radio communication

October 1970

Journal of the Radio Society of Great Britain

RSGB EXHIBITION — REVIEW, Page 679

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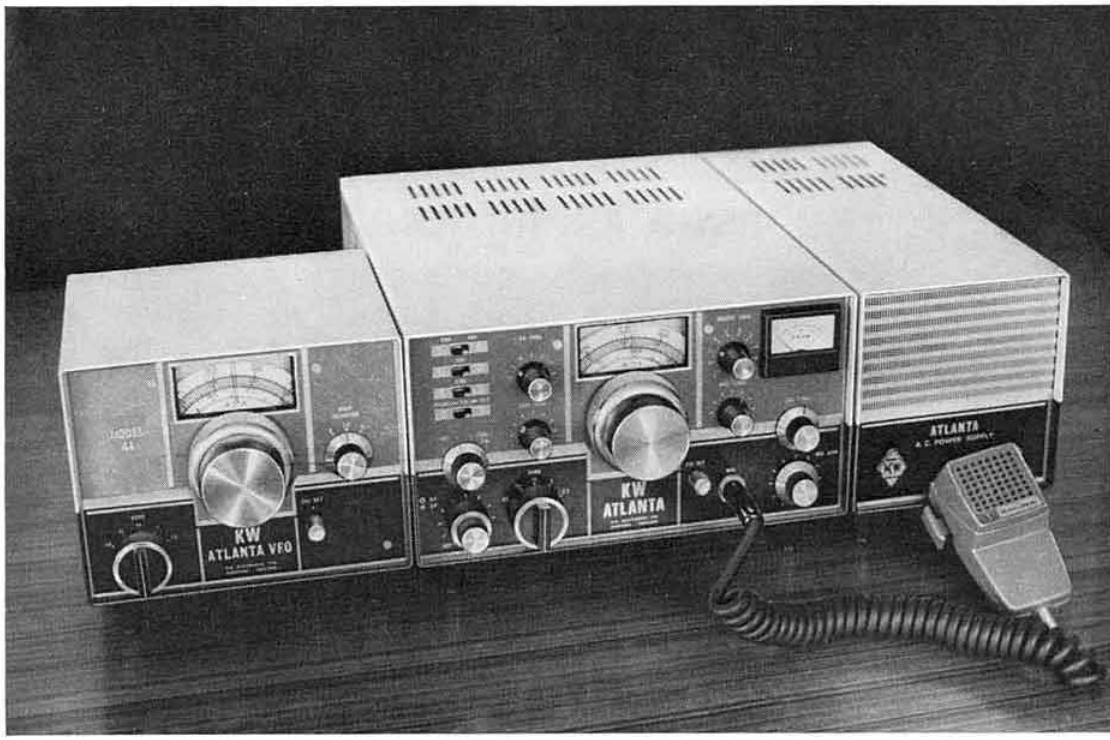

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October 1970

radio communication

Volume 46 No 10 Price 4s

CONTENTS

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

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

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

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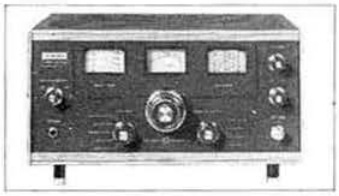

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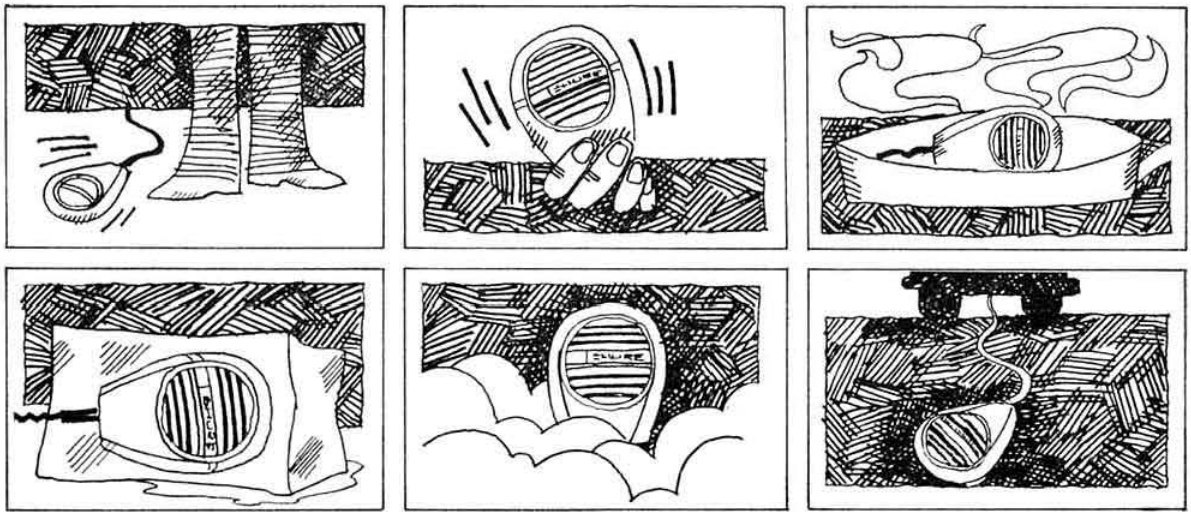

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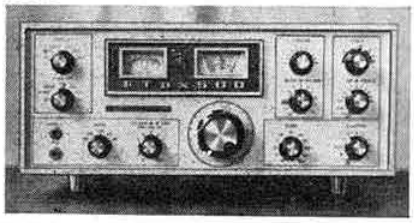
Sim GM3SAN 19 Ellismuir Road, Baillieston, Nr. Glasgow. 041-771-0364

FT 500



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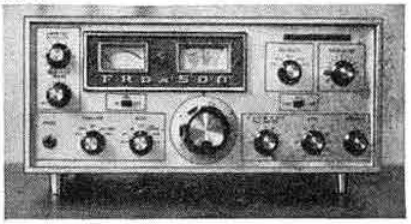

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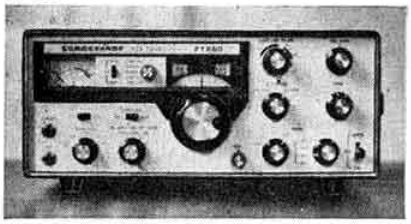

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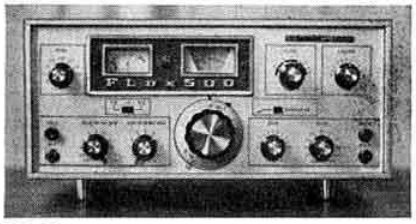

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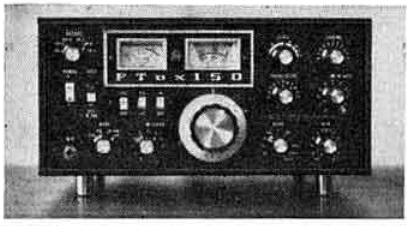

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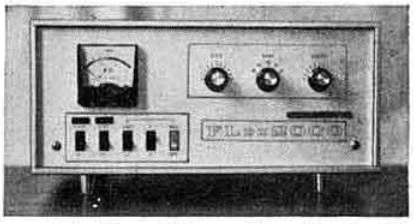

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B * *

QTC AMATEUR RADIO NEWS

EGM

The resolution put to the Extraordinary General Meeting held on 19 August 1970 at the Horticultural New Hall was passed by a large majority. A count of those present at the meeting showed 128 for and 22 against. The proxy votes produced figures of 2,157 for and 234 against.

No decision has yet been made by Council as to when, or by how much, the present subscription rates will be altered.

Society awards

The following awards have been approved by Council and refer to articles contributed to *Radio Communication* during the year July 1969—June 1970:

The **Norman Keith Adams Prize** for the most original article to Mr J. M. Gale, G3JMG, for *Ropes and Rigging* in the March 1970 issue.

The **Bevan Swift Memorial Prize** for the most meritorious article to Mr T. Kirk, G3OMK, for *Workshop Practice* in the October 1969 issue.

The **Wortley-Price Trophy** for outstanding experimental work in the field of amateur radio to Mr G. E. Goodwin, G3MNQ, as reported in *Long term observations of meteor scatter on 70MHz* in the August 1969 issue.

The **Ostermeyer Trophy** for the most meritorious description of an item of home-constructed equipment to Mr D. H. Guest, GM3TFY, for *A Droitwich-locked frequency standard* in the April 1970 issue.

The **G5RV Trophy** for outstanding work in connection with the suppression of television interference to Mr and Mrs B. Priestley, G3JGO/G3XIW.

The **Courtney Price Trophy** for the outstanding technical development of the year was not awarded.

RA Examination, December 1970

The RSGB will be providing a centre at University College, London WC1, for this examination. Applications to sit the examination at this centre must be sent to RSGB headquarters together with a remittance of 35s for members or 45s for non-members. Closing date for acceptance: 31 October 1970.

Can you help?

Mr T. C. Swann, 45 New Zealand Lane, Queniborough, Leicester, LE7 8FU, would like to obtain an ex-Ministry rotary converter, stores reference No 5U/110 Type 1, 12V dc input/230-250V ac output. Required to provide power from car battery to work oxygen machine on outings for his three-year-old son suffering from cystic fibrosis.

Mr Jack Parminter, ZL2OU/ZL2EG, Box 175, Wairoa, HB, New Zealand, needs the circuit and parts list for a Panda Explorer.

RSGB groups

In recent years the number of RSGB groups in existence has decreased markedly. In order that Society headquarters may be aware of the current situation, all members responsible for RSGB groups are requested to register the existence of their group with headquarters. The following information is required: (a) Name of group; (b) Address for correspondence; and (c) Information concerning meeting place and dates of meetings etc.

Calling Mr R. H. Kelsall

Would Mr Kelsall, or anyone knowing his present address, please contact: The Secretary, Lambda Investment Co Ltd., 35 Doughty Street, London WC1N 2AE.

Correction, QSL Corner

The callsign and address of Mr R. I. Buckey, QSL submanager for the G4AAA series, given in the August issue should read: G3VGW, 3 Great Easton Road, Caldicott, Market Harborough, Leics, LE16 8RP.

Licence figures

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

Class A	13,537	Class B/M	294
Class B	2,188	Television	184
Class A/M	2,584	Model Control	18,524

Radio Society of Bermuda

The RSB plans to hold an Amateur Radio Week during the third week of October and it is expected that the club station VP9BDA will be active on all bands.

The society's annual banquet takes place on 22 October at which G5WP and G3NMH, winners for the UK of the cw and phone sections, respectively, of the Bermuda Contest, together with their ladies, will be the guests.

The society will also be sponsoring VP9BS, which will be active during Jamboree on the Air.

RAE Courses, 1970-71

Eastbourne, Sussex. Eastbourne College of Further Education, St Anne's Road, Eastbourne. Wednesdays and Thursdays 7–9pm.

Lichfield, Staffs. Lichfield School of Art & Evening Institute. Thursdays 7–9pm.

London N1. De Beauvoir GLC Evening Institute, Tottenham Road, Balls Pond Road, London N1. Booster course for candidates who failed last examination. Mondays, Wednesdays, Thursdays and Fridays 7.30–9.30pm.

Luton, Beds. Luton College of Technology, Park Square, Luton. Wednesdays 7–9pm. Fee £2.

Northwood, Middx. Northwood Adult Education Centre, Potter Street, Northwood. Details from H. Hardy, G4GB, 12 Lawn Close, Ruislip, Middx.

Prudoe. Prudoe County Secondary School, 10 miles west of Newcastle/Gateshead. Tuesdays 7–9pm. Contact M. Stott, G8BGU, tel Prudhoe 2020.

Lytham St Annes, Lancs. Ansdell County Secondary School Evening Institute, Worsley Road, Ansdell, Lytham St Annes. Tuesdays and Thursdays 7–9pm. Details from Mr J. R. Laughland, Fleetwood Nautical College, tel Fleetwood 2772.

MR F. C. WARD ELECTED RSGB PRESIDENT FOR 1971

In this photograph, taken at the Derby & D ARS 13th Annual Mobile Rally on 16th August 1970, Mr F. C. Ward appears on the left. On his left are G8BAV, W1NLB, G2BVN, G4JW and G3FGY

At the monthly meeting of the Council of RSGB held on 7 September, Mr F. C. Ward, G2CVV, Council member for Zone B, was elected President of the Society for 1971.

Mr Ward's interest in radio began in the late 'twenties, while he was still at school. He joined Derby Wireless Club in 1935, and in 1937 joined the RSGB, obtaining an artificial aerial licence 2CVV later the same year.

His career began in a local solicitor's office, and he served in REME and the RAF during the war. On demobilization he joined the Post Office Engineering Department, and at present is in the Radio Investigation Service.

He is keenly interested in the history of amateur radio, and has been secretary of Derby and District Amateur Radio Society since 1948 (the Derby society is the oldest in the country, having been founded in 1911). Mainly through his efforts the Derby club has a comprehensive collection of documents and equipment from the early days of amateur radio.

Mr Ward has been an active member of the RSGB for many years, and has read the GB2RS news since 1960. He was elected Town Representative for Derby in 1952; Region 4 Representative in 1960; and Zone B Representative in 1969.

He is active on 160m to 2m, and, he says, would be interested in the higher frequencies if there were more hours in the day!

Pirates caught

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

B. E. Wainwright, 80 Greenaleigh Road, Yardley Wood, Birmingham 14, at Birmingham Magistrates' Court on 24 June 1970. Fined £90 plus £10 costs and forfeiture of equipment.

B. J. Staniforth, 190 Gainsford Crescent, Bestwood Estate, Nottingham, at Nottingham Magistrates' Court on 10 June 1970. Fined £10 on each of two charges plus £25 costs and forfeiture of equipment.

T. O'Reilly, 68 York Road, London N18, at Tottenham Magistrates' Court on 12 May 1970. Fined £25 on first charge, £10 on second charge, plus £15 costs and forfeiture of equipment.

R. J. Brimson, Brookwood Lodge, New Road, Porchfield, IOW, at the Guild Hall, Newport, IOW, on 28 April 1970. Fined £50 on each of three charges, plus forfeiture of equipment.

A. Heath, 17 Montgomery Avenue, Swindon, Wilts, at Swindon Magistrates' Court on 19 February 1970. Fined £25 on each of two charges, plus £15 15s costs.

D. R. Wilson, 18 Denby Drive, Mansfield, Nottinghamshire, at Mansfield Magistrates' Court on 1 July 1970. Fined £10 on each of three charges, plus £5 costs and forfeiture of equipment.

G. Wood, 48 Church Drive, Carrington, Nottinghamshire, at Nottingham Magistrates' Court on 10 June 1970. Fined £10 on each of two charges, plus £25 costs and forfeiture of equipment.

F. S. Mason, 65 Trelawney Avenue, Langley, at Slough Magistrates' Court on 31 July 1970. Fined £25, plus forfeiture of equipment.

G. Bligh, 24 Back Road West, St Ives, Cornwall, at Yeovil Magistrates' Court on 25 June 1970. Fined £25.

M. A. Phelphs, Lookout, Norway Street, St Ives, Cornwall, at Yeovil Magistrates' Court on 25 June 1970. Fined £25.

D. Peroni, The Priors, East Heath Road, Hampstead, at Hampstead Magistrates' Court on 5 August 1970. Fined £25 on each of two charges, plus £15 costs and forfeiture of equipment.

J. Dean, 12 High Park Crescent, Belfast, Northern Ireland, at Belfast on 5 August 1970. Fined £15, plus forfeiture of equipment.

D. J. R. Purcell, 39 Dale Road, Derby, at Derby Magistrates' Court on 30 July 1970. Fined £10 on each of two charges, plus £10 costs and forfeiture of equipment.

L. S. D. Ratcliffe, 175 Village Street, Normonton, Derby, at Derby Magistrates' Court on 30 July 1970. Fined £10 on each of two charges, plus £10 costs and forfeiture of equipment.

A. J. Burnham, 30 Marescroft Road, Slough, Bucks, at Burnham Magistrates' Court on 27 July 1970. Fined £5 on each of two charges, plus £10 advocates fee and forfeiture of equipment.

R. W. Taylor, 20 Northampton Street, Swindon, at Swindon Magistrates' Court on 28 May 1970. Fined £20 on each of two charges, plus £10 costs and forfeiture of equipment.

P. J. George, 48 York Road, Swindon, at Swindon Magistrates' Court on 28 May 1970. Fined £20 on each of two charges, plus £10 costs and forfeiture of equipment.

N. W. Chambers, 53 Gooch Street, Swindon, at Swindon Magistrates' Court on 28 May 1970. Fined £20 on each of two charges, plus £10 costs and forfeiture of equipment.

D. Anderson, Kines Road, Dorchester, at Yeovil Petty Sessions on 11 August 1970. Fined £10, plus £5 costs.

P. Stephenson, 8 Bristol Gate, Brighton Magistrates' Court on 13 August 1970. Fined £75, plus £20 costs and forfeiture of equipment.

L. J. Curtis, 9 Bramble Rise, Brighton, at Brighton Magistrates' Court on 13 August 1970. Fined £50, plus £15 costs and forfeiture of equipment.

B. J. Keane, 40 Oakfield Gardens, Wood Avenue, Dulwich, London, SE19, at Camberwell Green Magistrates' Court on 23 July 1970. Fined £10, plus £5 costs and forfeiture of equipment.

The G8ARV two-metre portable receiver

by DAVID J. TAYLOR, G8ARV, G6SDB/T*

AFTER the publication of a previous article [1], the author received a number of requests for information concerning the receiver in use with the portable transmitter. This article is the result.

Although wishing to use the best and most modern circuitry, there was a requirement that the receiver should be functioning as quickly as possible, leaving sufficient time to sort out any hidden snags. For this reason a conventional converter-tunable i.f./fixed i.f. arrangement was used, rather than the more up-to-date tunable oscillator single conversion system. A commercial design was adopted for the fixed i.f. for the same reason.

To avoid the need for i.f. alignment (which could go out of adjustment under portable conditions) a block filter/broadband i.f. was used. In the prototype a 10·7MHz crystal filter provided the selectivity, and this was the most costly part of the receiver.

The units are described separately—their interconnection is shown in Fig 1. A table of coil values will be found at the end of the article.

Converter

The converter must first provide low noise amplification of the signal and then translate any signal in the 144-146MHz band down to the equivalent frequency in the i.f. band (22·5-24·5MHz in the prototype). It must do this with the minimum amount of spurious signal generation. Circuit, Fig 2.

A cascode fet rf stage (suggested by G3FPI) is used. Full supply voltage operation of each transistor and neutralizing (of a non-critical variety) of the first ensures optimum gain and noise performance from this stage. Variable gain control is provided by a variable source resistor in the first fet. This is provided with a small bleed current via R3 so that the fet may be fully cut-off.

