealing (E & DARS)—Tuesdays, 7.30 pm, Northfields Community Centre, Northcroft Road, W13.
East London—19 January (TVI lecture plus transistor sale), 2.30 pm, Wanstead House, The Green, London, E11.
Edgware & Hendon (EADRS)—6 January (AGM), 20 January (Quiz Night), 8 pm, St Georges School, Flower Lane, Mill Hill, NW7.
Gravesend (GRS)—Third Wednesday, 8 pm, RAFTA Club, Overcliff Road.
Guildford (G & DRS)—10 January (Junk sale), 18 January (Annual dinner at Woodenbridge Hotel), 21 January (Meet Surrey University), 8 pm, Guildford Engineering Soc in Stoke Park.
Hampton Court (TVARTS)—First Wednesday, 7.30 pm, " Cardinal Wolsey," Hampton Court.
Harlow (DRS)—28 January (Tape lecture—" Radio Aurora "), 8.15 pm. CW every Tuesday, 8 pm, also senior meeting. Junior meeting every Friday, 7 pm, Mark Hall Barn, First Avenue. New Hon. Secretary is B. King, 36 Upper Park, Little Pardon, Harlow.
Harrow (RSH)—Fridays. 3 January (AGM), Roxeth Manor School, Eastcote Lane, Harrow.
Havering (H & DARC)—British Legion House, Western Road, Romford.
Hemel Hempstead (HH & DARS)—Rucklers Lane Hall, Kings Langley.
Holloway (GRS)—Mondays (RAE), 7 pm, Wednesdays (Morse), 7.30 pm, Fridays (Club), 7.30 pm, Monten School, Hornsey Road.
Kingston (K & DARS)—Second Wednesday in month, 8 pm, Penguin Lounge, 37 Brighton Road, Surbiton.
Leyton and Walthamstow—Tuesdays, 7.30 pm, Leyton Senior Institute, Essex Road, E10.
London UHF Group—First Thursday in month, 7.30 pm, Whitehall Hotel, Bloomsbury Square, Holborn, WC1.
Loughton—Loughton Hall (near Debden Station).
Maidenhead (M & DARC)—21 January, 7.30 pm, Victoria Hall, Cox Green, Maidenhead.
New Cross—Second and fourth Fridays, 8 pm, 225 New Cross Road, SE14.
Paddington (P & DRS)—Thursdays 7.30 pm, Beauchamp Lodge, 2 Warwick Crescent, W2.
Purley (P & DRS)—First and third Fridays in month, 8 pm, Railwaymans Hall, Side Entrance, 58 Whytecliff Road, Purley.
Reigate (RATS)—First Wednesday, 7,45 pm, George and Dragon, Cromwell Road, Redhill.
Romford (R & DRS)—Tuesdays, 8.15 pm, RAFTA House, 18 Carlton Road.
Scouts ARS—16 January, 6.30 pm, Baden Powell House, Queensgate, South Kensington.
Sidcut (CVRS)—16 January (Surplus night), 8 pm, All Saints Church Hall, Bercta Road, New Eltham.
Slough (SDR Group)—First Wednesday in month, 7.30 pm, United Services Club, Wellington Street.
Southgate (SRC)—9 January, 7.30 pm, Parkwood Girls' School, (behind Wood Green Town Hall).
St Albans (Verulam ARC)—Cavalier Hall, Watford Road, St Albans.
Stevenage (SDARS)—First and third Thursdays, details from 83 Spring Road, Letchworth.
Sutton and Cheam (SCRS)—21 January, 8 p.m The Harrow Inn, High Street, Cheam.
Welwyn (Mid-Herts ARS)—9 January (" Calculation of Path Profiles at VHF " by G. Gibbs, G3AAZ), 17 January (Annual Dinner at Heath Lodge Hotel), 8 pm, Welwyn Civic Centre, Welwyn.
Wimbledon (W & DRS)—10, 31 January, 8 pm, St John Hall, 124 Kingston Road, South Wimbledon, SW19.
Wembley (CECARS)—The club is open to non-GEC employees by invitation, telephone ARNold 1262 first. Tuesdays, 7 pm, Sports Club, St Augustin Avenue, North Wembley.

REGION 8

Crawley (CARC)—Trinity Congregational Church, Ifield, Crawley, Sussex. Details from G3FRV.
Mid Sussex (MSARC)—2 January (to be arranged), 16 January (AGM),30 January (Informal),7.45 pm, Marle Place Further Education Centre, Leylands Road, Burgess Hill, Sussex. Visitors are always welcome. Details from G3RXJ, Hon Secretary. Accommodation has now been arranged at the above address for the installation of a club station. Equipment is available, and 1½ wavelengths on 160m can be used for antennas. The immediate task is decorating and furnishing a room. Members are being press-ganged as it is hoped to use it for the AFS in January.
South Coast VHF Group—Details from G3JHM.
Worthing (W & DARC)—Ross Wilmot Youth Centre, Worthing.