The mixer utilizes a dual-gate mosfet. The signal is coupled to gate 1 from a tap on the output coil of the cascode, and the local oscillator is coupled to gate 2 via C26. At i.f. C26 acts as a decoupler, ensuring good grounding of gate 2 to i.f. The mixer drain circuit together with the input circuit of the second mixer form a bandpass overcoupled pair.

The local oscillator section uses a 40·5MHz overtone oscillator, trebler to 121·5MHz and filter. The crystal is operated in the third overtone mode. The trebler emitter resistor R16 may be used to vary the injection level if desired. A second tuned circuit at 121·5MHz is used to clean up the oscillator injection waveform. Gate 2 of the mixer is fed from a tap on this second tuned circuit.

Tunable i.f.

The function of the tunable i.f. is to select a signal in the i.f. range and convert it down to the fixed i.f. As signal levels are higher than in the converter no rf stage is necessary. To avoid the physical size of a three-gang capacitor, and its associated alignment complications, a bandpass pair of tuned circuits was used and only the local oscillator was tuned. This had the disadvantage that strong signals anywhere in the band can cause cross-modulation, not only those immediately adjacent to the desired signal. However, this is offset by the fact that there is no rf stage at i.f., when near signal cross-modulation would be worse by a factor approximately equal to the gain of the rf stage.

A dual-gate mixer is again used (circuit, Fig 3) which is fed from a source follower connected to the secondary of the bandpass pair to ensure low drive impedance at all frequencies. Gate 2 is fed with local oscillation from a tap on the local oscillator tuned circuit, a point which also proves convenient for its dc return. The drain circuit goes via a capacitively tapped tuned circuit to the input of the filter. Formulae are given in Appendix 1 to enable the values of C32 and C33 to be calculated for the particular filter used.

The local oscillator uses a BSX19 in common base mode. An oscillator very similar to this is in use in the author's main station tunable i.f. and gives satisfactory results for ssb.

Fixed i.f. amplifier

This amplifier uses a Mullard circuit [2], to which the reader is referred for further details. Three stages of i.f. amplification are used, to which reverse agc is applied. A transistor detector, agc amplifier and squelch are incorporated. No facility is made for the reception of cw signals. Circuit, Fig 4.

The input impedance of the amplifier at 10·7MHz is inferred to be 370Ω resistive, and it is suggested that for values of filter impedance up to 1kΩ a series resistor R28, equal to the difference in resistance between the filter and 370Ω, is used. Any terminating capacitance required can be provided by C_t. For higher values of filter impedance it is suggested that the matching circuit described in Appendix 1 may be used.

* "Crestwood", New Rowley Road, Dudley, Worcs.

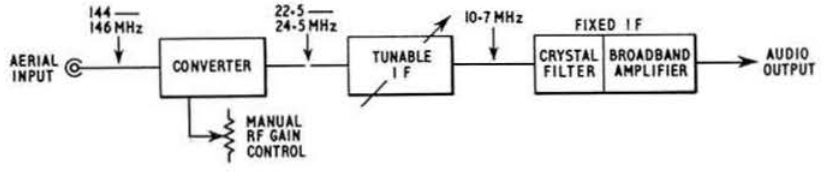


Fig 1. Block diagram

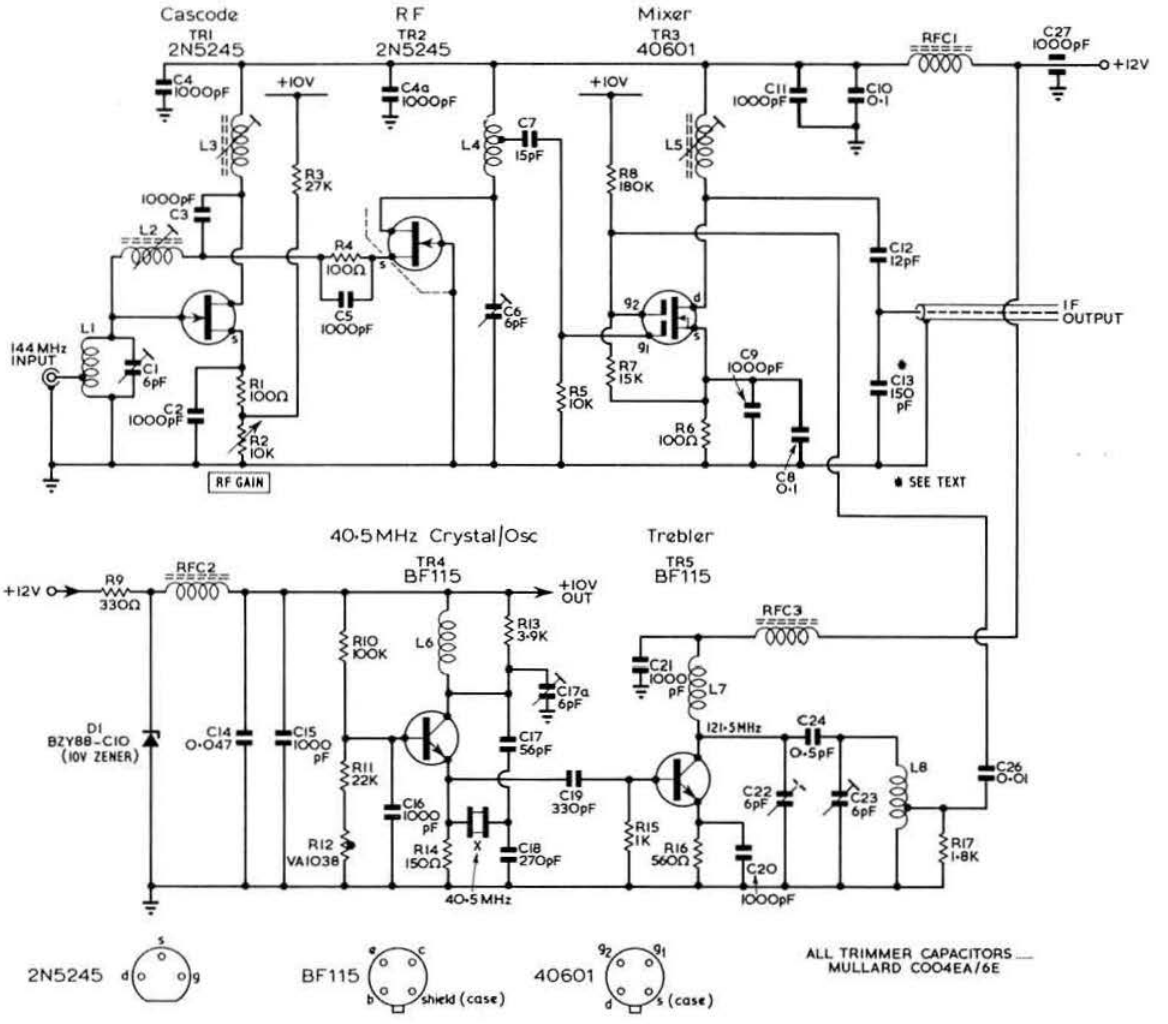


Fig 2. Converter

To match to the audio amplifier in use (a PC5) R65 is in series with the volume control. If a high input impedance amplifier is available, omit R65 and make R66 50kΩ.

An experimental noise limiter circuit developed by G3WGY is included in Fig 12.

Agc and squelch are provided on this i.f. amplifier. Two other people have built the i.f. amplifier and both encountered a "latching" condition (the agc voltage goes too high and bottoms the transistors). R70 should prevent this, but adjustment of value may be required. The Mullard circuit indicates R59 as 10kΩ. With this value it was found that the squelch could not be turned off permanently (ie to listen to very weak signals) but changing the resistor to a 6·8kΩ cured this. The squelch is noise compensated, so that to quote from [2], "traffic noise is thereby prevented from turning on the squelch in the absence of carrier". Agc voltage should be about 2·8V on no-signal (on 10KΩ/V multimeter).

Interstage couplings

Signal paths between the units rely on capacitively tapped tuned circuits, so that when calculating the capacitor to be used the capacitance of connecting cables must be taken into account:

$$C13 = 150pF - C_{cable\ 1}$$

$$C33 = C_{calculated} - C_{cable\ 2}$$

Typical cable capacitances are:

cheap coaxial: 50pF/m
sub min coaxial: 100pF/m
mic cable: 400pF/m

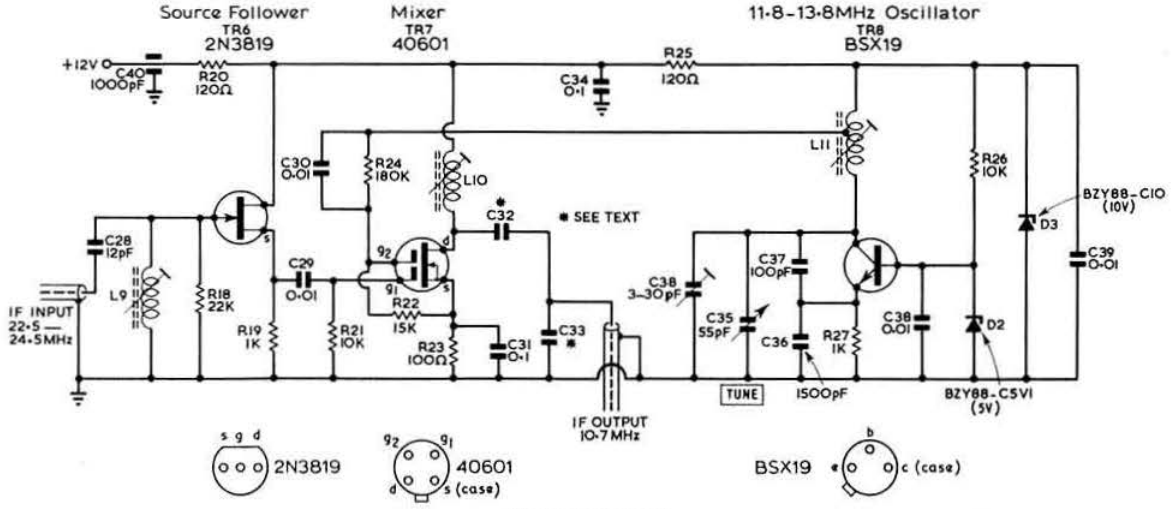


Fig 3. Tunable i.f.

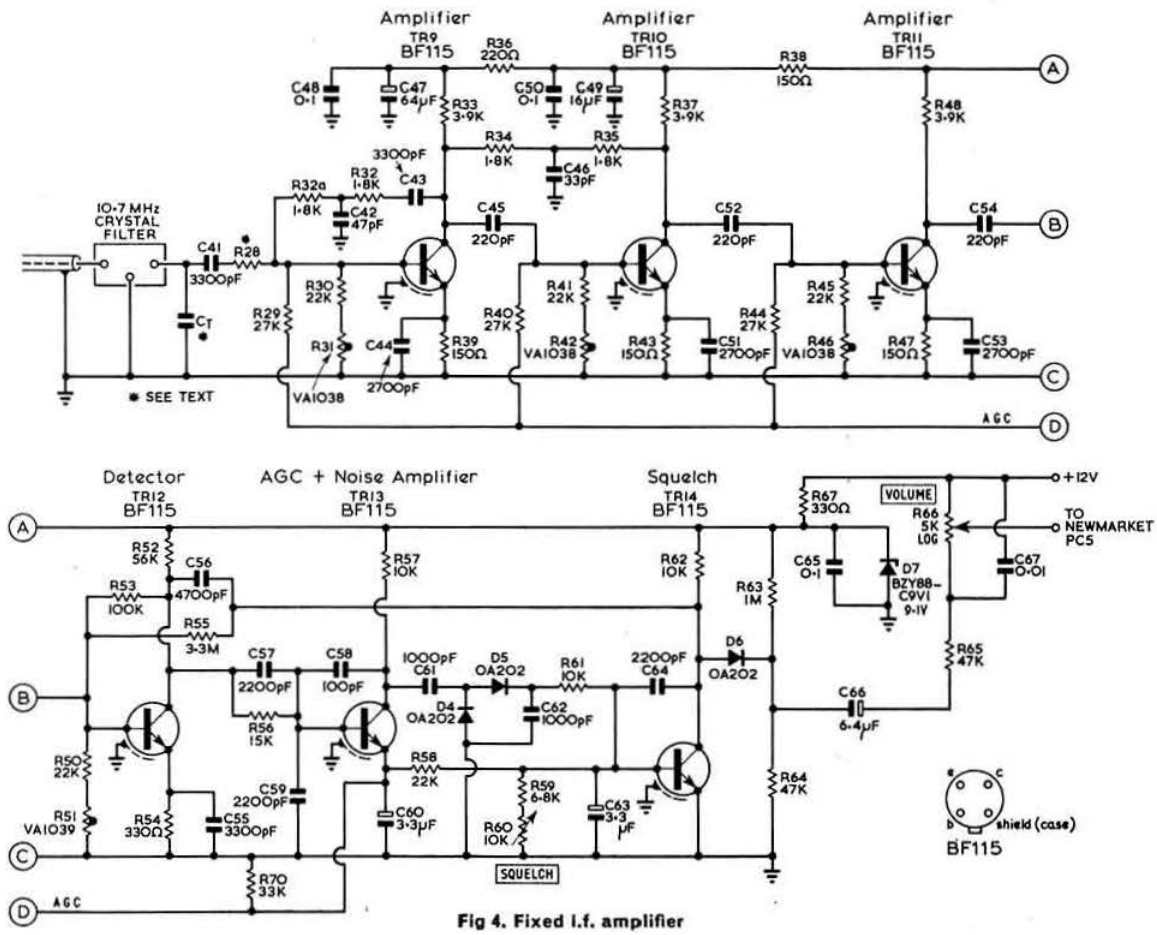


Fig 4. Fixed i.f. amplifier

Automatic changeover

(Can be omitted by wiring RL1 in series with a transmit/receive switch to the 12V supply.)

The circuitry shown in Fig 5 performs the logic function depicted in Fig 6.

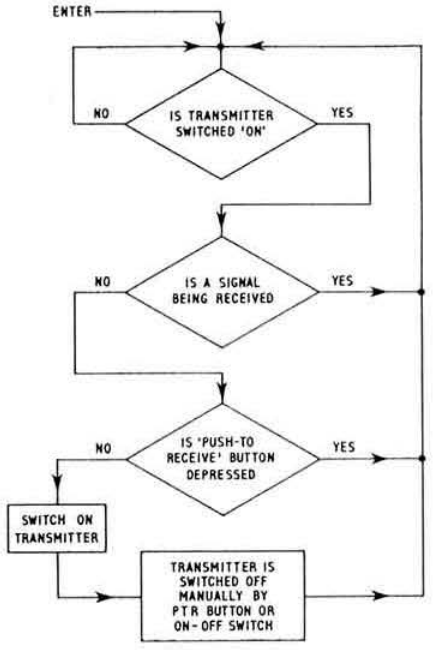
Thus, in use, the operation is as follows:

(i) While tuning the band or listening to other people the transmitter is switched off.

(ii) Before calling CQ listen on your own frequency, then if someone else is on you cannot operate and block him out with your CQ call. The transmitter is then switched on.

(iii) When in normal QSO the transmitter is switched to "on" and when the other person passes the transmission back to you, the transmitter automatically comes on. To return the transmission, depress the "push to receive" button until the other person's carrier appears. The transmitter will then be locked off and the button may be released.

This may seem complicated initially, but it is easy to get used to. This does not work for very weak signals as there is not enough change in agc voltage to determine whether or not the other carrier is present. Normal transmit-receive switching with the transmitter "on-off" switch is used in this case.



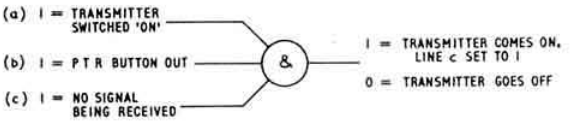


Fig 6. Automatic transmit/receive logic

Alignment

A simple rf voltmeter such as that in Fig 9 is required.

(a) Converter

Adjust C17a for stable oscillation at 40·5MHz (the value of L6 may need adjusting for crystals of different frequency). Drive should be measurable across R16 (about 1V). Using an absorption wavemeter tuned to 121·5MHz resonate C22, and then with the rf voltmeter across R17, resonate C23. The value of R16 should be adjusted to give 0·5-1V from the rf voltmeter.

A strong signal on 2m should now be tuned in, coupling a general-coverage receiver tuned in the range 22·5-24·5MHz across C13. Adjust C1, C6, L3 for maximum output (L3 is quite broad). Disconnect one end of R1 and adjust L2 for minimum output. Reconnect R1 and repeat peaking of C1 and C6 for optimum gain at 145MHz. With the rf voltmeter disconnected re-peak C22 and C23.

(b) Tunable and fixed i.f. (as one unit)

Using a signal generator set L11 and C38 to give the desired tuning range. If this is too small decrease C38,

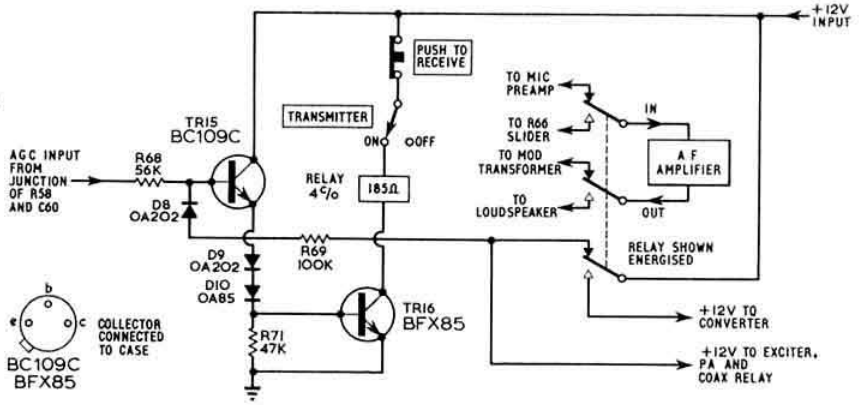


Fig 5. Automatic transmit/receive

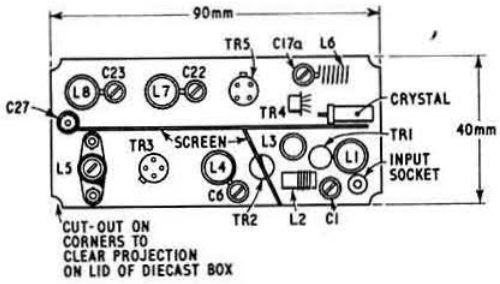


Fig 7. Converter layout

increase L11 and vice versa. The prototype tuned 2·4MHz with C38 = 27pF. Set L10 for maximum gain at 10·7MHz, unless otherwise specified by the filter manufacturer.

The alignment of L5 and L9 now takes place.

Connect a 1kΩ damping resistor across L5 and peak L9 for maximum response at 145MHz (23·5MHz at i.f.). Transfer the damping resistor to L9 and similarly peak L5. When the damping resistor is removed the result should be a symmetrical bandpass response curve. Tune across the band and notice the way that the noise peaks in intensity at two frequencies. Final slight adjustment to L5 and L9 may now be made if required. Increasing or decreasing the inductance of both will shift the whole response curve, changes of relative inductance will alter the response curve shape.

The noise peaks on the prototype were at 144·5 and 145·5MHz.

No adjustment is required in the fixed i.f. (squelch is a front panel control).

Construction

It is not proposed to say too much here about the layout of individual units, as intending constructors will doubtless have their own ideas concerning this.

Each of the three units was built into the smallest Eddystone diecast box, each attached by the smaller side to the front panel.

A suitable layout for the converter has been sketched in Fig 7.

A central screen divides oscillator and rf compartments and a small screen is fitted across the second transistor of

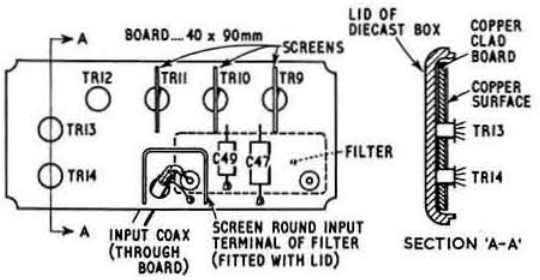


Fig 8. IF amplifier layout

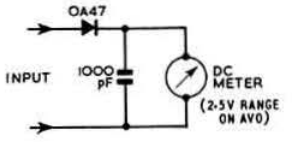


Fig 9. RF voltmeter

the cascode. Power is fed in through a feedthrough capacitor and a sub-miniature Belling-Lee plug/socket pair is used for signal input. Only L5 and L3 have coil formers in the normal sense, although a former is fitted into L2 to hold the slug!

The layout of the tunable i.f. is not critical, provided that coils are kept at a reasonable distance apart.

The layout for the fixed i.f. will be partially determined by the filter in use. The layout used by the author is shown in Fig 8. The only point of note is the screening "hat" round the input to the filter—no point in throwing all those decibels of attenuation away, is there?

In the converter and fixed i.f. a piece of copper-clad laminate was used as the earth plane, components being soldered to this, transistor leadouts, or each other as necessary. In the i.f. the transistors were mounted "upside down" in appropriately-sized holes in the copper-clad laminate, thus giving a little extra room vertically (see section).

The overall layout of the three units may be judged from the photograph (in [1]). The only snag with this arrangement is that oscillator harmonics can get into the converter and cause spurious responses on the 2m band. This effect is not serious, however, and some variation on this layout, or changes in the oscillator circuit (eg use of a fet oscillator) could eliminate the effect.

Conclusion

The receiver is suitable for use with the transmitter described [1]. Together they form a portable transceiver suitable for low consumption battery operation. Undoubtedly for amateur operation the greatest drawback of the receiver is its use of a 10·7MHz crystal filter. These are, however, available fairly cheaply these days, and a suitable filter will have really good performance, enabling weak signals quite close to strong (but not overmodulated) signals to be rendered audible. A list of filters follows (Appendix 2).

The performance of the receiver on weak signals will depend on the bandwidth of the filter in use. The noise figure will be as good as most converters available today.

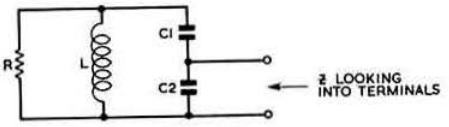


Fig 10. Capacitively tapped impedance matching circuit

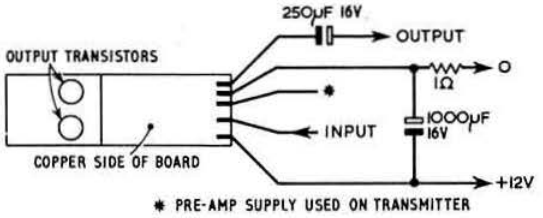


Fig 11. Connections for Newmarket PC5 amplifier. The 1,000μF electrolytic should be reversed

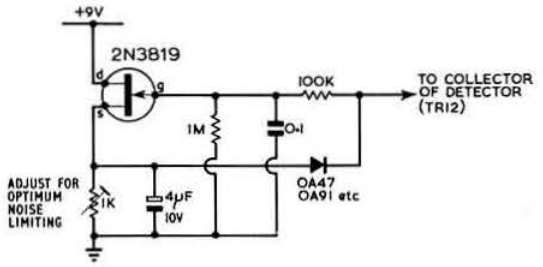


Fig 12. Experimental self-following noise limiter developed by G3WGY

Acknowledgements

Many thanks to G3FPI for the cascode circuit, and to G3HBW, G3WUI and others for the many hours of their time spent discussing receivers.

Table of coil values

L	Turns	Gauge	Diam (mm)	Spacing	Length (mm)	Core	Former	Tap (turns)
1	7	18 TC	6		12			2
2	12	34 DCC	5	cw		√	√	
3	5	22 TC	5	cw		√	√	
4	5	22 TC	6		7			2
5	28	28 EC	7	cw		√	√	
6	8	28 EC	5	cw				
7	7½	24 TC	6		10			
8	8½	24 TC	6		12			2
9	28	28 EC	7	cw		√	√	
10	12	20 EC	7	cw		√	√	
11	11	20 EC	7	cw		√	√	1½

All RFC 2 turns on Mullard ferrite bead FX1115.

Appendix 1—Capacitively tapped impedance matching circuit

For a circuit such as that shown in Fig 10, for a perfect coil

$$Z = \frac{R}{\left(\frac{C2}{C1} + 1\right)^2}$$ * at resonance.

So that for my filter, where

$Z = 670\Omega$ in parallel with 10pF

output resistance of mosfet = $20k\Omega = 50\mu S$† (G_1).

Take coil to be $1{\cdot}07\mu H$

$X_L = 2\pi f L = 72\Omega$

$Q = 200$ (say)

$Rp = QX_L = 14{\cdot}4k\Omega = 69{\cdot}4\mu S$ (G_2)

$\therefore$ Net conductance at drain = $119{\cdot}4\mu S$ ($G_1 + G_2$)

$\therefore$ Net resistance = $8{\cdot}37k\Omega \left(\frac{1}{G_1 + G_2}\right)$

$$\left(\frac{C2}{C1} + 1\right)^2 = \frac{R}{Z} = \frac{8{\cdot}37 \times 10^3}{670} = 12{\cdot}5$$

$$\frac{C2}{C1} + 1 = 3{\cdot}53$$

$$\frac{C2}{C1} = 2{\cdot}53$$

but for $1{\cdot}07\mu H$, C to resonate = 204pF

$$\therefore \frac{1}{C1} + \frac{1}{C2} = \frac{1}{204} \quad (C_1, C_2 \text{ in pF})$$

$\therefore C1 = 290pF$

$C2 = 715pF$ approx $\left(\frac{C2}{C1} = 2{\cdot}5\right)$

As filter needs 10pF termination, increase C2 to 725pF. Cable capacitance is 45pF

$\therefore C33 = 680pF$ and $C32 = 290pF$ (Fig 3)

* *ARRL Handbook*

† S = siemens (SI unit)

Appendix 2—Some crystal filters at 10·7MHz

Make	Type No	Impedance Ω	Impedance pF	Passband kHz @dB		Stopband kHz @dB	
STC	455 LQU 901C	470	25	±3·75	3	±8·75	70
	455 LQU 929C	910	20 (T1)	±3·5	3	±12·5	55
		910	55 (T3)				
	455 LQU 914D	820	25	±6	3	±18	70
	455 LQU 904A	2,700	25	±20	6	±45	80
SEI	QC1121D	560	25	±3·75	3	±12·5	55
	QC1121E	560	15	±3·75	3	±12·5	80
MEL	YL3682						
	YL4200	560	25	±3·75	3	±8·5	70

Note: The omission of a filter from this list does not imply its unsuitability.

References

[1] "The G8ARV two-watt two-metre transistor transmitter" by D. J. Taylor, *Radio Communication*, December 1969, p840.

[2] "Mobile 166MHz a.m. communications receiver" by D. Singh, *Mullard Technical Communications*, Vol 10, No 91, pp14-29.

LOFT AERIALS

by J. B. ROSCOE, MA(Oxon), GM4QK*

WHY on earth use an indoor aerial? Might as well try putting the thing underground—but let us not get involved with that old chestnut. There are several reasons for using indoor aerials. Among them are landlords—and landladies—and other intransigent local authorities; lack of space outside; wind. It was the last of these that sparked off this series of experiments—a 196ft top erected externally stayed up for precisely 18 hours. The arguments here will be confined to loft aerials—metal roofs, gutters, lightning conductors, and other structures that can be isolated from ground and caused to radiate will not be considered.

Two of the disadvantages of loft aerials are immediately apparent: lack of space and absorption of rf. A third one is the probability of increased tvi, both because of proximity to tv aerials and because of feedback of rf into the mains. Against this, they are cheap, easy to erect and adjust, and wind and water proof. All coupling and loading circuits also operate in the dry, so standing-wave losses are easily kept down.

The loft

Lofts come in three types, according to whether they have one, two or three dimensions. The one-dimensional, or tunnel, loft gives little scope for experimentation, since it can usefully house just one wire with just one variable dimension. The standard method of inserting the wire is to attach it to a cat and blow this through the tunnel with compressed air: a suitable cat is available from this address against the deposit of a budgerigar, hamster, etc. More ingenuity is required with a blind tunnel, unless a non-returnable cat is available.

A two-dimensional loft is defined as one where the maximum vertical dimension is less than a quarter of any interesting wavelength. A three-dimensional loft with a peak height exceeding 12ft is rare: otherwise it is coveted for, and soon converted to, an additional bedroom.

The first thing to do with the loft is to empty it completely. This is a mammoth task, but it should have been done years ago anyway, and quite three-quarters of the junk can be thrown away. Secondly, if you are going to use the loft as a shack, wire in a permanent power point—a temporary hook-up from the bedroom will result in forcible interruption of that QSO with 3A2AY when there is washing-up to be done.

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Thirdly, floor it. This will be much cheaper than putting your foot in it even once. Half-inch chipboard is adequate for distributed loads, but three-quarter-inch is better if you are going to put all your weight on one leg of a spindly chair. Chipboard generally comes in 8ft by 4ft sheets: helpful diy shops will slice this down to 8ft by 2ft, which is large enough for the average trapdoor and still horribly heavy. Screw-driving brings down less plaster than nail-hammering; and both will do a lethal job on household wiring. And now we are ready to go.

The Yagi

A 30ft by 20ft loft will accommodate the classical 3-element 14MHz Yagi with 0·1 and 0·2 wavelength spacing. The ends of the elements can be stuffed down the wall cavity, and with a good deal of crawling around in tight corners the beam can be reversed. Unfortunately, the aerial will be completely useless. This illustrates the first point about loft aerials: parasitic arrays do not work. This can soon be demonstrated by loading up a dipole and adding a director or reflector: they will have little or no effect on the tuning or loading. The answer is, of course, that the average loft is already full of parasitic radiators—gutters, mains wiring, roof metal, perhaps even gas pipes—and additional elements contribute little.

The ground plane

The two essential parts of a ground-plane aerial are a vertical radiator and a conducting plane. It is hardly worth putting up a ground plane unless the first half of the radiator (the high-current portion) is reasonably vertical: the second half can be bent over without detriment. Separate verticals on 14 and 21MHz will not interfere unduly, and a 14MHz radiator will work well, though probably at rather a high angle, on 28MHz.

In a detached house the highest point in the loft will probably be near the centre, and in this case eight radials should be laid out and joined by a perimeter wire. In a semi-detached house the highest point may well be at one end; and this raises the second point about loft aerials: wire up your neighbour's loft.

The usual problem of matching the low impedance of a ground plane could be aggravated by bending the top, but in a loft this is of no importance. The aerial can be fed direct from a Z-match (*Radio Communication Handbook*, page 13.37) with no difficulty at all. The vertical radiator can be folded if desired, but a single wire should give ample bandwidth for the cw or phone portions of the bands.

Two dipoles

There are various methods of driving two dipoles, both in and out of phase. Even two driven elements on 7MHz could be contemplated with the co-operation (so far unrealized here) of that neighbour. In general, two parallel dipoles in phase can be driven easily, whereas when they are out of phase (as in the "ZL Special", for example) a low swr is not so easily attained.

The most useful arrangement is the horizontal X aerial, which can take advantage of the full diagonal of the loft, since the arms need not be at right angles. This can be made of four quarter-waves of flat flex or feeder and fed across one or other of the diagonals (Fig 1). The switching is most easily done at the aerial: in theory two feeders could be used, with

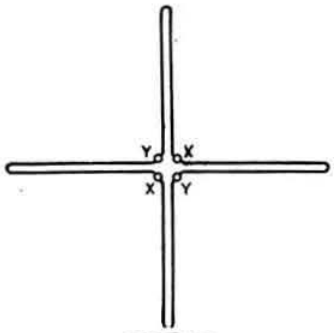

Fig 1

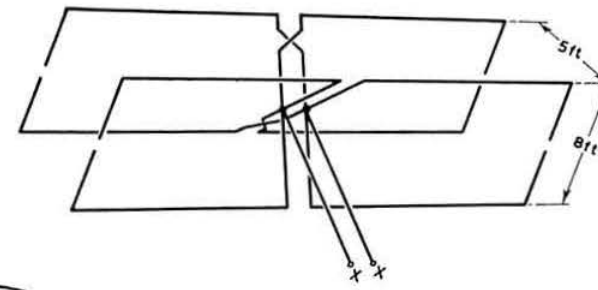

Fig 2

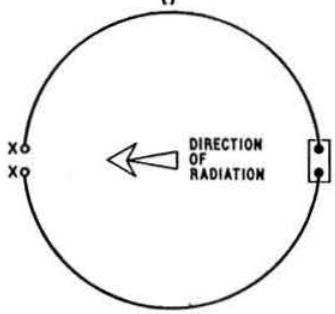

Fig 3

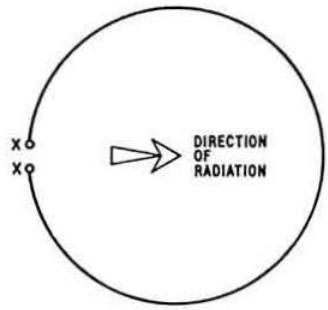

Fig 4

Fig 5

the lengths cut so that the unused one presents a high impedance at the top, but this one has not worked out. Switching the feed point should rotate the angle of radiation through 90°—but probably will not. This illustrates the third point about loft aerials: the directivity is largely determined by the house structure and not by the radiating system.

Four dipoles

Close-spaced arrays of three or more parallel driven dipoles in the same plane seem to present insuperable impedance and phasing problems: they will certainly radiate, but the signal is likely to take off in unexpected directions. Three-dimensional arrays of four dipoles, stacked two and two, are useful where space is available. An array with 8ft vertical and 5ft horizontal spacing (Fig 2) will load nicely on 21MHz and quite tolerably on 14MHz as well. The ends of the dipoles can be folded in to meet and support each other. This is potentially one of the more useful systems.

Loops

There are two ways of deriving a half-wave loop aerial. If a dipole is bent round a circle till the ends almost meet (Fig 3), the resulting current-fed loop radiates "backwards", in a direction away from the feed point. If a free half-wave of wire is bent round a circle till the ends almost meet (Fig 4), the resulting voltage-fed loop radiates forwards. Unlike the full-wave loop used in the quad, both half-wave loops radiate in the plane of the loop, and not at right-angles to it. Facing facts, though: the half-wave loop is not a brilliant aerial.

With both ends folded in towards the centre (Fig 5), a horizontal half-wave on 3·5MHz can be accommodated round the perimeter of the stipulated 20ft by 30ft loft. The feed point can be changed over to alter the directivity—slightly. Alternatively, the system will work as a horizontal full-wave loop on 7MHz, for what that is worth, or can be adapted to form two half-wave loops fed back-to-back. The performance of these systems has not proved to be stimulating.

Vertical half-wave loops on 21MHz have proved more rewarding. A hybrid combination of an open and a closed loop (Fig 6), though not too clever in theory, works well enough in practice, and two of these have been used, parallel to each other and about 6ft apart.

Vertical full-wave loops, run right round the roof trusses, can often be accommodated on 21MHz, and even on 14MHz. Unlike the quad, if two are used they should both be driven. This array looks promising on paper, but so far has produced more tvi than any other—and little else.

Loaded aerials

Inductance and capacitance are easily added to an indoor aerial, since they do not have to be waterproof, and a trap dipole is one of the possibilities for a one-dimensional loft. An unsuccessful attempt at making a loaded horizontal loop on 14MHz produced an unexpected S7 from a genuine-

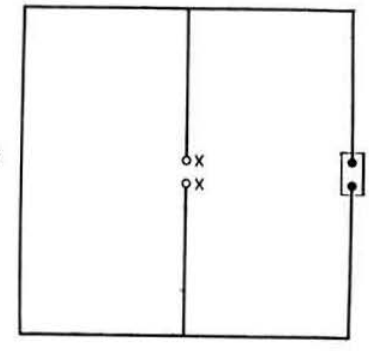

Fig 6

sounding (but non-QSLing) CR7 on 7MHz—and nothing else. There is plenty of room for further development here, and among the designs under consideration is one for a pair of vertical "trap loops", to make the best use of the vertical components of the roof slopes.

Construction

Little need be said about the materials for constructing these aerials. Wire gauges in the thirties and nylon thread will work, without any additional insulation, though better materials should be used. Ordinary "figure-of-eight" pvc flex makes a good feeder in the lengths normally required.

Because of high stray capacitances, aerial lengths are sometimes a little unexpected. Grid-dip meters, aerial noise bridges etc, are obviously helpful, but a standing-wave meter, even of comparative imprecision, is essential.

Television interference

The loft is shared with the usual crop of tv aerials. BBC-1 is on Channel 3, about 20 miles away and by no means line-of-sight. Virtually no type of high-impedance voltage-fed aerial can be used, indoors or out; and even the low-impedance voltage-fed full-wave loop gives trouble. With most current-fed aerials, using filters at both ends, a 1961 tv receiver with an inverted T gives a clear picture through 100W of cw on 21MHz. A newer transistorized receiver will only stand 50W of cw, and ssb produces severe breakthrough on BBC-2 (corner reflector). What a dismal prospect with colour tv!