REGION 9

Bristol (BARC)—Every Monday and Thursday, 7.30 pm, Club HQ (G3TAD), University Settlement, 41 Ducie Road, Barton Hill, Bristol 5. 9 January (" DXing the hard way" Tape Lecture by W1BB), 16 January (" Skylark—Upper atmosphere Research Vehicle " by E. Harris of BAC Guided Weapons Division), 30 January (" History of Radio " by Norman Burton, tape lecture). The Club Station has now a HW100 ssb transceiver for the hf bands in addition to 2m. A Listeners' section has now been formed with its own CR100, the licenced section has greatly increased in numbers with a lot of new calls. Anyone from schoolboys to old 'uns are very welcome to come along. *G3WLZ.*

(RSGB Group)—27 January ("Measuring Equipment" by Vic Newport, G3CHW) 7.30 pm, Becket Hall, St Thomas Street, Bristol 1. The AGM was held on 9 December and the usual reports were made, the Officers and Committee were duly elected and then followed an interesting talk by Ted Robinson, G3TWT who has successfully constructed a Tx for 2m, 70cm, and 23cm. 24 February ("Those Were The Days"—reminiscences of some old timers, the days of Marconi and living memories of the earliest radio experiments in the south-west and maybe in the UK, by G5KT and G6GU), 7.15 pm, Becket Hall, St Thomas St, Bristol 1. This meeting has extra significance because G2ZR, who at 90 is the oldest amateur in the country, will be amongst the guests. G2ZR has personal memories of Marconi's experiments in the Bristol Channel. It is hoped that BBC television will be covering this important event. Bristol won the MARS Contest again this year by over 300 points so retain the trophy for another year. *G3JMY.*
Burnham-on-Sea (B-o-S ARC)—Meet second Tuesday in each month, 8 pm, Crown Hotel, Burnham-on-Sea. *G3GIW.*
Cornish (CRAC)—2 January ("Ladies Night") South Western Electricity Social Centre, Pool, Camborne. *G3NKE.*
(SSB Group)— Second Thursday in each month. *G3OCB.*
(VHF Group)—Third Thursday in each month, both 7.30 pm, Truro. *G3XC.*
Exeter (EARS).—First Tuesday in each month, 7.30 pm, George and Dragon, Blackboy Hill, Exeter. *G3HMY.*
Newquay (NARS)—Alternate Wednesdays, Treviglas School, Newquay. *G3THT.*
Plymouth (PRC)—First and Third Tuesday in each month. 7.30 pm, Virginia House, Bretonside, Plymouth. *G3UQF.*
Saltash (S & DRC)—Alternate Fridays, Burraton Toc-H Hall, Warraton Road, Saltash. *G3UBY.*
South Dorset (SDARS)—First Friday in each month. 7.30 pm. Labour Rooms, West Walk, Dorchester. *G3BKV.*
Taunton (T & DARC)—3 January Lecture Theatre, Taunton Technical College. A caravan, and a portable pneumatic mast have been given to the Club, and plans are afoot to go portable on all bands. The RAEN Section are liaising with the Somerset Emergency Voluntary Organization for whom they are going to provide communications. Temporary headquarters has been provided by this organization. *G3WPJ.*
Torquay (TARS)—Every Tuesday and Friday Club nights, 25 January (Business meeting),7.30 pm, Club Headquarters,Bath Lane, rear of 94 Belgrave Road, Torquay. Thirteen members are taking the Club RAE course, another member G3YAR is congratulated in obtaining his "ticket," a large Junk Sale was held recently. *G3VNG*
Wells (WARS)—Mondays, EMIE Social Club, Chamberlain Street, Wells. *G3MQQ.*
Weston-super-Mare (WSM ARS)—3 January, 7.30 pm, Westhaven School, Ellesmere Road, Uphill, WSM. Cliff Toomer, Winscombe 3220, is the Area Representative for Weston-super-Mare and surrounding districts. *G3GNS.*
Yeovil (YARS)—1 January (AGM) Wednesdays, 7.30 pm, Park Lodge, The Park, Yeovil. *G3NOF.*

REGION 10

Blackwood (BARC)—Fridays, 7.30 pm, Blanche Cottage, off High Street, Blackwood, Mon.
Barry College of Further Education (ARS)—Thursdays, 7 pm Barry College of Further Education, Colcot Rd, Barry, Glam.
Cardiff (RSGB Group)—13 January, 7.30 pm, TA Centre, Park St, Cardiff. *GW3GHC.*
Pontypool (PARC)—Tuesdays, 7 pm, Educational Settlement, Rockhill Rd, Pontypool Mon. *GW3JBH.*
Pembroke (PARC)—Last Friday in each month, Defensible Barracks, Pembroke Dock. *GW3LXI.*
Rhondda (RARS)—Pengelli Hotel, Treorchy, Glam. *GW3PHH.*
University College, Cardiff (ARS)—Students Union, Dumfries Place, Cardiff.

REGION 11

Rhyl (R & DARC)—Second Tuesday in each month, Rhyl's Silver Band Room, Windsor Street, Rhyl.

REGION 12

Aberdeen (AARC)—Fridays, 3 January (Ragchew), 10 January (Junk Sale), 17 January (Mini-lectures), 24 January (NFD discussion), 31 January (Talk on metal work), 7.30 pm, 6 Blenheim Lane, Aberdeen. *GM3HGA.*
Moray Firth (MFARS)—Details from GM3IAA.

REGION 13

Border Area—Members in the Scottish Border area are asked to contact G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick, who has recently formed a club to cater for amateurs in the district.
Edinburgh (Lothian RS)—Thursdays, 7.30 pm, YMCA, 14 St Andrew Street, Edinburgh. 28 January (Tuesday—visit to Talisman Telphone Exchange), 7.30 pm.

REGION 14

Ayrshire (AARG)—Refer to R. Harkness, GM3THI, 36 Wellington Street, Prestwick, Ayrshire.
Glasgow University (GURC)—10 January, 7.30 pm, Engineering South Building, University of Glasgow.
Greenock (G & DARC)—10, 24 January, 7.30 pm, Arts Guild Campbell Street, Greenock.
Lowland Royal Signal Group (LRSG)—7, 21 January, 7.30 pm 21 Jardine Street, Glasgow.
Mid-Lanark RSGB Group—17 January 7.30 pm, YMCA, Brandon Street, Motherwell.