Results

The aerials were tested on cw (by choice) and with an input of 50W or less. The most consistent performers were the X aerial and the ground plane. As might be expected, the X gave more high-angle radiation, and on 14MHz would produce S8/9 reports from Europe, S7/8 from East Coast W, reducing to S5 from W6. On 14MHz the ground plane was still running S6 at W6/7, and was down to S5 at VE8. On 21MHz the ground plane raised PJ and W6, and VK and ZS which are never easy from this location. The four-dipole array produced S8 from OX and W on 14MHz, and gave solid contacts with W on 21MHz; but it felt rather higher-angle than it should have done. The four vertical half-wave loops on 21MHz produced S6 from JA under rather difficult conditions, and would probably merit further attention.

Conclusions

Loft aerials certainly suffer from considerable loss of rf, perhaps amounting to two S points under a heavy load of Welsh slate, but they can obviously give interesting contacts on the hf bands. They are also entertaining because of the ease and speed with which they can be erected and dismantled. These experiments suggest that the most useful aerial for a two-dimensional loft is an X, and for the three-dimensional a ground plane, with the possibility of using an X as the radial system for a ground plane.

A low-level and windproof (so far) bi-directional external beam is now in use at this station, and experiments with loft aerials are continuing in the hope of extending coverage round the compass.

An automatic rotator

by R. G. BROWN, G8CXV*

AFTER a few months of operating on 2m it became obvious to the author that it would be advantageous to know which way his beam was pointing. The original system was a one-way/stop/other-way hit and miss arrangement with the aerial turned by an aircraft actuator as shown in Fig 1(*a*). The only way of learning in which direction the beam was heading was to go outside and look! This had to go, but as commercial rotators cost around £20 it was a matter of getting down to the drawing board.

The system already employed certainly turned the aerial, so it was just a matter of an indicator. Then it was realized there was little difference between an indicator and an automatic system in which a control is set to the required heading and the beam follows. Of course, it must be simple and above all cheap.

The circuit

All components for the final design were found in the junk box. As may be seen from the circuit, Fig 2, RV1 and RV2 form between them the four arms of a Wheatstone bridge. RV1 is attached to the mast in such a way that just over 360° rotation causes full travel over it. RV2, on the other hand, is set to the desired beam heading.

Consider the bridge unbalanced, ie RV2 set to the new desired heading. When the spring-biased key ST is pressed, a battery (18V in the prototype) is applied across the bridge. If the ratios of the resistances of the two halves of each potentiometer are different (unbalance), a potential appears across points (a) and (b). Consider an unbalance such that (b) becomes negative with respect to (a), then D1 conducts and the pair TR1 and TR2 are switched on and RLA/2 is energized. RLA/2 then operates the actuator which turns the beam and RV1 towards balance. At the same time RLA/2 has held up RLC/3 after the key was released, hence the beam continues to rotate until balance is realized. At balance, RLA/2 releases, which stops the actuator and also releases RLC/3 which then switches off all the power. The lamp LP1 indicates when the beam is turning.

The values of RV1 and RV2 are those used in the prototype, but it would appear that a pair of potentiometers of lower value may be used instead, and the battery voltage energizing the bridge reduced in proportion. The current drain from this battery in the prototype was in the order of 3mA, and this is only drawn when the beam is rotating, hence the life of the battery is very good. Two PP9s were used, but PP3s are adequate. The resistances of the relays quoted are nominal and unless PO relays are used for RLA/2 and RLB/2 then their values should be chosen so that they operate easily from the supply voltage. RLC/3 is chosen to

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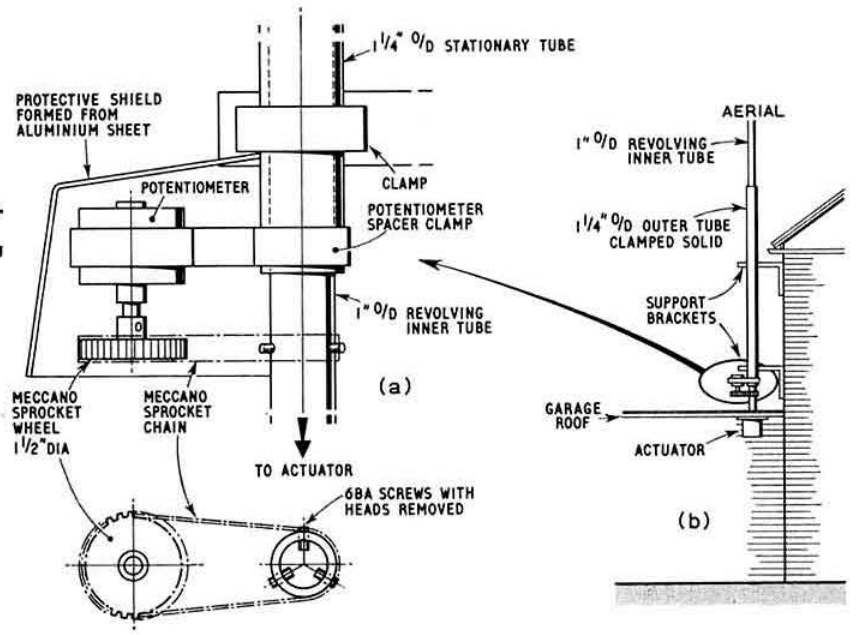


Fig 1. (a) The rotator.

(b) The author's aerial rig

operate from 12V. The centre tapped supply was a car battery already used to power the actuator.

Construction

No problems should be experienced and layout is, of course, totally uncritical. RV2 should be fitted with a calibrated scale which can be marked with actual beam headings when the potentiometer has been permanently fixed to the mast. The prototype was constructed as a 19in rack unit purely for convenience. Probably the most difficult part, attaching the potentiometer to the mast, has to be left to the constructor, though the system used by the author in his situation is shown, as a guide, in Fig 1.

The operation of the prototype cannot be faulted, and the accuracy is limited by the grade of potentiometer used and the sensitivity of the relay amplifier. It may be desirable that the gain is not too great, as it is possible that in a high wind the system might attempt to correct for "play" in the mast. The accuracy of the prototype was considerably greater than the beam width of the 8/8 used.

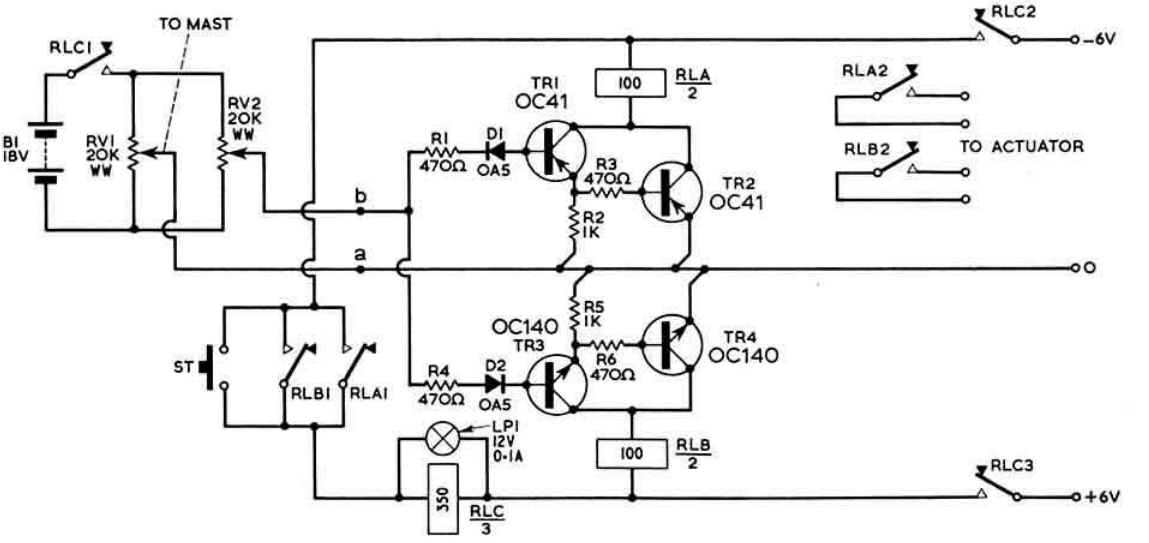


Fig 2. Circuit diagram

A simple transistor tester

by I. D. MACARTHUR, G3NUQ*

MOST amateur users of transistors (and many professionals, too) would like a cheap, reliable and simple device to give a good/bad indication of the state of doubtful devices (often removed from a suspect circuit). The tester presented here is just such a device and enables, in addition, measurements and matching of β to be carried out.

With this device it is a simple matter to run through a box of assorted transistors, selecting good ones, sorting pnp/npn types etc, and furthermore is so simple that it has been successfully used by engineers with no previous instruction.

The parameter of most interest in a transistor is the dc current gain in the common emitter mode. This parameter is known by the symbol h_{FE} or, more commonly, β. This is the ratio of collector current to base current.

$$\beta = \frac{I_c}{I_b}$$

The commonest type of transistor tester causes a fixed base current (say 100μA) to flow. The collector current is then 100$\beta\mu$A and the meter is calibrated directly in terms of β. This circuit seems very attractive at first sight but on closer examination it has several drawbacks.

The base current is determined by the battery voltage V and R1, and if the battery voltage changes then the accuracy will be impaired since the base current will be different from that at which the meter was calibrated. Hence, for this circuit to yield consistent results the voltage must be stabilized, which increases battery drain.

The collector current at which a measurement is made is not a fixed value but depends on the β. Now this is a bad thing for two reasons. Firstly the β of a transistor is not a constant value but is a function of collector current. Secondly, in practice, one wishes to know the base current required for a particular value of collector current rather than the other way round.

The β of transistors can vary between wide limits, say between 10 and 500, and if the base current is 100μA then the collector current will vary between 1mA and 50mA. Now a collector current of 50mA is too much for some transistors. A figure of 5mA would be more appropriate, but if the base current were made 10μA then low β transistors would be measured at very low collector current.

The above reasons led to the adoption of the circuit of Fig 1. The action of this circuit is as follows. If R1 is large, a small base current V/R1 will flow (neglecting V_{be}) and this will cause a collector current of βV/R1 to flow. As the value of R1 is reduced the collector current will increase. However it can only increase to a value of V/R2 (neglecting V_{ce} and meter voltage drop) when the transistor will bottom and any further reduction of R1 will cause no further increase in collector current.

Hence the point at which the transistor just bottoms is given by

$$\beta = \frac{I_c}{I_b} = \frac{V/R2}{V/R1} = \frac{R1}{R2}$$

Thus β as measured by this circuit does not depend on the voltage V, and the collector current at which the measurement is made is determined by V and by R2.

Practical circuit

A suitable value for V is 9V since several small batteries are available at this voltage and it is high enough to ensure the validity of the assumption that V_{be}, V_{ce} and meter voltage drop are negligible. A suitable value for collector current is 5mA which gives a value of 1·8kΩ for R2. Hence if the instrument is to measure β in the range 10 to 500 then R1 must vary from 18kΩ to 900kΩ. A 1MΩ potentiometer could have been used for R1 but would require calibration, and high resistance carbon potentiometers are not renowned for their stability and reliability. A series of switched resistors makes calibration easier and improves reliability. The values of β and resistance chosen are on a logarithmic scale giving increments of equal significance. Eleven values are provided enabling a 12-way switch to be used. The twelfth position leaves the base of the transistor under test open circuit, when the collector current is the collector leakage current (I_{CEO}).

In order to measure leakage current a sensitive meter must be used, but to measure a collector current of 5mA the sensitivity must be reduced. This is accomplished by shunting the meter with a diode, but to prevent the scale being too cramped at high currents a resistor (R13) is inserted in series with the diode. Fig 2 shows how R13 modifies the diode characteristic, and Fig 4 shows a typical meter scale.

The complete circuit

Fig 3 shows the complete circuit which includes the pnp-off-npn switching. The instrument is built in an Eddystone die-cast box, with grommets for rubber feet to avoid damage to the polished surface of the shack bench. Connection to the transistor under test is made by croc-clips of the fine wire type on flying leads about 3in long. This method of making connections is preferable to terminals or a transistor socket, since it enables transistors with short leads, power transistors, diodes and rectifiers all to be tested easily.

The resistors R2 to R12 are made up by paralleling standard values as shown in the parts list, but if great accuracy is not required the nearest preferred value may be used. It will be observed that the first position on S2 has no resistor; this position enables the leakage current I_{CEO} to be measured.

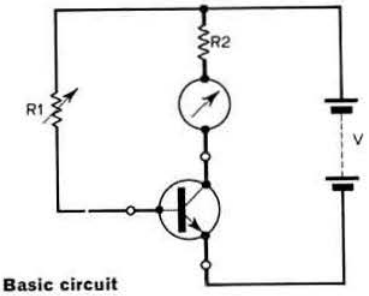


Fig 1. Basic circuit

*Beverley, Bramley Close, Bramhall, Stockport.

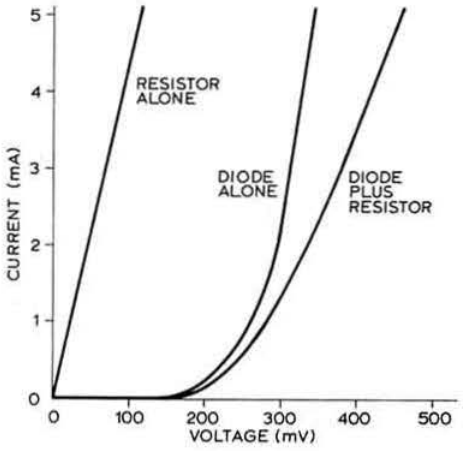


Fig 2. Modification of diode characteristic by R13

Calibration

Calibration consists of two parts, (1) setting the full scale current in the meter, and (2) calibrating the meter in terms of collector current.

(1) Connect leads C and E together and adjust RV1 till the meter reads full scale, when S1 is in either the PNP or NPN positions.

(2) Connect a micro/milliameter in series with a 1MΩ potentiometer and connect between leads C and E. Now, as the 1MΩ potentiometer is varied the current will vary, its value being read on the test meter and marked onto the transistor tester's meter at suitable intervals. The appearance of a typical meter scale is shown in Fig 4.

Operation

The transistor to be tested is connected to the leads E, B and C and S1 moved to NPN or PNP as appropriate. With S2 fully anti-clockwise the meter reads leakage current, which will be typically 100 to 400μA for a small germanium transistor and zero for a silicon one. Then as S2 is moved clockwise the collector current will increase until a state is reached when the meter just reads full scale. The position of S2 will now indicate the current gain.

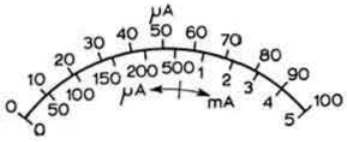


Fig 4. Typical meter scale

Diodes can be tested by connecting the anode to C and the cathode to E, then with S1 at NPN the meter should read 5mA (if the diode is a good one). With S1 at PNP the meter will read reverse diode current which should be negligible for a good diode.

This circuit was originally designed in the course of the author's work and the prototype has been in use for some eight years, often in preference to more sophisticated commercial equipment. Several versions have been built, all giving excellent service.

Acknowledgement

The author would like to thank International Computers Limited for permission to publish this article.

Components list for complete circuit

RV1	5kΩ wirewound potentiometer	All resistors are ¼W 5 per cent, preferably of a high stability type such as a metal oxide or carbon film type.
R2	18kΩ	
R3	27kΩ	
R4	39kΩ	
R5	56kΩ	
R6	330kΩ in parallel with 120kΩ	
R7	390kΩ in parallel with 180kΩ	
R8	220kΩ in parallel with 1·5MΩ	
R9	330kΩ in parallel with 1·8MΩ	
R10	560kΩ in parallel with 1·5MΩ	
R11	1·2 MΩ in parallel with 1·5MΩ	
R12	1·8MΩ in parallel with 1·8MΩ	
R13	22Ω R14 1·8kΩ	
D1	OA47 or similar germanium diode	
M	100μA FSD meter, maximum resistance 4kΩ	
S1	4-pole 3-way rotary switch	
S2	1-pole 12-way rotary switch	

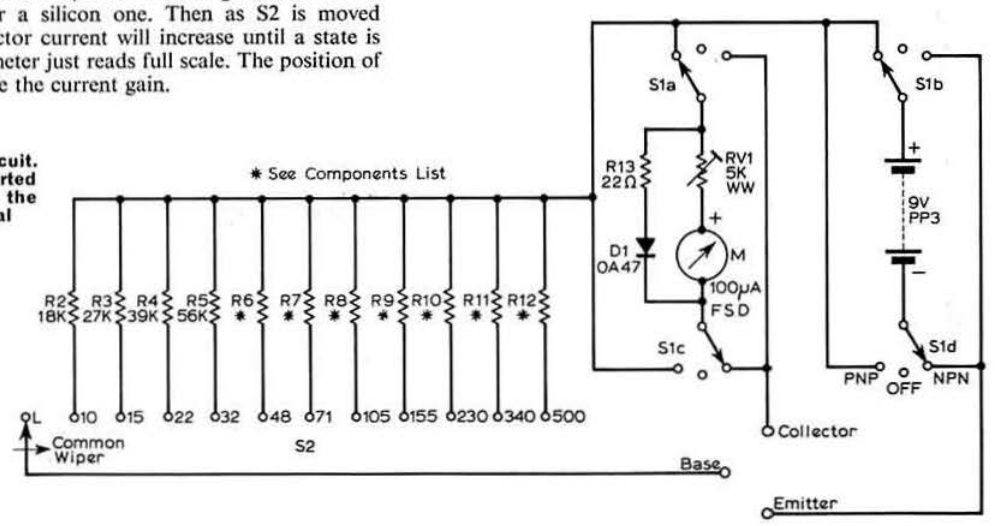


Fig 3. Complete circuit. R14 should be inserted in series with the collector terminal

EQUIPMENT REVIEW

The Heathkit HW17A 2m transceiver

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

SCANNING the advertisement pages of amateur radio journals reveals a lack of ready-made vhf equipment. Converters and other modules are available, but the only complete station appears to be the Heathkit HW17A which is the subject of this review. Available from Daystrom Ltd, Gloucester, the price is £59 10s for the kit, plus 6s post and packing. The equipment reviewed was supplied in kit form and built by J. Mathews, G6LL.

Description

Apart from the transmitter rf line up, the HW17A is fully transistorized. Field effect transistors are used for receiver rf and mixer stages, which are in a preassembled tuner unit together with the bipolar variable oscillator. The tuner unit is mounted on a large printed circuit board which contains the remainder of the receiver except for the audio driver and output transistors. The receiver is a double superhet with a 26·51MHz first i.f. and 2MHz second i.f.; the second oscillator is crystal controlled. Agc is applied to the rf stage and the second i.f. amplifier. A squelch circuit is provided which gates the audio pre-amplifier transistor in the absence of signal.