REGION 15

Ballymena (Radio Club)—Tuesdays, 8 pm, morse and theory classes in progress, Club Rooms, 46a Bridge Street, Ballymena. Details from GI3XDX.
Belfast (B & D RSGB Group)—15 January ("Amateur Radio in Iran" by GI3CDF/EP2GI), War Memorial Building, Waring Street, Belfast. Details from GI2DZG.

REGION 16

Gt Yarmouth (GYRC)—Fridays, 7.30 pm, 98 South Market Road, Gt Yarmouth.
Ipswich (IRC)—1 January, Film Show, 7.30 pm, 29 January, Military Communications, 7.30 pm, D. Godfrey, British Red Cross HQ, Gippeswyk Hall, Gippeswyk Avenue, Ipswich. *G3UJR.*
Norwich (NARC)—Mondays, 7.30 pm, The Clubroom, Brickmakers Arms, Sprowston Road, Norwich.
Southend and District Radio Society (SDRS)—Fridays fortnightly 8 pm, 10, 24 January (AGM), 7 February. Staff Canteen, E. K. Cole Ltd. *G8BSB.*

REGION 17

Chippenham (C & DARC)—7 January ("SSB Transistor tx for 160m". Part 3 of a series of informal talks on design and construction by G3UFW), 14 January (Film show "Mirror in the Sky"), 21 January (SSB Transistor 160m tx, part 4), 28 January (Colour Television), 7.30 pm, Chippenham High School for Boys, Hardenhuish Lane, Chippenham.
Farnborough (F & DRS)—Alternate Tuesdays, 7.30 pm, Railway Enthusiasts Clubrooms, 310 Farnborough Road, Farnborough, Hants.
Jersey (JARS)—3 January (Grand Social Evening, wives and girl friends invited), 17 January (VHF/UHF lecture by G8AAZ), 31 January (Bring and Buy Sale), 14 February ("Telephone Electronics" by GC3XZE), 28 February (Tape and Slide lecture to be arranged). All visitors are welcome. The club room is open Wednesdays, Fridays and Sunday mornings. The secretary is T. Morrisey, Darlinghurst, Bagot Road, St Saviours, Jersey. At the recent AGM of the Jersey Amateur Radio Society, the following officers were elected for the coming year: President, Mr A. Cole, GC3GS; Chairman, Mr D. Gray, GC3XOJ; Secretary, Mr T. Morrisey; Treasurer, Mr E. Chapman, GC2FMV.
Swindon (S & DARC)—Alternate Wednesdays, Penhill Jun.

We extend thanks for the following publications which have been received at Headquarters.

Cornish Link, QUA Mashonaland, HKARTS, FOC, N Kent RS, QUA Cray Valley, Mobile News, IRTS, Collector and Emmiter, CQTV, West Australia, Radial, CQ ON4, Cyprus, Florida DX, NCDXC.

MEMBERS' ADS

CLOSING DATE FOR FEBRUARY—13 JANUARY *FORM ON PAGE 79*

FOR SALE

1965 Handbook to best offer (10s.). Lots of xtals. s.a.e. for list. 3s. 6d. pp. per xtal. G. L. Fitton, G8AVG, 29 Okus Grove, Upper Stratton, Wilts.

HRO, rewired with new polyester capacitors, completely built-in modulation monitor using 1CP1 c.r.t. Heavy duty p.s.u. and transistorized s-meter. Spkr and spare 1CP1. Offers to J. H. Adams, 85 Rosecroft Gdns, Twickenham, Mddx. Tel. 01-892 9062.

Osram 912 plus mono amp complete with pre-amp. 12 W output ultra linear response, new cnd. £5. W. J. Hills, 66 Richmond Rd, London, SW20. Tel. WIM 4573.

3BP1 scope tube and mumetal screen with transformer. Basis for homemade scope 30s. J. Clarke, G3OWQ, 12 Robin Hill, Bedford, Tel. Bedford 56676.

El-bugs. Several expertly built with integral paddle and circuit. Precise 6–80 w.p.m. using dry reed relays. 4½ × 4 × 2 in, run off PP6. £7. P. J. Skirrow, G3UJP, 33 Rowditch Avenue, Derby.

HRO-MX 10 coils, 3 b.s. p.s.u., spkr, complete on trolley, coil-pack also on trolley £25 o.n.o. 1154 tx any offers. 2 high speed 230 v. ac single phase motors with 10 in fans silent working. Wanted good tape deck. J. Rowland, BRS30497, "Koti", 1 Linden Road, Leatherhead, Surrey. Tel. Leatherhead 5441 ex 47.

M and G transceiver 160, 80, 20m with factory mains and d.c. p.s.u. Exch for good rx including 160m or sell. Worthington, G3COI, Foxhills, Orton Lane, Penn, Wolverhampton. Tel. Wombourne 2288.

P/W Henlow wideband scope, wkg. but needs attention £9 10s. Rotary transformer type 1–11·5 V d.c. i/p, 250 V d.c. 125 mA out. Type 57 6 V d.c. i/p, 280 V 150 mA 15s., all carriage extra. J. R. Easton, GM3VXR, 70 Leven Street, Motherwell, Lanarkshire, Scotland.

Cash and carry vertical aerials ex army £2 or carriage extra. Heavy duty mains transformers ok for linear amps etc £2 to £4, carriage extra. H. Tonks, G3JFL, 11 St. Edwards Road, Bournbrook, Birmingham 29.