Three valves comprise the transmitter rf line up, all mounted on a large printed circuit board. A pentode/triode is used as a crystal-controlled double tripler. Crystals in the 8MHz region are used, and a five-position switch provides facility for four crystals or external vfo. The pentode doubler/driver feeds a 8156 pa which runs at 25 to 30W input.

An interesting feature of the transceiver is the transmit/receive switching. By use of diode-controlled high-impedance circuits in the aerial leads, the rf input or output is routed on the right path. During receive, the cathodes of driver and pa are diode blocked, but the oscillator double tripler cathode can be independently returned to ground for "spotting" purposes. All the control switching is performed by the microphone pressel which is two-pole changeover. Surprisingly both input and output of the audio amplifier/modulator are switched on the one pressel switch.

The built-in ac power supply is conventional. A silicon bridge rectifier supplies 15V for the transistors, and a silicon voltage doubler circuit supplies 420V for the transmitter valves. A facility is provided for an external dc supply.

Of all-steel construction, the cabinet consists of two identical halves finished in green crackle paint. A bracket is provided so that the equipment may be suspension mounted in a mobile installation. The front panel contains crystal switch, pa tune and load, driver load, volume control/power switch squelch with pull anl switch, tuning control, circular scale, loudspeaker, S/rf meter and heater/spot slide switch.

The transmit rf indication on the meter is unusual in that the meter is dc offset to full scale and the rectified rf voltage is applied in opposition. One thus tunes the transmitter for minimum indication.

The rear panel contains the S meter zero control, power supply socket, phones socket, power plug for external vfo and two phone sockets—vfo and aerial.

Manufacturer's specification

TRANSMITTER
Power input: 25–30W.
Power output: 8 to 10W into a 50Ω non-inductive load.
Output impedance: 50–72Ω unbalanced.
Transmitting mode: A3 (am).
Modulation capability: automatically limited to less than 100 per cent.
Crystal holders: one HC6/U (small metal can), three FT243s.
Crystal multiplication: 18 times.
Microphone: ceramic PTT.

RECEIVER
Sensitivity: 1μV or better for 10dB, signal plus noise to noise ratio (30 per cent modulation at 1kHz).
IF selectivity: 27kHz at −6dB.
Audio output: 1W with less than 10 per cent distortion, 3·2Ω loudspeaker.

GENERAL
Frequency coverage: 143·2MHz to 148·2MHz.
Temperature range: −20 to +50°C.
Power requirements: 120 or 240V ac, 50/60Hz.
Battery saver: 8W.
Standby: 20W.
Spot: 35W.
Transmit: 100W.
Mobile: 12V dc negative ground.
Dimensions: 14⅜in wide by 8½in deep by 6⅛in high, including microphone and feed.
Net weight: 13lb.

Electrical tests

SENSITIVITY AND SIGNAL TO NOISE RATIO

All tests were confined to the UK allocation of 144 to 146MHz, and over this range the signal to noise ratio varied between 9·5 and 10dB for 1μV pd modulated 30 per cent at 1kHz. The available audio output was in excess of 1W over the whole range.

IF BANDWIDTH

The i.f. bandwidth was measured by feeding in a signal generator at carrier frequency and measuring the frequency of the −6dB points. The nose bandwidth was essentially symmetrical and totalled about 17kHz. This is substantially less than the specified figure of 27kHz, but this is a good thing since the specified figure is somewhat wide on a crowded band.

S METER

The S meter was very lazy and confirmed the rather poor agc figures. From observation with good crystal-controlled converters feeding a communications receiver, S9 is considered to be between 2 and 4μV pd, which is a very big difference to the widely accepted figure of 50μV pd on the hf bands. However, rather conveniently, 26dB gain is typical for a 2m converter so that 2·5μV would read S9 on the hf communications receiver which had been calibrated in the accepted fashion. However, to return to the HW17A, the S meter is not calibrated in S points anyway! It is calibrated 0 to 5.

Meter scale	dB relative to 1μV pd
1	+16
2	+24
3	+34
4	+50
5	+72

Thus, for a conventional S9 signal the HW17A meter would be reading less than 1.

AGC

The agc was only effective at high signal levels and during this test the audio gain had to be turned back and a fresh reference point taken in order that the result was not in error due to audio limiting.

Signal input	relative audio out dB
1μV pd	0
+20dB	+22
+40dB	+22
+60dB	+30
+80dB	+32

If the HW17A is used only with very strong signals in the range 10 to 100μV the agc would be quite good.

UNWANTED SIGNAL HANDLING

For this test, two signal generators were applied through a matching pad. The first was set at 1μV pd on the receiver tune frequency and the second was tuned 250kHz away and its output increased until the wanted signal was degraded by 3dB. This occurred at +74dB relative to the wanted signal and was a good result.

AUTOMATIC NOISE LIMITER

When the automatic noise limiter was switched into circuit, the audio output level fell by 11dB.

Transmitter tests

POWER OUTPUT

The transmitter was fed into a 50Ω Bird Termaline and delivered 10·5W.

MODULATION

Tone was applied to the modulator from an external source and the maximum modulation depth measured on a modulation meter was 80 per cent.

Construction

As mentioned above, Jimmy Mathews, G6LL, built the review equipment from a kit. The following are his comments:

GENERAL

Construction was straightforward, as it usually is with all Heathkit gear. Instructions were concise and clear, with the one exception of references to soldering in of the solder pins used in a few places on the printed circuit boards. In only a few instances were definite instructions given to solder the pin to the foil, and as a result the pins that were not soldered in did not make proper contact and neither the transmitter nor receiver worked until these had been soldered in.

SPECIFIC

The pins of the power transistors were badly bent and required careful straightening. There was no lubricant on the gears of the tuning drive in the tuner unit. An American-type mains plug was supplied.

There was no mention in the wiring instructions of the care needed in soldering into place the diodes and transistors or of the desirability of using heat sinks. This is especially important since many of these units would be wired by inexperienced amateurs.

The total time taken on actual construction—about 22 hours.

On the air

The HW17A was operated into a 24-element array during the March 144MHz Open Contest. Many QSOs resulted and several stations commented on the excellent quality. One station commented that early HW17s suffered from fm but there was no trace on the review equipment. The receiver tuned quite nicely and it was only occasionally that the broad i.f. prevented separation of some stations. One shortcoming that did show up was the agc characteristic, with the volume control in constant use. For the purpose of review testing this was just as well since it reminded the writers that they had forgotten to check the agc characteristic in the laboratory.

General comments

It was decided not to check the stability of the receiver for various reasons, but the calibration at normal room temperature was excellent. However, with very cold weather during the review period and in an outside shack it was found that the drift with temperature from 0 to 25°C was about 1½ scale divisions, which represents about 150kHz. This may sound excessive, but was not found troublesome in practice probably due to the broad i.f. and the absence of a bfo.

After G6LL had built the equipment, naturally he tried it out but had been requested by the reviewers not to touch

any of the preset tuned circuits. He found the receiver rather insensitive.

Initial laboratory tests confirmed the insensitivity and a complete handbook alignment was carried out. All tuned circuits—particularly the 2MHz i.f.—benefited from realignment, but during adjustment of the pre-assembled tuner two of the tuning slugs broke in their formers, although the trimming tool supplied was used, and a fault developed. It was felt that the HW17A should be repaired and checked by Daystrom otherwise the test results could be in doubt. Daystrom reported that they replaced the tuner unit and also an OA95 diode which had mysteriously found its way instead of a 350V silicon diode into the receive lead of the aerial changeover circuit. The review equipment, therefore, can be considered as electrically correct.

Handbook

What can be said about the Heathkit Assembly Manual? It is the type of handbook by which others are judged and most fall short.

The guarantee

WARRANTY

The Heath Company warrants that the parts supplied in its kits (except batteries) shall be free of defects in materials and workmanship under normal conditions of use and service. The obligation of Heath under this warranty is limited to replacing or repairing any such part upon verification that it is defective in this manner. This obligation is further limited to such defective parts for which Heath is notified of the defect within a period of ninety (90) days from the original date of shipment of the kit.

The obligation of Heath under this warranty does not include either the furnishing or the expense of any labour in connection with the installation of such repaired or replacement parts. The obligation of Heath with respect to transportation expenses is limited to the cost of shipping the repaired or replacement parts to the buyer, provided such repair or replacement comes within the terms of this warranty.

The foregoing warranty extends only to the original buyer and is expressly in lieu of all other warranties, expressed or implied. The foregoing warranty is further in lieu of all other obligations or liabilities on the part of Heath and in no event shall the Heath Company be liable for any anticipated profits, consequential damages, loss of time or other losses incurred by the buyer in connection with the purchase, assembly or use of the kit product or components thereof.

The foregoing warranty shall be deemed completely void if acid core solder or paste flux or other corrosive solders or fluxes have been used in assembling or repairing the kit product. Heath will not replace or repair any parts of any kit products in which such corrosive solders or fluxes have been used.

Conclusions

During laboratory and shack tests the reviewers formed the opinion that the HW17A is intended mainly for semi-local working rather than dx, although during spells of good conditions there is no reason why the dx cannot be worked. It is a compact equipment which would not look out of place in a living room or in the front of a car. The broad selectivity would be an advantage in mobile operation provided the car has a negative ground system.

Addendum

Since this review was written, Daystrom Ltd has changed its name to Heath (Gloucester) Ltd and now offers the following more attractive guarantee:

HEATHKIT WARRANTY

Heath (Gloucester) Ltd warrants that Heathkit products will function as represented in the catalogue specifications if constructed fully in accordance with Heathkit assembly instructions. Any kit sold by the Company which, although so constructed, cannot in the Company's judgement be made to function as represented, will be accepted for credit if returned to the factory, carriage paid and complete, within 90 days of the sale.

Alternatively, the Company warrants that any Heathkit constructed fully in accordance with Heathkit assembly instructions and returned to the factory, carriage paid and complete, within 90 days from date of purchase, will be repaired for a service charge not exceeding 5 per cent of the current catalogue price, plus shipping charges. If any malfunction is deemed by the Company to be due to faulty materials or workmanship on parts supplied by the Company, repairs will be carried out without charge. No replacement shall be made of parts damaged by the buyer in the course of handling or assembling Heathkit equipment.

Any repairs carried out by Heath (Gloucester) Ltd after the 90-day warranty period, as above, will be charged at normal service fees, plus shipping charges.

The Company warrants all components used to be free of defects for a period of 12 months from the date of purchase and undertakes to replace at no charge any defective parts returned to the factory within this period, carriage paid and with proof of date of purchase. (Valves 90 days).

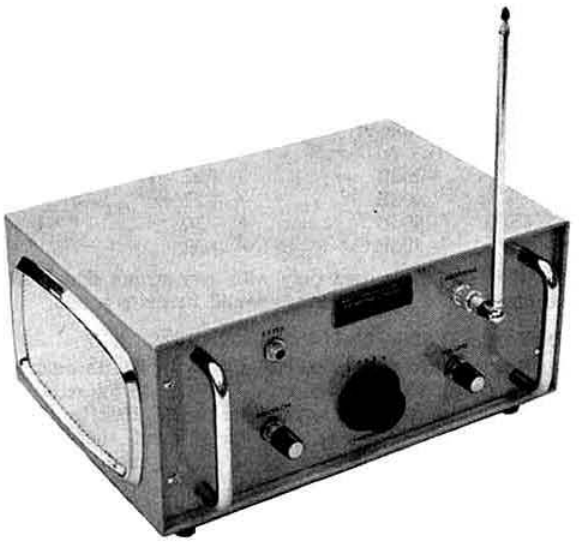
The foregoing warranty is not transferable and applies only to the original purchaser. It supercedes all other guarantees and conditions whether expressed or implied and no other liability will be accepted by the Company for any anticipated profits, or for any injury, damage or any other losses incurred by the purchaser in connection with the purchase, usage or assembly of any Heathkit product.

The foregoing warranty is completely void and the Company will not replace, repair or service products or parts thereof, if acid core solder or paste fluxes have been used, or where any modification to the design has been made by the customer.

New Product

VHF receivers

A new range of vhf receivers has been introduced by RCC Communications Equipment Ltd of 16 Abbey Street, Crewkerne, Somerset. Model TR20/K is for use in the 102·2 to 102·4MHz medical band; model TR20/L is for the 108 to 140MHz aeronautical band, and model TR20/L/M allows up to 10 channels anywhere in the 108 to 140MHz band. Prices of the single-channel models are £60 for each type. The multi-channel model costs £80 for two channels with additional channels costing £5 each extra. All models employ 14 transistors and three diodes and incorporate a built-in speaker. The design is for 25kHz-channel spacing and all models operate from an internal 9V dry or rechargeable battery. Further information can be obtained from RCC Communications Equipment Ltd at the address given above.



The model TR20/L/M for multi-channel use. Dimensions are 5in high, 12in wide and 8in deep

RSGB EXHIBITION REVIEW

The exhibition was opened this year by Major-General J. E. Anderson, CBE, Assistant Chief of Defence Staff (Signals), Ministry of Defence, who is also Colonel Commandant of the Corps of Signals. The ceremony took place at 12 noon on 19 August after which Major-General Anderson toured the exhibition with Dr J. A. Saxton, President of the RSGB.

Space reseach

Dr Saxton is Director of the Radio and Space Research Station at Slough and it was this establishment's display that occupied the stage area in the New Horticultural Hall. This illustrated some of the work currently being undertaken by the station: investigating the effect of the earth's atmosphere on radio communications; the exploration of the potentialities of millimeter waves; and the possibility of improving the forecasting of world-wide ionospheric conditions. The role in the ionospheric work of experiments carried out by satellites and rockets was illustrated, while other exhibits dealt with beyond-the-horizon propagation at centimetre wavelengths and the use of solar radiation in radio-meteorology studies.

Round the stands

Working around the main floor, first in order of stand numbers was the **RSGB Stand.** The bookshop in particular was doing a brisk trade, with the latest publications on sale, and the **Exhibition Stations** GB3RS and GB3VHF were making themselves well known on the bands. On display was the home-constructed equipment entered for the competition and the Signal/One transceiver on Comtec's part of the stand, but more about that later. Adjacent to the **RSGB Reception and Enquiry Desk** was the **World Certificate Stand** showing a number of the various awards and certificates available to licensed amateurs and short-wave listeners. The emphasis was on the new awards programme of the RSGB and the IARU Region 1 award.

The **British Amateur Radio Teleprinter Group** was demonstrating typical amateur teleprinter equipment in operation. Several teleprinters were on display including a German Hellschreiber made in 1940. Also shown were two Creed printers, the 7B and the 75, and the Lorenz model 15. A "breadboard" style layout of a DL6EQ demodulator, or terminal unit, was shown in operation on a closed loop. On the wall behind the stand were displayed "pictures" printed by teleprinters.

The automatic morse speed runs were once again in evidence on the stand of the **Royal Navy Amateur Radio Society.** They also showed a transistorized hf communications receiver, Type RA1218, which has a frequency range of 1 to 30MHz and features an electronic digital counter for frequency measurement, having a frequency setting accuracy of ±10Hz. The receiver is made to mount in a 5¼in by 19in rack, and the price quoted by the manufacturers is £1,780. A KW2000B was in operation on the stand for daily skeds with other RNARS members.

Garex Electronics had on show a range of vhf equipment consisting of transmitters, converters and suitable modulators. Several new products were also on display, including a 2m transmitter/receiver complete with a 12V power supply. The receiver was fully transistorized, covering all of the 2m band, and incorporated a built-in noise limiter and had a 5kHz bandwidth. The transmitter for a.m. used valves, with a QQVO3–10 in the pa running 15W input. The modulator was fully transistorized with speech compression. The unit measured 12in by 4¼in by 8in and, complete with a ptt microphone, costs £88. A 4m version is available at the same price.

Also shown was the Topmobile transceiver. This transceiver is vfo controlled and covers 1·8 to 2MHz, running 10W input. It is an all-valve design and incorporates a bfo for ssb reception and irt for offset receiver tuning. It is of small size, being 7¼in by 4¼in by 7in. It comes complete with a ptt crystal microphone, but less a psu, for £59. £4 will buy you a suitable 12V dc psu. Other items worthy of note were a 2m transmitter for the home station with keying facilities and using a QQVO3-20A in the pa, a matching psu, and 2m and 4m converters with a wide choice of IFs.

Seen for the first time at the exhibition, and displaying several impressive-looking metal towers, was **Western Electric Ltd.** The Telomast, made of galvanized steel, is a telescopic structure and may be extended up to heights of 30, 40 or 50ft. It telescopes down to 10ft and it is stated that one-man erection is possible. For a small hf tri-band beam it would be a good choice.

Dr J. A. Saxton, left, with Maj-Gen. J. E. Anderson, centre, pause at the Armed Forces Amateur Radio Stand

For the more ambitious amateur, the Teletower would satisfy most needs. It is a guyed tower with a retracted height of 25ft, which can be extended to either 42, 57, 79 or 101ft. This tower is hot-dipped galvanized and comes complete with raising winch and climbing rungs to the 25ft level, enabling work to be easily carried out on the aerial and the insertion of locking pins, thereby removing the load on the winch once the tower is raised.

The other tower on show was a self-supporting item labelled the Hamtower. This is a 30ft structure available in 10ft sections, each section weighing about 22lb.

Also available on this stand was a wide range of aerial fittings—boom clamps, insulators, etc. One interesting item was a remotely-operated switch enabling several aerials to be fed by one feedline. The information available stated that no insertion signal loss would be encountered by the use of the device.

The next stand was that of **J. M. Gale.** In the field of aerial masts and riggings, of which he wrote in *Radio Communication*, March 1970, he specializes in the supply of items for efficient (and safe) aerial systems. On display were many useful articles such as pulleys insulators, shackles, high-tensile cadmium-copper wire, etc, all catering for better aerial systems, and also steel-cored copper rods and copper strip for the sometimes much neglected earthing arrangements. Also shown was a model of a 40ft wooden mast, specifically designed for ease of one-man erection, which has been used very successfully at various mobile rallies.

The **RAIBC** stand once again demonstrated the services provided for its 300 or so members. One of the now famous "talking book" machines for the blind was on display. Volunteers are urgently needed for the job of keeping these machines in working condition in many parts of the UK. If you can help in any way or are prepared to undertake other work for the benefit of the incapacitated, G3LWY, the secretary of RAIBC, will be pleased to hear from you.

There were some very interesting items on the **Wireless World** stand, all based on designs published in that journal. One interesting item was a phase-locked loop decoder without the use of coils. The distortion figure is 0·3 per cent at 1kHz at full modulation; separation at 1kHz is 45dB, and the left and right channel gains are within 1dB of each other. The design was published in the September issue of *Wireless World*.