CR150 Marconi double superhet. 1·8–60MHz £25. Deliver 50 miles. E. J. Gregory, G3ORW, 2 Sycamore Road, Matlock, Derbyshire.

BC221 freq meter, complete with mains p.s.u. and original charts. £15 o.n.o. D. F. Gorrill, G8BOV, 30 Ashburnham Road, Furnace Green, Crawley, Sussex.

Wireless World Dec '50–Dec '62. *RSGB Bulletin* Aug '43–Jul '46. Sept '51–Dec '63. 6d. per copy plus post. S. Bagley, 17 Cockshutt Avenue, Sheffield, S8 7DU. Tel. Sheffield 45557.

Marconi CR100 rx 160 kHz to 30 MHz. First class cond (Top band contest winners), S-meter/n.l. £22. Deliver 20 miles. W. R. Steverson, G3JEQ, "Merrydawns", Meadowside, Gt Bookham, Leatherhead, Surrey. Tel. Bookham 2459.

Pye tx/rx. High and low band models, 50KΩ preset pots, motor generators, SCR552 a.c. power pack, stabilized h.t. pack VCRG7. Wanted. Wobbulator TV type. B. Alderson, G3KJX, 43 Brompton Road, Northallerton, Yorks.

Station of late G3CZT. DX1OOU with t.r. switch, Homemade Z match, BC221 recalibrated, 4/4 2m J-Beam, 1967, ARRL Handbook, offers and enquiries and buyers collect from R. A. Lord, G3DSK, 22 Elizabeth Crescent, East Grinstead, Sussex. Tel. East Grinstead 25149.

Wavemeter Class DN1, 6V a.c. with manual £3 10s. plus carriage. Xtal cal no 10 with circuit (may need attention). Offers. I. G. Mant, G8AVJ, 28 Welbourne Road, Childwall, Liverpool, L16 6AJ.

Elizabethan tx 150 W, 2 807 p.a., 2 807 mod. Separate p.s.u., Philpotts cabinet. Buyer collects or deliver reasonable distance. £25. C. Haddock, G3UZM, 26 Featherbed Lane, Exmouth, Devon.

Lafayette KT320 rx £18 o.n.o. Exc cond 550 kHz–30 MHz in four bands. Bandspread on amateur bands. Buyer collects. Good Joystick and a.t.u. wanted. N. A. Mason, 60 St. Mary's Crescent, Ruddington, Notts. NG11 6FR.

160m mobile based on export car radio, b.c. and s.w. bands usable on rx. Two in-car units with all valve circuits. Very compact. £9 inc fibreglass whip. J. N. Carter, G3OWB, 193 Kingsway, Petts Wood, Orpington, Kent. Tel. Orpington 29184.

Heathkit p.s.u. type HP13 in exc wkg order, complete with leads £20. Panda PR120V export model 150 W tx £25. Antenna rotor suitable for quad wanted. G. McCallum, GM3UCI, 5 Lawhill Road, Law, Carluke, Lanarkshire.

Minimitter mobile tx 160, 80, 40m with control unit £10. Minimitter mobile whip 160m £3. 6 V heavy duty vibrator pack 15s. 2m tx in datum case, two xtals; 2E26 p.a. £8 10s., all carr extra or collect. R. J. Price, G3ECH, 1 Hinton Close, Bellfields Estate, High Wycombe, Bucks. Tel. 01-584 7011 (Office).

Valves, new and boxed. 4–400A £10, 4CX250F (24 V heater) £5. AR88D xtals 455 kHz 10s. Wanted, 75A4. Cash and SB100 offered. SB200 any cond. S. J. Pilkington, G3NNT, 1 Deansgate Lane, Formby, Lancs. Tel. Formby 72778.

2m fixed and mobile station comprising Withers Twomobile rx, TW2 tx, a.c. p.s.u., Garex mobile p.s.u. for 12 V d.c. positive or negative earth £45 complete or will split. D. Eckley, G3UFQ, 24 Fernwood Road, Sutton Coldfield, Warks. Tel. 021-373 6642.

Complete all band station, home or mobile. KW76, Valiant, 12 V p.s.u. in control unit, 12 V accumulator, whips, cable loom, ready and working £60. Assorted xtals, valves, meters, s.a.e. details. W. E. Bartholemew, G8CK, 61 Osmarston Road, Stourbridge, Worcs. Tel. Stourbridge 4360.

Hallicrafters S76, 11 valve double conversion rx 540 kHz–34 MHz b/s 10–80m S meter, var sel, vgc, £38 or exch with cash for 888A or similar. M. Snowdon, Swainsea Lane, Pickering, Yorks. Tel Pickering 2560.

Collins KWS1 and matching rx, spkr and complete station hardly used, mint cond cost £1500, offers J. Sherratt, G5TZ, 82 High St, Newport, IoW. Tel Newport 3358.

Quad centre spider, solid welded unit and three 12 ft poles £2. Four PL500s for linear (new). Wanted Ipf and 6146. C. T. Stagg, G3KPW, 62 Prospect Place, Grays, Essex.

Heathkit CR-1, 12V car radio with spkr and handbook pos or neg earth, 4W output, mint, £12. Amateur bands rx SR550 mint with handbook, £50. Carpenter, G3TYJ, 10 Avenue Rd, Frome, Somerset.

Chapman tuner am/fm/s-p £5. Ayantic stereo amp £7 10s. Wavemeter-oscillator 144-300 MHz, £5 10s. 2m tx £12 10s. RF105 10s. Garrard autochanger £2 10s. 2m mobile TW or similar wanted. F. Henshaw, G8BBO, 26 Randals Hill, Stevenage, Herts. Tel 55361.