Of interest to /T operators was a television wobbulator described in the August to October 1970 issues of *Wireless World*, for the alignment of 625 line television sound and vision i.f. amplifiers. Also on view was a logic display aid (used to teach Boolean algebra, test logic circuits, or used as an aid for logic circuit design), a surface thermometer ideal for measuring heat sink and transistor case temperatures, and an electronic dice game. Various publications of interest to radio amateurs were also an show.

A wide range of test equipment was brought by **Nombrex Ltd.** This included various rf and af signal generators, CR test bridges and inductance bridges—the models 29 and 31 rf generators shown being fully transistorized. There were two versions of the model 29; the 29S with a 40in total length slide-rule type scale covering 150kHz to 220MHz, and the 29X which has a similar specification but incorporates an integral 1MHz crystal oscillator providing calibration check-points on all ranges. The 31 is the latest model, featuring a frequency range of 149kHz to 350MHz generally within 0·5 to 1·5 per cent at most settings and ranges. The frequency coverage is provided by eight ranges separately marked on a circulator type dial, directly calibrated. The unit output averages 100mV into a 75 Ω load The retail price is quoted as £12 10s.

The companion to the 31 is the 30, which is a transistorized generator covering 10–100,000Hz with sine or square wave output obtainable by switch selection. It operates from a standard 9V battery with provision for external battery or mains supply unit use. The model 32 is a CR test bridge covering 1 Ω–100M Ω on the resistance scale, and 1pF–100μF on the capacitance scale. The model 33 is an Inductance–Q Bridge covering 1μH to 100H on inductance scales and 0·1 to 1,000 on the Q measuring scale. These items are available for £10 10s and £20, respectively.

On the **KW Electronics Ltd** stand there were several items of new equipment on view for the first time, apart from almost the full range of present well-known equipment. The most interesting of the latest KW offerings was a transmitter and receiver, both styled in the famous G line, with the model numbers KW204 and KW202, respectively. Designed for either split frequency work or transceive, these units now completely cover all of the bands from 160m to 10m in nine ranges, with 500kHz segments, unlike other G line items where sections of 15m and 10m were not included in the basic models. Also worthy of note is the return of the use of 6146s in the transmitter pa instead of the tv line output tubes as in the Vespa. Both include mechanical filters and the popular two-speed tuning arrangements of the 2000B.

The transmitter can operate on ssb, cw or a.m. with power inputs of 180W p.e.p., 150W dc and 75W dc, respectively. The receiver features a built-in Q multiplier for notch or peak facilities, and a clarifier to enable exact transceive operation. A 100kHz calibrator is available as an optional extra. Power supplies are built-in. These two additions to the present G line are very flexible and may prove very popular. The KW204 is priced at £135, and the KW202 at £125.

Another interesting new item was the KW105, which consisted of an swr bridge, a dummy load and a Z match. Again, a very useful addition to the shack for £25.

Also on show were the KW Atlanta with its associated remote vfo; the KW2000B also with a remote vfo (available for £35); the KW1000 linear amplifier; and various ancillary gear such as baluns, dummy loads, swr bridges, the EZ matches, CDR rotators, and several interesting mobile aerials as manufactured by Webster and Hustler.

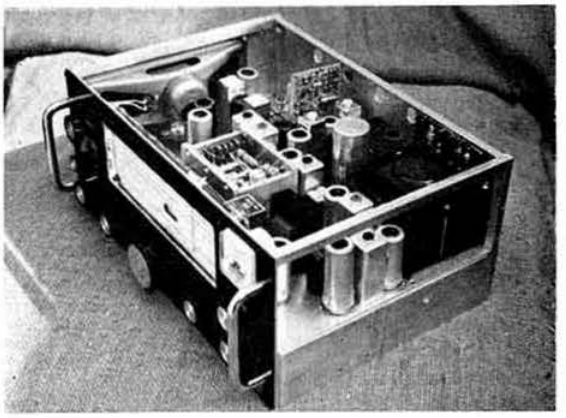
It was the first appearance of **Baginton Electronics** at the exhibition and they were introducing to the amateur market some very useful-looking high-quality obsolescent aircraft equipment, bearing such names as Bendix, Collins, Marconi, STC, etc. A large range of transmitters and receivers suitable for conversion to 4m or 2m were on sale.

Next door, on the RSGB Stand was what must be almost the ultimate in amateur equipment, namely the **CX7** by **Signal/One.** It gives transceiver plus receiver performance on all bands from 160m to 10m (using two identical VFOs, each tuning 1MHz) and a unique dual-receiver system permitting simultaneous listening to two different frequencies (with the ability to transmit on either frequency). Instant band-change is possible without the need for tune-up by the use of a broad-band driver and bandpass pa output filters pretuned from 160 to 10m—provided the load is not a bad mismatch or reactive, otherwise manual tuning has to be resorted to!

The direct instantaneous frequency readout, accurate to 100Hz, is by means of an ic digital counter. The pa delivers 300W p.e.p. input from a rugged, ceramic-metal 8072 tetrode which is conduction-cooled (coupled to a massive extruded heat-sink). Space does not allow us to go too deep into the finer technicalities.

Other features include an electronic cw keyer with a variable speed of 5–50wpm, built in psu, a noise blanker, fast silent digital vox, and a push-button spotting facility to enable an instant check of exact transmit frequency. The price of the CX7 in this country will be about £900 to £1,000.

Ham Radio Magazine was once again represented by the publisher Skip Tenney, W1NLB, who was handing out free sample copies to visitors. Reduced rate subscriptions were being taken.



G. R. Goldsmith's prize-winning entry

Home Constructed Stand

This section of the RSGB Stand was found to be both interesting and disappointing; interesting from the point of the *quality* of equipment on show, and disappointing in the *lack* of it. In all, *eight* items were submitted for show and all were of very good quality. First, in order round the stand, was a single conversion receiver covering 144-146MHz. Built by G6JP, it uses a crystal filter and an i.f. of 10·7MHz.

Described in the September 1970 issue of *Radio Communication* was a vhf dip oscillator, and it was this that G3HBW submitted for the stand. The unit covers 29–460Hz in four overlapping ranges, using plug-in coils and loops as tuning elements.

An impressive-looking digital frequency timer/counter built by G3SRN was next. The frequency coverage had a range from 2Hz to 18MHz, and the timing was from 1μs to 999s. It also incorporated a 1MHz internal standard.

G. R. Goldsmith won the Horace Freeman Trophy for his entry, that of a G3PDM receiver as described in 10/104 of the *Radio Communication Handbook*, incorporating a number of up-to-date developments such as noise-immunity and frequency synthesis. The receiver uses no rf amplifying stages, the aerial feeding straight to bandpass circuits, and then to a balanced mixer. The vfo is solid-state and temperature compensated, and agc is dual time constant audio derived. The sensitivity is claimed as 0·4μV for 10dB s/n.

The Thorogood trophy was awarded to OH2GF for a very compact and well constructed receiver for 3·5 and 14MHz. Briefly, the 50Ω input is fed to a double bandpass circuit followed by a bridge type balanced mixer using four hot carrier diodes. The first oscillator is variable between 5 and 5·5MHz giving a 9MHz first i.f. This is then fed to BF245B FETs in cascode, followed by a XF9B crystal filter, and then two 3N140 dual-gate mosfet amplifying stages. The second oscillator is crystal controlled on 8525kHz giving a second i.f. of 475kHz. Separate envelope and product detectors are provided together with amplified agc. The output stage gives 2W into a 5Ω load, and the power supply is suitable for inputs of 220V ac and 12V dc. It is understood that OH2GF has also constructed a matching ssb transmitter.

Other items on the stand were a digital clock by G3NPA, a 2m solid-state transceiver by G3LFM, and a compact 150W 2m amplifier by G6JP using a 4CX250B which produces 90W for a drive of 2·6W. G3LFM was awarded a five guinea voucher for his 2m transceiver, as was G6JP for his 2m receiver.

Another organization making their debut at the exhibition was **The Amateur Radio Shop.** Popular items of KW and Trio were on display, including the JR310 ssb receiver; several vhf converters, notably the 4MH 2m converter and the Solid-State Modules 2m converter (which was the subject of an equipment review in the July 1970 *Radio Communication*); an interesting mobile aerial system by Tavasu with coils for all bands up to 10m; and plenty of useful second-hand gear. Also creating a lot of interest and doing a good trade was the components section.

A comprehensive display of vhf aerials for amateur and industrial use was the subject of **J-Beam Aerials Ltd.** On view for 70cm use was the Multibeam, a 46-element yagi, giving a 20dB gain over a dipole and weighing 6lb; several 2m and 4m yagis, stacking and

matching harness to enable very high gain arrays to be built up, and an extensive range of brackets and mounting clamps, etc. For industrial usage there were several omni-directional arrays on display, including a fibre-glass end-fed dipole for 450–470MHz. Two Stolle aerial rotators were also in operation, one being a transistorized unit and costing £18 10s, and the Memomatic at £14 10s.

Practical Wireless, Practical Electronics and **Practical Television,** together on one stand, showed a number of projects for the home constructor and experimenter. Items on display were to designs published in the "Practical" magazines and included a light-beam telephone, an organ pedal bass unit, an electronic digital combination lock, an amateur bands communication receiver a 625-line television receiver, the PEAC analogue computer, and a proton magnetometer which is used for the detection of ferrous objects.

Lowe Electronics Ltd, which had two stands, was again displaying a large array of Japanese amateur equipment. This including the Sommerkamp FT250, FTdx150, FTdx400 and FTdx500 transceivers, the FR100B receiver, and the FL200B transmitter; the Inoue IC700 series; and the new Frontier Electronics products such as the FE-600, a 200W ssb transceiver, the FE-1200, a 500W ssb transceiver, and the FE-3500 linear amplifier giving 1500W p.e.p. from five 6KD6s. In addition, the display included second-hand gear, test equipment, accessories and small components of all types.

The latest piece of equipment from Inoue was a 2m fm transceiver. It is all solid-state, has six front-panel selected crystal controlled channels, delivers 20W input with 12W or more out, a double conversion receiver with IFs at 10·7MHz and 455kHz and using an fet front end (sensitivity is claimed as better than 0·4μV for 20dB quieting), a hash filter for mobile use, and a built-in speaker. The power requirements are 12–15V dc (negative earth). The unit measures 2·8in high, 6·3in wide, and 7·3in deep weighs 4·4lb, and comes complete with microphone at £80.

Adcola Products Ltd was showing a complete range of its soldering instruments with ratings from 19W to 90W, together with replacement bits, de-soldering tools, and various ancillary gear such as printed-circuit board holders, stripping tools, etc. The latest iron to emerge from Adcola was named the Invader, which was on show publicly for the first time at this exhibition. This instrument is very light in weight, being only 2oz complete, with the handle specifically designed for cool operation and enabling the instrument to be laid on the bench without burning it. The element is a plug-in type allowing a complete change in 90 seconds, These irons are available from stock at several operating voltages and temperatures, ie 6, 12, 24, 50, 11, 220 and 240V with ratings between 250°C and 450°C, but any specific voltage from 6V to 250V, and temperatures from 250°C to 440°C, can be supplied on request at no extra cost.

The **British Amateur Television Club** had their stand nearby at which demonstrations of /T equipment were in progress.

Nearby, the **BBC World Radio Club** was supporting the exhibition this year with a display of information about its activities.

A joint effort by the services provided the next stand under the title **Armed Forces Amateur Radio.** Two stations were in evidence, the Royal Signals ARS using Heathkit equipment, and the Royal Air Force ARS with Collins equipment. At one end of this stand was a replica of the first service wireless transmitter; designed in 1896 it was installed in HMS *Defiance* and gave reliable signals over a distance of 5,800yd at 10wpm! The oscillator was fired by an induction coil, capable of giving a 6in spark from a primary voltage of between 12V and 24V. The primary consisted of 300 turns of No 16 swg dsc, and the secondary, 12lb of No 36 dsc wound in double pancake sections. The receiver used with the installation was a coherer and a relay which worked a morse inker.

The stand also showed various equipment previously used by the RAF, namely the T19 transmitter and T20 receiver (used for point-to-point working between RAF stations), and the R1082 and T1083 receiver and transmitter in common use up to 1940.

Next, working around the main floor, was another new name at this year's show, **E.M.S.A.C.,**abbreviated from Electronic & Mechanical Sub-Assembly Co Ltd. The most striking item on show was a 23ft vertical aerial known as the GV1. This is an all-band aerial covering 1·8-30MHz, the vertical section being adjustable in height from 7 to 23ft. It is to be used in conjunction with a suitable tuning unit such as the TU2 available from the same firm. Also in the aerial line was the GD1, a G5RV type aerial with 102ft horizontal top, supplied with 110ft of feeder. Various converters were also on show, the CN1, a 2m nuvistor converter with an i.f. of 28–30MHz and a noise factor better than 3dB, and the CN3, a 4m version of the CN1. These items are available complete with PSUs and mounted in one cabinet (titled CN2 and CN4, respectively), for £15 each. Without the PSUs they are available for £9 10s each. An igfet 2m pre-amp was also being displayed. Entitled the PR1 it gives gain in excess of 15dB over the noise level and costs £4 15s. The CN5, a 160m converter with a 600–800kHz i.f. (ideal for the car radio) is available at £8 10s. Another useful item shown was an rf-actuated keying monitor. Made to be inserted in coaxial line of between 50 and 75Ω it will operate using powers between 5 and 200W.

Angus McKenzie are specialists in the hi-fi market, and on demonstration were several high-quality units from the big names in stereo equipment such as Leak and Revox. A new item, it seems, was a stereo tape cassette deck by Dolby employing the so-called Dolby noise reduction system. The playback was a superb reproduction, and by using this system a claimed drop in background noise level of 10–15dB is attained,

The **Ministry of Posts and Telecommunications,** as the UK licensing authority, deals with various aspects of transmission and reception, and methods of suppressing or eliminating interference provided the main theme for its stand this year. Equipment such as panoramic receivers for identifying signals, and tracing receivers for measuring field strength and aerial feeder voltages were on the stand; plus a section with various explanatory diagrams and graphs, along with an assortment of high-pass, low-pass and mains filters, showing how to eliminate the offending signals. A chart was also on display showing the international frequency allocations.

Telecomms had a wide range of articles for sale, ranging from scopes to resistors. Apart from the second-hand and ex-government equipment, Telecomms is also a Trio stockist and a range of Trio receivers and transceivers were also being shown.

Information on various educational schemes and their related examinations was provided by the **City and Guilds of London Institute,** most of it dealing with the electrical industry. On hand were copies of the syllabuses and past examination papers of many courses connected with telecommunication, radio and tv.

A range of instant-heat soldering guns and kits were shown by **Weller Electric Ltd,** covering all sizes of irons from 15 to 175W. For the well-known Marksmen range of irons there were several bench holders on show, acclaimed for the way in which they hold the iron safely. Temperature controlled low voltage and mains voltage irons, together with a variety of their special attachments for soldering and de-soldering of flatpacks, and general use, were also on view.

VHF Communications is a magazine familiar to most vhf enthusiasts, containing excellent articles on up-to-date vhf/uhf equipment, and **Microwave Modules Ltd,** apart from acting as agents for this magazine and displaying copies of it, was also selling printed circuit boards, transistors, capacitors and other components for some of the published designs. Also included in the display were mosfet converters for 4m, 2m and 70cm, and a 5W solid-state transmitter for 144MHz, labelled ATK–1, along with the ATK–2 and ATK–3, its associated modulator and dc psu, respectively.

Radio Shack Ltd had its stand packed full of modern equipment, as usual, making it impossible to give an itemized list of everything on display. One new item shown from the firm of Ten-Tec, manufacturers of the popular squeeze keyers, was a cw synchrodyne transceiver called the Power-mite. Two versions were on the stand, the PM2 and the PM3. The PM2 is all solid-state vfo-controlled and covers 80m and 40m, the transmitter consisting of an oscillator-buffer driving a 2W transistor amplifier. The receiver requires less than 1μV to give a readable signal and has a selectivity of 2kHz. The unit measures 10$\frac{3}{4}$in wide, 4$\frac{1}{2}$in high and 6$\frac{3}{4}$in deep. The PM3 is similar in size and performance to the PM2 but covers 40 and 20m and has an approximate power input of 5W. Both items require 12V dc at 20mA on receive, the PM2 requiring 200mA on transmit and the PM3 500 mA on transmit. These particular units are available at an extremely low price.

Other new items worthy of note include a 2m transverter from Drake, the TC–2, giving 180W throughout the full 2m band and using a 20m injection signal; and the SPR–4 also from Drake, which is a solid state receiver giving coverage which can be programmed to suit all interests, ie swl, marine, amateur, etc. Apart from stocking transceivers etc, Radio Shack also had a wide variety of aerials and various mobile whips on display, including that of Ham Cat.

Lastly we came to the **Professional and Academic Book Exhibitions Stand** where books emanating from those of Britain's leading publishers concerned with radio and its associated fields were available. These included many works on radio engineering, communications and electronics in general.

TECHNICAL TOPICS

A monthly feature by PAT HAWKER, G3VA

THERE are two related views of amateur radio—both of which have been expressed recently by outside observers —that need to be corrected. One is roughly that "yes, amateur radio did a magnificent job in opening up the short-waves—but that was 50 years ago." The other is the view that with so much professional research, amateurs today are really only kidding themselves if they think they can contribute significantly to the advancement of radio communication—in other words, "it's a fine hobby, but of course really you are only playing at science and electronics."

The idea that the amateur contributions to fundamental radio science are all in the distant past, and that nowadays the professional researchers have got it all taped, is just not borne out by the facts. For instance, no professional research project could hope to employ the number of stations and observers available in the amateur service. And, for the historically minded, there is plenty of evidence that useful fundamental contributions have been made by amateurs in every decade, even though these may not be as spectacular as the opening up of the short-waves in the early 'twenties. But when challenged, it is difficult to respond satisfactorily, since by the time that a contribution is universally recognized as being significant, it is only to be expected that the main centre of activity will have shifted to the professional researchers.

Transequatorial propagation

For example, some of us suspect that one of the most significant discoveries of the past few decades is transequatorial (TE) propagation and the related chordal hop modes.

Both can be traced back directly to amateur radio for the initial observations—indeed it took many years for amateurs to convince the "professionals" that, in TE, they had uncovered something really quite remarkable. Later, partly as the result of a classic paper by Southworth ("Night-time equatorial propagation at 50MHz", *J. Geophys. Res.*, 65 (1960) pp601-607) TE began to be investigated; a number of important research projects have all confirmed the early work by amateurs. It must be admitted that, to begin with, the amateurs once again "stumbled" rather than theorized into this phenomenon, simply by being active on the right bands (initially 50MHz) at the right times and looking for dx signals. But this was soon followed by much concentrated effort (see, for example, R. G. Cracknell, ZE2JV's description of the work of F9BG, G4LX, ZC4IP, ZC4WR and ZE2JV, (*QST*, December 1959) and the account of the 28MHz ZD7WR beacon work from St Helena (*Radio Communication* December 1968).

But if it is important that the professionals should be kept aware of amateur work, then equally it is vital that amateurs should know what the professionals are doing with these ideas. Recently published results of a Japanese/Australian study, which formed part of the IQSY programme, have very important implications for those interested in the 70MHz band. It also shows the need for *international* allocations, preferably at both 50 and 70MHz.

For this project ("Experimental Results of VHF Transequatorial Propagation" by K. Tao *et al*, *Journal of the Radio Research Laboratories, Japan*, January 1970, which follows an earlier paper by I. Kuriki, July/September 1968) confirms quite clearly that (as forecast by amateurs) the TE mode extends, even during years of low sunspot activity, to frequencies above 70MHz. Observations were made in southern Japan, during the years 1965 to 1968, on three 500W beacon transmitters located in northern Australia—a path length of 4,850km, (3,000 miles), roughly north/south, spanning the equator. The beacons operated on 32·8MHz, 48·5MHz and 72·65MHz from a location near Darwin (12°20′S, 130°50′E) with the receiving site at Yamagawa (30°12′N, 130°37′E). Although fairly high Yagi four, five and six element arrays were used, nothing about the set-up puts it out of good amateur performance standards.

The article provides detailed records of the reception of the Australian signals on all three frequencies. On 32MHz it was found that TE-mode propagation regularly occurred during a large part of the time (except for a few hours in the mornings), despite the low sunspot numbers. On 48MHz *and* 72MHz, reception was considerably less frequent than on 32MHz, but took place at good strength on many occasions, mostly evenings/nights (about 2000—0200 local time on 48MHz, about 2000—2400 local time on 72MHz) and primarily around the equinoxes; in other words from September to October and March to April.

The Japanese workers believe that the night-time TE-mode differs from that in daytime and is closely associated with the anomaly in the equatorial ionosphere and "Spread F" conditions. It is suggested that both the layer tilt and scattering processes affect this type of TE. The night-time fading range is about 10dB compared with violent interference type fading in daytime (to a range of about 25dB). This TE propagation follows Spread F conditions and *appears to correlate with local Sporadic E.*

Equatorial Spread F is well known to many amateurs as it often causes violent distortion on radio transmissions to the tropics. It is said that at one time operators at Singapore noted that radio communication seemed to break down frequently in the evenings; since this was about midday in the UK they referred to it as the "Whitehall lunch-time effect".

It is hoped that this brief account of the Japanese work will stir up further interest in TE with its potential for more vhf dx. While the UK is probably rather too far north for regular 70MHz TE operation, the 28MHz ZD7WR beacon

showed that this is by no means out of the question. Equally interesting is the further evidence of the correlation of these modes with Sporadic E, and one suspects that some of the interesting east-west paths associated with auroral and Sporadic E (such as those being exploited by Geoff Kennedy, VE2AIO) may sometimes be of a chordal hop form, rather than the "multi-hop Sporadic E" that is usually suggested.

Amateurs have every reason to be pleased that this current professional interest in TE can be traced back directly to amateur operation in the period 1947-50, when it was shown clearly that long-distance contacts could take place on frequencies and at times when these would be expected to be well above the "maximum usable." A clear case of history repeating itself, and underlining the value of the amateur service without going back 50 years.

Solid-state receiver design

"The day of the high-performance hf solid-state receiver has arrived—there are enough examples now in the realm of military and commercial hardware to justify this conclusion." This is the uncompromising opening to a valuable article—"The solid-state receiver"—on the subtler design problems of advanced hf receivers by William Sabin, W0IYH (*QST*, July 1970). W0IYH is a member of Collins Radio but he makes it clear that the receiver he has developed for his own amateur use is not going to appear as a factory-built model. Another indication of the advancing status of semi-conductor receivers was provided at the recent RSGB Show in the form of the extremely compact and neat receiver made by Jukka Vermasvuori, OH2GF, and brought over by Risto Halinen, OH2MK, editor of *Radio Amatööri*. This receiver is a later, all-band (using pre-mixer vfo) version of the two-band design mentioned in *TT* (April 1970) where a diagram of the front-end was provided. We shall have more to say on this effective Finnish approach to compact receivers another time.

For, in practice, there are significant differences between the design ideas of the OH2GF and W0IYH receivers, and one suspects that the W0IYH receiver would prove a much more difficult animal to reproduce. W0IYH stresses that advanced performance of semi-conductor receivers is achieved only through meticulous engineering and careful measurements. But he indicates that after many years during which it has been constantly necessary to warn readers of the extreme difficulties of achieving, with semi-conductors, a performance truly comparable with that of good valved units, it is at last possible for the amateur to build receivers as good as those using valves while at the same time retaining the advantages inherent in a semi-conductor model.

The W0IYH design is basically a triple conversion unit but with a high-selectivity filter in the first i.f. and with the well-known problems of multi-conversion tackled carefully. He pays full regard to questions of gain distribution, signal levels, noise figures and bandwidths: Fig 1 outlines the early stages.

His aerial input arrangement and first mixer stage are of considerable interest. He achieves a 3dB noise figure with a balanced junction fet mixer, even though the overall noise figure of the receiver is around 8dB; this allows him to dispense with any rf amplifier and yet to use an ingenious high-selectivity triple-tuned filter ahead of the mixer, minimizing the amplitude at the mixer of all undesired signals, even on closely adjacent frequencies. By having all of his signal-frequency selectivity ahead of his first semi-conductor stage, he obtains greater immunity to loud local signals than would be possible with a broader-band input arrangement. He has only 9·5dB effective gain up to his 3·395MHz crystal filters.

W0IYH indicates the importance of low injection source noise in achieving a low noise first mixer, showing the importance of oscillator noise sidebands; he advocates the use of a balanced mixer (Fig 2) to reduce the influence of this noise by about 25dB. He also delivers an important reminder that (at least for the cw operator) it is not sufficient to achieve high-selectivity at low signal-level early in a receiver, and then to forget about the noise bandwidth of the later stages of the receiver. His design goes to a lot of trouble to make the noise bandwidth of the i.f. chain only slightly wider than that of the crystal filter. He points out that if the i.f. chain is not quiet (meaning low noise and *narrow bandwidth*) then the front-end gain must be increased, degrading receiver performance, in order to override sufficiently the i.f. noise level: "this problem is especially serious in cw because the narrow-band noise coming through the filter is less able to compete with a broad, noisy i.f. The result is a high 'hiss' level and poor sensitivity."

He uses this valid argument to justify what is clearly a complex and expensive approach to receiver design, including as it does the further conversion to a final 50kHz i.f. While only a few amateurs may attempt to duplicate the receiver which he outlines in broad terms, he presents many design points which deserve to be studied carefully by anyone interested in modern receiver design.

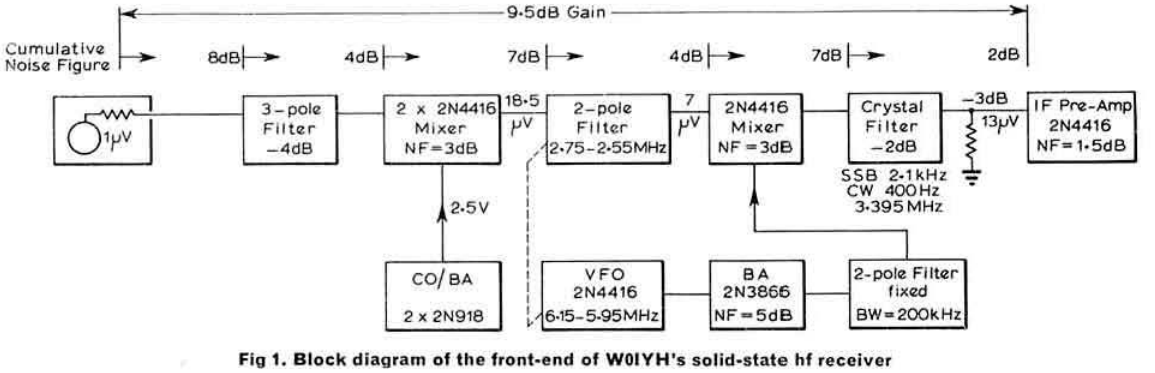


Fig 1. Block diagram of the front-end of W0IYH's solid-state hf receiver

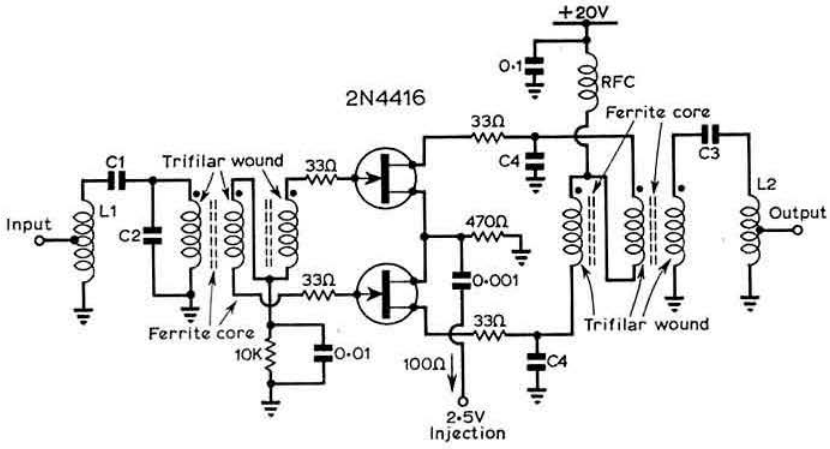


Fig 2. The first stage balanced-mixer with balancing transformers at the input and output. L1, C1 and C2 form the input tuned circuit tuned to signal frequency; L2, C3 and C4 are the intermediate frequency output circuit

For example, the three-pole minimum-loss bandpass filter used between aerial and first mixer is unusual and little known: see Fig 3; though only this basic information is given with no attempt to provide any precise details for the various bands. He points out that it is a triple-tuned, bottom-coupled array using high-Q toroid inductors, based on a filter approach suggested by S. B. Cohn (*Proc IRE*, August 1959, pp1342 to 1348). W0IYH considers that when properly designed (and one has a feeling this may not be too easy) this type of filter has the property that for a specified number of tuned circuits, unloaded coil Q, and filter noise figure, it will provide the best possible rejection outside its passband: basically it is a bandpass filter derived from a low-pass prototype having *equal* elements.

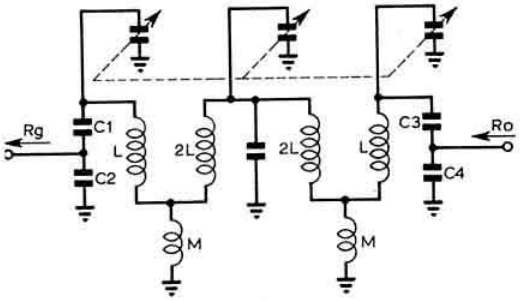


Fig 3. The tunable three-pole minimum-loss bandpass filter provides a high degree of signal frequency selectivity before the first mixer. The ratio of C1/C2 should be adjusted for correct matching to the aerial, while the ratio C3/C4 provides the required output impedance

IF breakthrough hints

Some degree of i.f. breakthrough must have worried almost every amateur who has ever used a vhf or hf converter in front of a receiver used as a tunable i.f. strip. It is often extremely difficult to eliminate entirely very loud stations working in the range chosen to form the tunable i.f.; only too often these signals persist despite every effort to improve screening, so that practical hints in this area are always useful.

W. H. Allen, G2UJ, mentions that he was particularly troubled at times by breakthrough of commercial cw stations when tuning 4 to 4·7MHz in conjunction with his 70MHz transistorized converter (*Radio Communication*, May 1968). He uses (as a tunable i.f. receiver) an R1475 which, although particularly well screened, can resolve the stronger signals without an aerial being connected. On this receiver there is a 30kΩ potentiometer connected between ht negative supply and chassis to provide a source of negative control voltage, and it turned out that it was on the negative rail that signals were being picked up—but *not* on the positive supply line. Bypassing the negative line to chassis, right at the input socket, with a 2,000pF capacitor rendered the receiver almost completely dead in the absence of an aerial. The value of this capacitor was not found to be critical, but silver-mica or stacked foil types were preferable to tubulars or disc ceramic types.

However, on connecting the 70MHz converter, strong cw signals again became audible. It was found that pick-up was on the positive supply line from the 12V accumulator used to supply all transistor gear at G2UJ. There appeared to be a degree of amplification of these signals in the converter mixer stage. Bypass capacitors across the 12V supply line made no difference; an rf choke in the positive line reduced the breakthrough considerably, but still not sufficiently.

The next move made by G2UJ was to connect a screened parallel tuned circuit (broadly resonant to the centre of the tuning range) in series with the positive supply line, as close as possible to the screening box of the converter. This proved entirely satisfactory for any given interfering station, but it was not possible to provide a sufficiently wide response, while maintaining complete rejection, despite the use of various *LC* ratios and/or resistive damping.

A complete solution was provided by the use of a toroid inductor wound on a ferrite ring. Several coils were made up on different sized rings, with various *LC* ratios; all performed satisfactorily. G2UJ has no details of the ferrite rings but mentions that a ring measuring 1in outer diameter, about ¾in inside diameter and ½in deep, wound with 5ft 6in of No 22 dcc wire, leaving only a small gap, hit the middle of the band (4·35MHz) when resonated with a 22pF capacitor. All breakthrough signals in the range 4 to 4·7MHz were reduced in strength to the point where they were inaudible in the presence of the converter noise.

Watch those 1,000pF disc ceramics

Alan Williams, G3KSU, draws attention to the "constant misuse" of 1,000pF disc ceramics as decouplers "regardless of the frequency in use". The question of capacitor types and values for effective bypassing is one which used to receive more attention than it does today. Useful references are articles by Philip Rand, W1DBM (*QST*, February 1951) and George Grammer, W1DF (*QST*, April 1951) both of which indicated the resonant frequencies of typical bypass capacitors with leads shorted. For example, W1DBM showed that small mica capacitors resonate at about 23MHz for 1,000pF, rising to 225MHz for 10pF. W1DF provided similar information for various other types of capacitors, and showed that nominally 1,000pF disc ceramics are in fact quite often nearer 2,000pF. While disc ceramics have fairly low inductance, capacitor manufacturers usually recommend that for decoupling at frequencies above about 200MHz coaxial tubular types (that is, "feed-through" types) should be used, as these retain decoupling efficiency up to uhf.

G3KSU considers that 1,000pF disc ceramics should be used for decoupling only up to 30MHz; he suggests using 380pF to 70MHz, 100pF to 144MHz. At uhf, conventional 1,000pF types are well past resonance and appear decidedly inductive. He also mentions that G3GVM has recently found that the value of certain ceramic capacitors can decrease by as much as 55 per cent when subjected to a large change of applied voltage.

Wide-swing VXOs

An article on "practical vxo design" by Gus Gerke, K6BIJ (*ham radio*, August 1970) reports achieving stable swings of up to 50kHz on 7MHz with a vxo using 7MHz fundamental, FT241-type crystals. This is an appreciably greater frequency variation than is usually considered as being possible for really stable vxo operation; although it is worth recalling that the original 1940 patent for variable frequency crystal oscillators certainly suggested that such wide variations could be achieved. K6BIJ provides several circuits, one for a transistor vxo which he claims provides stable 50kHz padding on 7MHz: see Fig 4. The coil L1 is 40 turns of No 32 gauge wire closewound on a $\frac{3}{8}$in slug-tuned coil former. Transistor types are relatively non-critical (K6BIJ suggests 2N706, 2N2219, 2N3662, 40237). He indicates that for minimum thermal drift the supply voltage should be kept low. He also suggests that when optimum values of C2 have been found (using a two-gang variable) it is possible to replace this by two fixed silver-mica capacitors of appropriate value (usually about 200pF). The two remaining variable capacitors should preferably have straight-line-frequency characteristics to provide linear vxo calibration. We would be interested to have observations from anyone trying this circuit for hf or vhf operation. K6BIJ states that the stability of his vxo is adequate for hf ssb and for vhf operation, and has replaced vfo operation entirely.

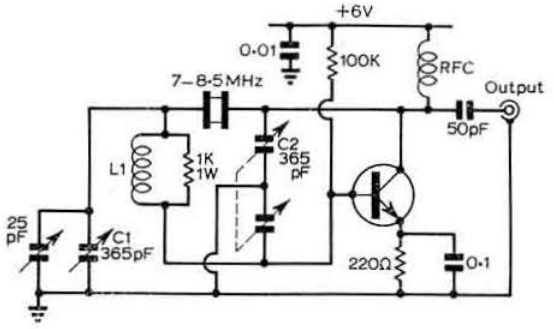


Fig 4. K6BIJ's vxo circuit which is claimed to provide up to 50kHz variation on 7MHz and to have given good results on cw and ssb. Details of the loading coil L1 are given in the text

Beverage aerials

Top-band dx enthusiasts will probably need no reminding of the Beverage aerial which has recently been used on both sides of the Atlantic for the reception of 1·8MHz signals. Several references to these aerials have appeared in W1BB's *160-metre DX Bulletin*. But there must be quite a few *TT* readers who have only a hazy idea of this highly effective directional receiving aerial although it has been around for almost 50 years.

So, a few words of introduction. The Beverage aerial (originally called "The Wave Aerial") was developed by Harold Beverage (one-time W2BML), Chester Rice and Edward Kellogg in the early 'twenties for the reception of commercial long-distance stations operating on the very low frequencies. In its simplest form it consists of a very long straight wire, extending sometimes up to several miles in length, mounted on quite low poles, and correctly terminated at the far end to earth so as to prevent reflections. Not exactly an aerial for the amateur with only a short garden.

But a check with the original description of this aerial (*American IEE*, 1923) has brought to light several features which are seldom mentioned. For instance, the normal system on vlf was to use two wires with a reflecting transformer at the far end and the terminating impedance at the receiving end, making it possible accurately to null out interference. Then again, although one normally thinks of the Beverage as being many wavelengths long, this was always impossible at vlf, and the paper suggests that pronounced directional effects can be achieved with an electrical length of $\frac{1}{2}\lambda$ to 1λ—this puts a different order of magnitude on the real estate needed on hf! The Beverage is more or less related to the vee-beam and rhombic aerials, and is not limited to low frequencies. Very much to my surprise, I found that the original 1923 paper actually showed how the electrical length of the aerial could be reduced by "stretching" the wire by inserting a series of capacitors at intervals along its length (the basis of G6CJ's very interesting "Loaded wire dipoles" described in the *RSGB Bulletin*, July 1961).