TW Topmobile transistor rx £12. 12V/6V converter, foc if reqd. Courtney-Pope 50/150 joule electronic flash £15. Transistor power unit 6V in, 120V out 30s. W. Fletcher, G3NXT, Holmdale Martin, Lincoln.

MEMBERS' ADS members' ads MEMBERS' ADS members' ads MEMBERS' ADS

BC221, freq meter with charts £20. P. Kelley, 245 Kenton Rd, Harrow, Mddx. Tel 01-907 5218.

AR88D, S meter, manual, 100 kHz cal, buyer collects £35. Gibbs, Copperwood, New Road, Digswell, Welwyn, Herts. Tel Welwyn 4078.

1929, 1938 callbooks, 1930 handbook, *Bulletins* from 1928 offers. G5VA, QTHR.

70cm converter, two EC88, two 12AT7, ECC84, EF91, 32-34 MHz output, power 200/250V 20/25 mA and 6·3V 2A. G. Jeapes, G2XV, 165 Cambridge Rd, Gt Shelford, Cambs.

TCS12, unmod, int preamp for xtal mic, £7. 52 TX 200W. 813 final, handbook £7. Psu 800/400V 250 mA fil bias, £6. 7TR reperf 110V ac/dc £6. Carriage extra or deliver 50 miles. T. Hickinbottom, G3LCZ 13 Almond Grove, Fairfield, Stockton on Tees, Teesside. Tel Stockton 66248.

Loud speaker amplifier, 1921/22 vintage, vgc made for BBC. Will swap. G3AQW QTHR.

2m tx with QQV03-20A final. Part dismantled but complete incl psu. Circuit for rf section. Buyer collects. G. N. Dale G3PZF, 18 Lezayre Rd, Green Street Green, Orpington, Kent. Tel Farnborough 54512.

Labgear LG50 tx gd cnd relay added £25 or offers. N. H. Brown, G3DRS, 9 Meadow Bank, Hollingworth, Hyde, Ches. SK14 8JW. Tel Mottram 3286.

Two 38 rx working plus attachments. Also 19 set with int'l psu and speaker in gd cnd £11. Prefer collect or add 30s. pp R. Nunn, 16 Sunderlands Ave, Sawston, Cambs.

AR77E rx £15. R1155L rx. G4ZU double boom triband beam. Tran 2500-0-2500, 1·75 kW. 2m tx self contained Imhof cabinet mod psu QQV03-10. Complete set components for G2DAF Tx. Prefer collect sae for list with details. C. Pedder, G3VBL, c/o 107 Broad Oak Lane, Penwortham, Preston PR1 OXA, Lancs. Tel Edinburgh 667-1326.

KW2000 with ac psu. FL1000 linear. Swan 500C with ac and dc psu's. DX40U with vfo. Akai 910 4 track mono with tapes mic etc. D. Jack, G3OFV Streatham Camp, Barnard Castle, Co. Durham.

Swan 350 ser 2 with psu anl, cal, upper/lower sb xtals vox and 22 adaptor skts vgc, little used. £205 ono. G3VGH QTHR. Tel York 69245.

Land Rover, series 1, petrol, 24V 60 amp screened and supressed electrics, ideal field days and expeds. Recent mech overhaul. Sell or part exch gd hf rx, 2m gear or prof tape rcdr. P. Jury, G8AKV, 5 Pinewood Ave, Midsomer Norton, Bath, Somerset.

Exch, Panda Explorer tabletop tx all spare valves, diagram instructions gd cond for Merry Tiller with truck, sawbench, pump, or p/t-o. Mutual delivery by arrangement. Sell £40. W. K. Findlay, GM3RSZ, 42 Hanover St, Stranraer, Scotland. Tel Stranrear 2134.

Heathkit Mohican and mains psu £17 10s. B. H. Price, G3MTQ, 69 Pershore Rd, Edgbaston, Birmingham 5. Tel 021-440 4042.

0-15 pF trimmers miniature air spaced 2s each, 6 for 7s 6d. Valves 5U4G 5Y3G 5s each RF24 12s 6d VCR 97 10s all post free. M. J. Bonner, G8ALB, 90 Aveling Park Rd, London E17.

Pye ultra modern telephones crystal clear long range. Bargain at 6 gns plus 4s. pp. Also two No 38 AFV sets two way radios £4 ono. J. Waters, 15a Midmoor Rd, London SW12.

Heath swr meter £5. Caslon 24 hour digital clock £6. Radiospares auto transformer 250W £3. Japanese multimeter unused £2 10s Calculating machine £5. D. Barry, G3XLY, 15 Fairlawn Court, London, W4.

Pye PTC 8710, uhf fm 70cm tx/rx base station 5W rf, also PTC fm 8002 r/t 4m mint. Mic etc manuals available for both. £10 each. G. Kennedy, G3OGK, 23 Hollytree Close, Hoton, nr Loughborough, Leics. Tel Wymeswold 658.

1392 vhf rx 90–150 MHz, gd cnd, but not wkg. Also circuit and psu type 234A giving 250V dc and 6·3V 4A, £12 10s ono. J. C. Lotz. G3VUL, 22 Lichfield Road, Kew Gardens, Surrey.

Heathkit RG–1 gc rx with spkr £17 ono. Z match homemade £3 10s KW low pass filter 75 ohm BBC ch 1. Successful RAE course by BNRS with past exam papers and answers £4 10s. J. Garret, 201 Bishops Oak Ride, Tonbridge, Kent. Tel Tonbridge 61656.

Pye Ranger high band model unmod £8. Heathkit Q mult 1·6 MHz if £5. A. F. Walton, G3XBE 39 Oakdale Drive, Wrose Shipley, Yorks. Tel Shipley 57490.

Valves 813 10s, 815 (2) 10s, 5B255M 5s, TT12 5s, CV415 CV2318 5s. Xtals 7810 (7) 6065·56 (4), 7040, 7010, 13200, 13208·3, 9166·7, 9522·22, all at 5s each. 5820 (5) 3s each. B. Dodds, 1 Croft View, Killingworth, Newcastle upon Tyne, NE12 OBT.

DX100U, gd wkg order, £45 ono. Insp jnv or sked arranged. Will deliver 50 miles. J. R. G. Corbett, G3TWS, 32 Bibury Road, Benhall, Cheltenham, Glos. Tel Cheltenham 22366.

62 set 1·5–10 MHz 12V dc tx/rx swop for TCS 12 tx with psu. A. J. Jackson, 79 Glencairn Road, Streatham, London SW16. Tel 764-4779.

Mosley Commando SSB MkII tx vgc £70. M and G transceiver 160/80/20 works fb £45. GR54 Heathkit gen cov rx 150 kHz/30 MHz £30. O52 scope £20. Z match (Olympic) £10. M. John, G3COI, Foxhalls, Orton Lane, Penn Wolverhampton. Tel Wombourn 2288.

Eddystone EC10, mint £35. Green 2m20 50W tx as new £30. M. Harrison, 11 Castle Green, Weybridge, Surrey. Tel Weybridge 47112

Valves. 813 (3) £2. TZ40 (2) 10s, 35T (2) 10s, 833A (2) 10s, GU50 or equiv (3) 10s, 5U4 FW4/500 (6) 10s, PT15 (4) 10s, or £4 10s the lot. Curtis, G3AGN, 58 Queens Road, Felixstowe, Suffolk. Tel Felixstowe 2848.

Many xtals useful for converters etc, sae for lists. Pye base tx, 25W output, mains psu, modulator 2m, £10 ono. 4m mob tx no mod psu 6 xtals fitted £6. A. Webb, G3KCJ, 69 Lalleford Road, Luton, Beds.

CR150 with psu, £22 10s. Isolating safety transformer (500W) steps up or down £6 10s. Beam Echo Stereo preamp STEP2I £2 19s 6d. TF144G £16 10s. RF517 £9 10s. 4X150A 15s 6d. Philco mobile s/w converter £2 10s. Plus carriage. B. Byrne, G3KPO, Jersey House, Eye, Peterborough. Tel Eye 351.

Osram 912 plus mono amp complete with preamp 12W output ultra linear response £5 new cnd. W. J. Hills, 65 Richmond Road, West Wimbledon, London SW20. Tel Wimbledon 4573.

VHF wavemeter W1432 160–260 MHz £5. 200 MHz preamp 30s. BC453 Q5er £4. ASB7 420 MHz rx £5. CV67 klystron. Large selection tubes sae list. Many other items. F. Hattermore, G3WSH, 94B High Street, Staple Hill, Bristol.

Pye Marine rx type CAT gd cnd 60 kHz to 30 MHz no gaps with handbook psu miniature valves £16. Creed 6S auto heads £3. B. Robertson, G3TTV, 12 Hazel Close, Mildenhall, Suffolk.

3E29 unused £1. Four 6CH6 10s. 5000V micas 0·001, 0·0004 0·0002, 0·0001, 0·0005 3s each. STC 4242A 15s. RK34/2C34 1s 6d each. VR92 1s each. 7S7/X81M 5s, 7C6 2s 6d, five 3B24 £1, 28D7 5s. J. Casson, G2ACT, 14 Station Road, Upper Poppleton, York. Tel Upper Poppleton 366.

Racal RA17 150 kHz–30MHz, superb mechanical and electrical cnd complete with manual £185, can deliver London, Derby or Portsmouth areas. M. S. Maisey, 5 Woodhatch, Spinney, Coulsdon, Surrey, CR3 2SU. Tel 01-668 2880.

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Minimitter 150W am, cw tx, built in psu and mod, £20. A. P. Teale, G3SGT, 16 Whitestile Road, Brentford, Middx.

DX100U tx incorporating mods for use with a SB1OU, excellent appearance, offers please. E. Fielding, G3WDN, Lynd Hurst, Quarry Road, Low Leighton, New Mills, Stockport, Cheshire.

B44 Mk III, un mod, complete £4. J. Dobie, G3XWP, 1 Tudor Close, Chessington, Surrey. Tel 01-397 5552.

Mind cnd HA500 RX Twin mech filter, £30 ono. TSC 12 with matching psu mod for all bands £10. D. Hill, G3VWW, 32 Blundell Road, St Annes on Sea, Lancashire.

Pair 27 MHz Walkie Talkies, Range 1 mile £3. D. Pinnock, G3HVA, 9 Crowland Rd, Luton, Beds. Tel Luton 24479.

RSA amp with 2 mic inputs and controls. Output for two 7 omh or 1 15 ohm spkr. Mic and 2 spkrs in carrying case £10. Selmer Clavioline complete with keyboard spkr and amp £10. Buyer collects. E. Nash, 60 Peveril Rd, Chesterfield, Derbys.

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Mint SB1OU sideband adaptor, needs aligning. Minimitter mobile tx complete with control box and psu. Sensible offers to M. Whitaker, Rose-Dene, Wood Lane, Hipperholme, Halifax. Tel Halifax 22784.

Heathkit RA1 as new little used £25 ono. C. Willoughby, 79 Liskeard Rd, Park Hall, Walsall, Staffs.

Bandswitched exciter for am tx £8. Xtal mic, large smoothing chokes, miniature relays 12V for car equipment. Wanted small mains tran 100V sec also xtal 6·5 MHz for overtone working. A. Parker, 133 Station Rd, Cropston, Leicester LE7 7HH.

BC348 vgc 1·5–18 MHz £12. CDR beam rotator AR22 and control unit £10. 6 el 2m J-Beam plus balun 25/-. All carriage extra. T. Gardner, 303 Wollaton Rd, Wollaton Park, Nottingham NG8 1FS.

Mobile outfit AT5, T28, 12MS psu, 12 RC control, FIF whips 80 and 160 £40. Eddystone 750 with spkr S-meter £20 ono. Wooden mast 29 ft. Buyer collects. G. Williamson, G3FYZ, 9 Caryl Rd, St. Annes on Sea, Lancs. Tel St Annes 22416.

Codar AT5 and mains psu exc cnd complete with operating manual £18 carriage paid. J. Bennett, G3FWA, 47 Ibbett Close, Kempston, Bedford. Tel Kempston 2427.

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BC342 rx interference limiter fitted gd cnd £15 or offers. Wanted inst book for Mullard type GM4/40/1 RC bridge, TT21 valve, Eddystone type 598 drive dial, Electroniques two speed SMD2 dial. A. Conway, G3WQL, 17 Mountcastle Rd, Leicester.

Panda OUb, DX4OU (no mains tran), HRO (needs attn), 17 coils bs and gc, Panda ATU, relay co-mute, ant selec unit, Leland bfo 0–20 kHz, numerous xtals. Best offer over £50. Buyer collects and takes away all junk box (valves, trans, relays, knobs, switches, spkrs, resistors, condensers etc). K. Smethurst, G3GPE, 8 Westfield, Wadsworth, Hebden Bridge, W Yorkshire.

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Panda Explorer 150W all band gd cnd £25. Buyer collects. Would exch for mobile transistorised gear. R. E. Hardman, G3LGV, 80 Green Lane, Garden Suburb, Oldham, Lancs. Tel Med 1783.

R209 rx £10 10. R107 £10. 30 ft sectional aerial with guys etc £3. GPO handsets modern 5/- H.M. Brash, GM3RVL, 5 Hillview Drive, Edinburgh 12.

Complete Codar station including spkr, mic etc £38. Joystick £2. TX 1154 £2. GEC Miniscope £8. G3FIF whip with two coils £7. Spare top section £1. M. Kidman, G3SDK, 232 Marsh Rd, Leagrave, Luton, Beds. Tel OLU 2 55001.

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3B240M 2E26, BCC68/69, any cond C. G. James, G3VVB, 63 Halkingcroft, Langley, Slough Bucks. Tel Slough 28014.

Eddystone 840C rx in gd cond in exch for AR88LF rx in vgc, G3XWV, 63 Weoley Ave, Selly Oak, Birmingham 29.

12AH8 valve and tweeter for GEC metal cone spkr M. A. Trickett, G3SAT, 15 Egerton Rd, Bembridge, Isle of Wight. Tel Bembridge 2696.

Pair gd 10m walki-talkies, 8-13 transistors, superhet. rx, possibly 2 chan 0·5-1 W, full rundown and price. F. Pardey, GW3DZJ, 27 Roe Parc, St Asaph, Flintshire.

Handbook for Cossor ganging oscillator-wobulator 3343, to borrow or buy. W. Harrison, 25 Wilmount St, Woolwich, SE18. Tel 01-855 4437.

Compact phone tx to enable recently disabled amateur to get back on the air also manual for AR88D reasonable prices paid, offers please. R. Davies, G3CXJ, 13 Lovett Rd, Copnor, Portsmouth. PO3 5EU.

Astatic D104 mix, gd cnd essential. B. Kenneford, 2 Mill Lane Shoreham-by-sea, Sussex.

ISWL Monitor from Oct 65. *Mobile News* from Feb 67. *IRTS News*, from June 54. Any/all copies of *Ex-G Radio Club Bulletin, WCCGB Contact, GM Magazine* and *Ham-Hop News*. F. A. Herridge, G3IDG, 96 George St, Basingstoke, Hants.

Circuit diagram of Panda Explorer tx, will photo-copy and return, all expenses refunded. R. Neave, 24 Mayfield Road, Writtle, Chelmsford Essex.

Davco DR30 rx, brief details of cond and price. E. Henderson, G3LYD, Rydene, Moorend, Radwell, Beds.

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RSGB Bulletin for October and November 1967, will pay any reasonable price and postage. J. Bower, VE6TN-G3OSM. Tranquille School, Tranquille, British Colombia.

Hard-up student requires rtty gear, Creed 3X or 7B, also reperf or why. Need not be wkg but must be cheap. P. Holliday, G3UVZ, Ethel Villa, 19 Stanley Rd, Mapperley, Nottingham. NG3 6HT.

Am/cw 2m tx for University Radio Society, will pay up to £30 for good equipment, send details. J. Haine, G8CEG, The Union, University Rd, Edgbaston, Birmingham 15.

HRO Senior with or without coil packs for South Coast Radio Club. Must be tip top cond. J. A. Rampton, G3VFI, 23 Oxford Close, Fareham, Hants. Tel Fareham 3120.

Megger 500V also valves for Marconi Q meter type V339 45. State price including postage. R. Joyce, G3WLM, 20 Barking Close, Luton, Beds.

Morse key type D or similar. A. Walton, 243 Barnes Hill, Weoley Castle, Birmingham 29. Tel 021-427 3088.

VE7BQX in England 6–8 months would like to rent tx/rx or transceiver for 20 40 80m. Will insure same. R. Haslett, "Periotts," Kellaton, Kingsbridge, S Devon.

Coils for Eddystone 348 rx. TA33Jr beam in gd cnd. G. Edwards, G2UX, Chapel Street, Barford, Norwich, NOR 38X, Norfolk.

Eddystone 960 rx F. W. Bolton, G3JZB, 15 Holmcroft Rd, Stafford.

Any coils for 358X (B34), and a 100/1000 kHz crystal suitable for Class D wavemeter no. 1, mk. 2. P. S. Taylor, 52 Beaulieu Ave., Sydenham, London, SE26. Tel. 01-778 9741.

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Coils for Eddystone 358/400 rx. Any range. T. D. Hackney, 3A Clumber Cres South, The Park, Nottingham. Tel. Nottingham 47081.

Handbook for circuit diagram for Hallicrafter SX24, borrow or buy. T. C. Platt, G2GA, 64 Holcombe Ave, Bury, Lancs. Tel. 061-764 6266.

Eddystone 898 dial. Details to D. Forster, G3KZZ, 41 Marlborough St, South Shields, Durham.

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Any type/freq xtal between 48·1 and 48·6 MHz. R. C. Warwick G3VCJ, "Beresford," Hoe Lane, Abridge, Romford, Essex.

Bound vol *RSGB Bulletin* for 1965, also *QST*s for 1965. Your price paid. H. F. Lewis, G3GIQ, 271 Popes Lane, Ealing, London W5. Tel. 01-567 6389.

KW Z-match. KW77 rx, latest mark. Dow-key 60G coax relay. Items must be f.b. cnd. Also require *RSGB Bulletins* prior to Oct 1964. Clean cond. H. C. Pryse, G3WXT, 36 Hart Rd, Byfleet, Weybridge, Surrey.

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Geloso v.f.o., details to R. McWilliams, G3XUG, 5 Stonecliffe Walk, Leeds 12, Yorks. Tel OLE2-639697 or OLE2-52020 (business).

SWM for May 1951, borrow or buy. W. Brook, G4PL, 85 Brook-lea, Haighmoor Rd, West Ardseley. Nr Wakefield Yorks.

D.c. voltmeter, 1500–2000 V. Not electrostatic. Clark, G6BJ, 101 Warnham Court Rd, Carshalton, Surrey.

100 Hz ssb filter. Details to J Bratby, G3GVA, 4 Burford Park Rd, Kings Norton, Birmingham 30. Tel 021 458-4906.

SSB tx, DAF, Viceroy etc. Collected in N England. Must be gd wkg order with psu. Newcastle University Radio Soc., G3OWN, The Union Society, Kings Walk, Newcastle upon Tyne 1.

RSGB Handbook 3rd ed. R1155N. Joystick and 3A tuner. H. Gaze, 74 Redbrink Cres, Barry Island, Glam CF6 8TU.

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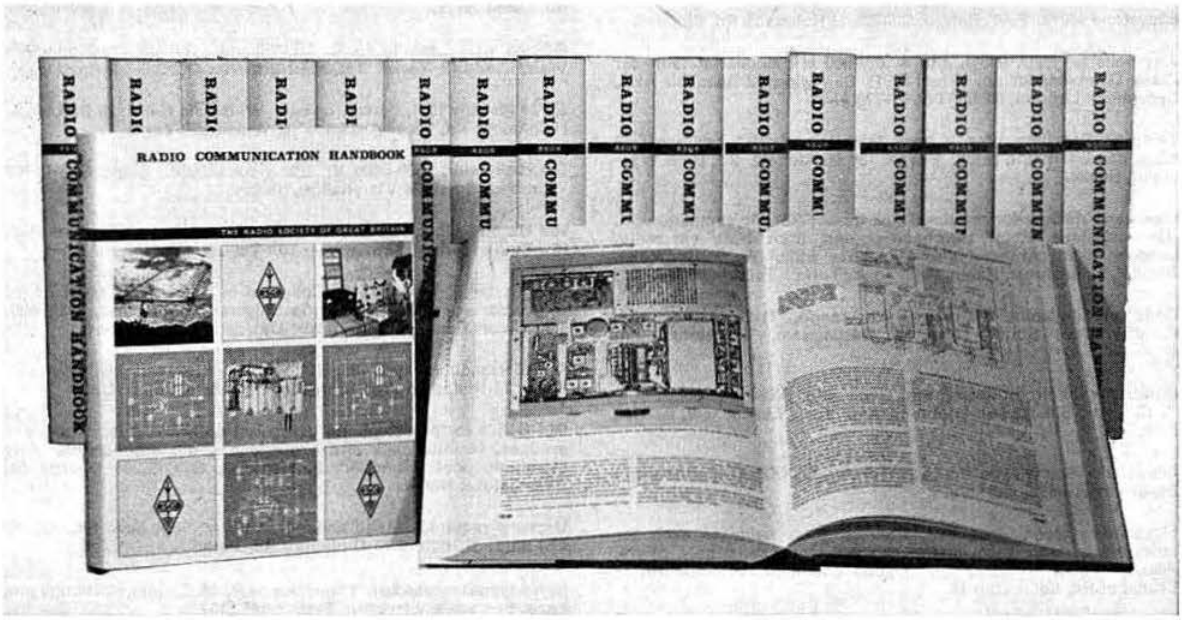

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Order form on page 70.

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