One of the most famous early Beverage aerials was that erected by Paul Godley at Ardrossan in Scotland during the vital amateur transatlantic tests of 1922 when his 400-metre long wire collected signals from a number of American amateurs who (despite the classic phrase "200 metres and down) were using around 200 to 300 metres. I can recall using a wartime Beverage aerial about $\frac{1}{2}$-mile or so long, on frequencies of the order of 3·5 to 9MHz; it was reckoned to be a very effective directional receiving aerial.

So far as signal *collecting* properties are concerned, there is little point in stringing this type of aerial higher than is required for ordinary security and to pass over obstructions. One of the organizations currently using Beverage aerials for the reception of overseas mf broadcasting stations has recently been carrying out some theoretical studies on

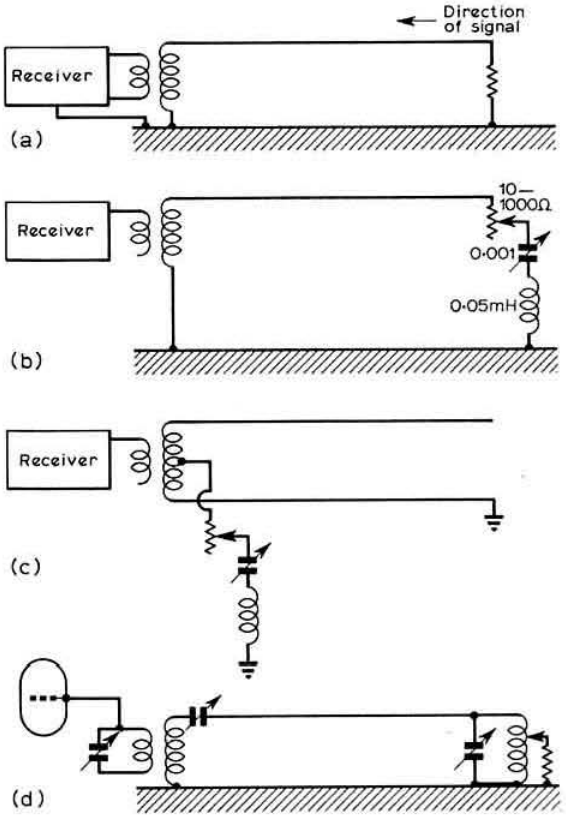


Fig 5. Some variations of the Beverage or wave aerial. (a) is the basic arrangement; (b) was suggested in 1923 for "short waves" (ie less than 450m); (c) is a variation of (b) enabling the termination to be at the receiving end; (d) from 1931 edition of the *Admiralty Handbook of Wireless Telegraphy*. Arrangements (a) to (c) come from the original 1923 paper

optimum lengths and heights to see if any improvement could be obtained by raising the present aerials (from 1,000ft to 2,500ft long and about 10ft high) to a height of about 30ft. Generally, these studies indicate that the first effect of raising height is to *degrade* sidelobe performance: the only real advantage in raising height would seem to be where extremely long aerials are possible, since additional height lowers the rate of attenuation. It is also shown that by connecting two Beverage aerials in parallel it is possible to slew the directivity over a useful angle. The study suggests that these aerials are useful for the reception of signals arriving at angles of, typically, about 5°.

Prof J. Brown of Imperial College has recently stated that a communications problem at present being investigated is the design of a single aerial system capable of receiving simultaneously many transmissions on different frequencies and from different directions. A proposed solution uses the Beverage aerial as the element of an array with combining networks, originally developed for microwave systems, as the means of providing simultaneous reception capability.

One way and another, it does seem as though we ought to be thinking rather more about the old Beverage, not only for 1·8MHz, where one needs some hundreds of feet of wire, but possibly also for hf (and even vhf?) bands, where the length of wire could be quite modest. It is worth remembering that some amateurs (and some of the early vhf radio link systems) have made very effective use of rhombics on vhf. And it is being increasingly recognized that there are advantages to be gained from using a different aerial for reception than for transmission.

Adjustment gadget for ssb transmitters

Alan Carpenter, 9J2RQ/G3RQT, forwards from Zambia the circuit diagram (Fig 6) of a simple gadget he feels will be found of general interest. Basically this is an 800Hz sine-wave oscillator having a continuously variable mark/space (on-off) ratio which can be varied all the way from about 1:5 to 5:1, adequate for adjusting any ssb transmitter. Transistor types are not critical, and npn devices could be used provided that the polarities of battery, electrolytic capacitors and diodes are reversed.

9J2RQ has just completed the design of a solid-state morse decoder with print-out on to paper tape capable of

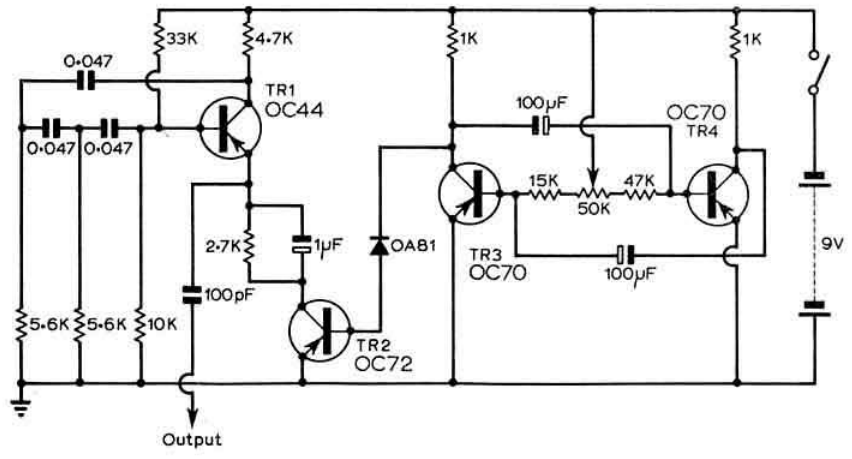


Fig 6. 800Hz sine-wave oscillator with variable on/off ratio for ssb transmitter adjustment by 9J2RQ

speeds up to 200wpm. It could decode even faster but the time limitation will be the print head which he is having epccially built; this is designed for use with a companion sender now in the design stage. The decoder has automatic speed compensation and the total cost (not including print head) will be in the region of £70; this will also take rtty. Feel like a 200wpm contact?

Transistor tester

For anyone who wants to be able to carry out rapid go-no-go checks on large numbers of surplus transistors, a useful-looking tester is described by William Hinds in *Electronic Design* (7 June 1960): see Fig 7. This tester, it is claimed, provides a rapid check of the quality of the junctions, shows whether it is a pnp or npn device, and indicates whether the material is germanium or silicon. This is done by applying a low ac potential across the base/emitter and base/collector junctions in turn, with a 50-0-50μA meter in series.

With a transistor inserted in the test socket, the meter will either deflect or not deflect; if there is no deflection then the junction is defective (either oc or sc); if the junction is good, the meter will deflect to one side or the other, depending on whether the device is npn or pnp. The magnitude of the deflection will be greater for a germanium junction than for a silicon junction. The base/emitter and base/collector junctions are tested at a flick of the switch.

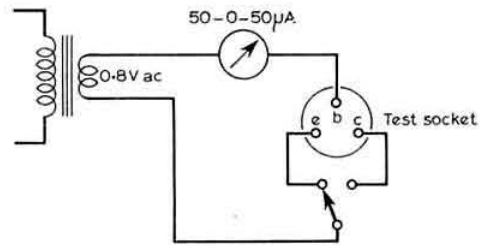


Fig 7. Simple transistor tester indicates whether the junctions are good, whether npn or pnp, and whether germanium or silicon

The changing pattern of TVI

As revealed in the latest MPT data

by PAT HAWKER, G3VA

Exactly a year ago (*Radio Communication*, October 1969) detailed information was presented on the interference to radio and television reception as shown by the cases investigated by the Post Office during 1968. While these figures remain broadly representative of the present situation, some interesting differences in the general pattern of interference can be detected from a Ministry of Posts and Telecommunications report (Memorandum RTD 1.1.2/9) giving similar information on cases investigated during 1969, even though this represents a period in which the start of the television uhf duplication project came only at the very end, and thus had limited effect.

The total number of cases "closed" during 1969 was 71,311 (1968 70,254), but one notes a fairly substantial increase in the number ascribed to amateur transmitters: from 1,151 in 1968 to 1,442 in 1969. In other words, amateurs were found responsible for almost exactly 2 per cent of the interference cases—still a very small percentage but a significant increase on the just over 1·5 per cent of 1968.

An analysis of these cases for the various broadcasting bands (see Table 1) reveals that, in absolute terms, the most significant increase is that in Band III (174-216MHz, Channels 6 to 13) which has shot up by 54 per cent, to within hailing distance of the notorious Band I (41-68MHz) problem. This could reflect two main trends: more 144MHz amateur operation, partly as a result of the many new Class B licences; and the greater susceptibility of transistorized front-ends in television receivers. In other words, it looks as though more interference is due to blocking and cross-modulation from strong local rf fields, rather than due to harmonics from transmitters.

Table 1. Interference from amateur transmitters

Band	1968	1969	per cent change
LW/MW	55	48	— 13
Band I	725	821	+ 13
Band II	34	44	+ 29
Band III	319	492	+ 54
Band IV	9	18	+100
Band V	3	8	+166
Mobile Radio	6	11	+ 83
Total	**1,151**	**1,442**	+ 25

The increasing incidence of uhf interference (Band IV 470-585MHz, Band V 610-960MHz) bears out the forecast last year that the spread of three-channel uhf television, while in the long-term it should do much to decrease the tvi problem, will not automatically end it. The fact that so many viewers, in areas now covered by uhf television, continue to watch the 405-line monochrome vhf transmissions, also suggests that it will be some years before any dramatic improvement takes place. Amateurs should encourage local viewers to use the higher-resolution (and less interference-prone!) 625-line uhf stations whenever possible.

The memorandum indicates that in 1969 there were some 8,177 base stations and 85,643 mobile stations in the vhf and uhf "mobile radio" bands. The number of interference cases

Table 2. Interference from specified sources

Source	LW/MW	Band I	Band II	Band III	Band IV	Band V	Mobile radio
Electric motors	401	5,350	70	1,439	5	9	6
Contact devices	846	8,448	177	2,048	21	19	21
Gaseous discharge lamps (exc. neon signs)	358	478	7	124	2	—	2
Neon signs	38	995	9	189	3	1	2
Industrial rf apparatus	10	490	11	235	6	6	20
Medical rf apparatus	2	36	1	20	1	2	1
Amateur transmitters	48	821	44	492	18	8	11
Other UK radio transmitters	91	790	140	637	69	15	134
Foreign transmitters	55	400	3	66	5	1	21
Local oscillators, Band I tv	—	153	7	416	4	1	2
Band II radio	—	—	4	26	1	1	1
Band III tv	—	—	—	70	6	1	—
TV time-base radiation	57	1,380	4	332	20	17	1
Misc receiver radiation	10	753	4	455	15	15	5
Power lines, overhead 11-66kV	112	3,531	13	379	4	9	16
132kV	4	320	2	102	—	4	3
275kV	3	59	—	18	—	1	4
400kV	4	122	—	18	—	—	1
Railways, electric overhead, 25kV	1	39	2	19	—	5	2
Other identified sources	473	3,906	91	1,248	57	36	104
Unidentified sources	1,465	14,141	257	3,509	93	98	242
	3,978	42,212	846	11,842	330	249	599
Complaints arising from conditions at receiving sites	1,250	12,073	862	7,054	515	553	142
Totals	**5,228**	**54,285**	**1,708**	**18,896**	**845**	**802**	**741**

ascribed to "radio transmitters in the UK, other than amateur" was 1,876, and is greater than that for amateur transmitters in every band other than Band I. Nevertheless, when one compares the total activity, it must be admitted that the mobile service has an impressive record.

Interference from "microwave ovens" has shot up by no less than 1,400 per cent during the year, though the actual number of complaints was still only 30 (compared with two in 1968).

The other side of the coin—electrical interference from appliances and the like—shows another increase of three per cent in complaints attributable to contact devices (now responsible for nearly 20 per cent of all complaints); the bulk caused by the thermostats of domestic heating systems. However, the report suggests that "recently new materials have been introduced by the manufacturers which it is hoped will help to decrease the degree of contact wear and the resultant interference which seems to become severe within 6 to 12 months of installation."

As ever, inefficient receiving aerial installations and faulty receivers were responsible for over 20 per cent of all complaints—and some 50 per cent of uhf complaints.

UHF television channels

There is some misunderstanding among amateurs about the 44 television channels (each 8MHz wide) in Bands IV and V. The BBC and ITA anticipate that for "national" coverage (that is, to something over 95 per cent of the *population* though not of geographical area) about 60 main stations (effective radiated power over 25kW) and almost 500 lower-power relay stations will be required for *each* service. Since the official plans anticipate the eventual setting up of a "fourth" (P4) programme network, this means that there will be well over 2,000 British television transmitters in the 44 available channels. All the four transmitters intended to serve a given locality are being co-sited and will use a common aerial-support mast, and in most (but by no means all) cases will be grouped to occupy a spread of about 11 channels (88MHz total bandwidth) to allow viewers to use a single high-gain uhf receving aerial. Main stations normally use horizontal polarization; low-power relay stations normally use vertical polarization.

It is useful for amateurs to know what channels are likely to be used for reception in their locality during the next few years. A convenient pocket-sized guide covering 105 of the new uhf stations (plus the 47 ITA Band III stations) can be obtained on request from the ITA (write to: ITA Engineering Information Service, 70 Brompton Road, London SW3, and ask for a copy of the "ITA Transmitters—a pocket guide" and "ITA Colour News" since this includes a number of coverage maps). The information in these publications covers BBC as well as ITA channels, but additional information on specific BBC stations can be obtained from: Engineering Information Dept, BBC, London W1A 1AA.

Post Office filters

For those who did not see the recent display of typical Post Office filters on the MPT stand at the RSGB Show, the following are some useful type numbers to know. It should be stressed that these filters are mostly commercially manufactured devices, and are normally marketed by the makers under their own type numbers. However, it is felt that it is often helpful to know the Post Office numbers when dealing with cases of tvi.

Miniature inductive mains filters: types RF15A, R18.

Capacitive mains filter: type No 13A.

Broad-band *composite mains filter*, covering mf and vhf: type No 2A.

Low-pass filter, rejection at vhf over 80dB: type No 55A.

High-pass filter, cut-off below about 40MHz: type No 38A.

G3JGO points out that this filter is primarily intended to prevent i.f. breakthrough.

Broadband "*outer-core*" *filter* (coaxial cable wound round "lossy" toroid ferrite core): type No 64A/1A.

A new feature

MICROWAVES—1,000MHz and up

Introduced by Dr D. S. EVANS, G3RPE*

The reason why

For many years activity on the microwave bands has been covered in *Four Metres and Down*, in various contest reports, and in the write-up of "Tests". The RSGB Council has recently decided that because of this fragmentation of reporting, a separate column to cover the microwave bands ought to be set up to act as a focus for the growing activity. The time seems appropriate in that recently we had the first microwave contest ever, which surely marks a new phase in the development of amateur radio.

The technical reasons for setting up a column separate from *FMD* require some justification, particularly because of the excellent efforts of G5UM and his predecessor in encouraging the exploitation of microwaves over recent years. The main reason is quite simple and is based on the major difference in techniques and practice at frequencies above 1,000MHz. On vhf, and 70cm, design and operating techniques are reasonably well established, being essentially narrow-band in that signals occupy less than 10kHz. This implies the use of transmitters and receivers which, if not crystal-controlled, have a frequency stability measured in tens or hundreds of hertz; indeed, a transmitter with a stability much worse than this is likely to be talked off the air. A second characteristic is that the rf components such as coils, capacitors and valves are familiar and generally still recognizable as such, and the principle of constructing equipment by assembling manufactured components is essentially the same as that used on the lower frequencies on which most of us cut our teeth.

Above 1,000MHz both equipment and philosophy differ appreciably. At present we have plenty of room on each of the bands, which cover at least 75MHz (on 9cm) and up to 1,000MHz (on 1·5cm). As there is, as yet, no QRM problem there is no need for restricting bandwidths of transmission, and this opens out the whole new world of broadband techniques in which bandwidths of typically 2MHz may happily be employed. The significance of this, of course, is that it is possible to make simple transmitters and receivers, each perhaps consisting of a single self-excited oscillator, which avoid the long-multiplication chains of crystal-controlled equipment. Such simple equipment is currently being used by several operators on bands 13cm to 3cm and has quite a surprising performance—indeed a reasonable case could be argued for starting amateur radio activity on microwaves on the grounds of simplicity! This simple equipment can be greatly improved in efficiency by such techniques as automatic tuning and holding, and by pulse modulation which at present are not widely-used amateur techniques. Of course, narrow-band equipment will also have its place.

Another difference is that whereas at vhf there is a great tolerance for the physical layout of components, on the microwave bands the electrical characteristics of a system become increasingly interwoven with its mechanical configuration: discrete components become impractical and tuned circuits, inductors and capacitors have to be built *as* the circuit rather than into the circuit. A $\lambda/4$ aerial for 10,000MHz is just over $\frac{1}{4}$in long. For this reason, much of the microwave equipment has to be fabricated rather than assembled from commercially-made bits and pieces, and for most amateurs this means that a whole host of construction tricks have to be mastered: design information has to be more specific and therefore perhaps a new style of article will have to be expected. Lest this makes microwaves sound too complicated, a simple example of a matching device, which in hf terms could be envisaged as consisting of several variable inductors and capacitors, on microwaves can be realized by 6BA screws spaced $\lambda/8$ set into one face of a waveguide.

For these reasons the establishment of a separate feature specifically to concentrate on microwaves is considered to be justified. The danger of perhaps producing another split in the amateur radio spectrum will be considered—the dx–vhf split is one too many already. It will be largely avoided simply by being aware of the danger. In practice, the inevitable use of vhf and 70cm for talk-back, and the position of the 23cm band in a sense being common to both vhf and microwaves will provide adequate linking.

Objectives

Having given the reasons why, we hope to everyone's satisfaction, we can now go on to the objectives of this new feature. They are quite simply to act as a focus for activity on the microwave bands: a means by which the great deal of interesting work of people, so busy in building and operating on these bands that they have no time to write it up, can be relatively painlessly extracted for the benefit of others. Therefore, we want lots of news on what you are doing and, almost as important, what you intend to do. We want to know of ways and means of doing things, and it is reasonable philosophy at this stage to assume our complete ignorance. We would like to keep in touch with efforts in other countries, and to review developments and techniques as they become available. The development of standards is also a function of this feature. To make it the success it ought to be, get your ideas on paper in as much detail as possible and we will see how much can be published.

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

FOUR METRES AND DOWN

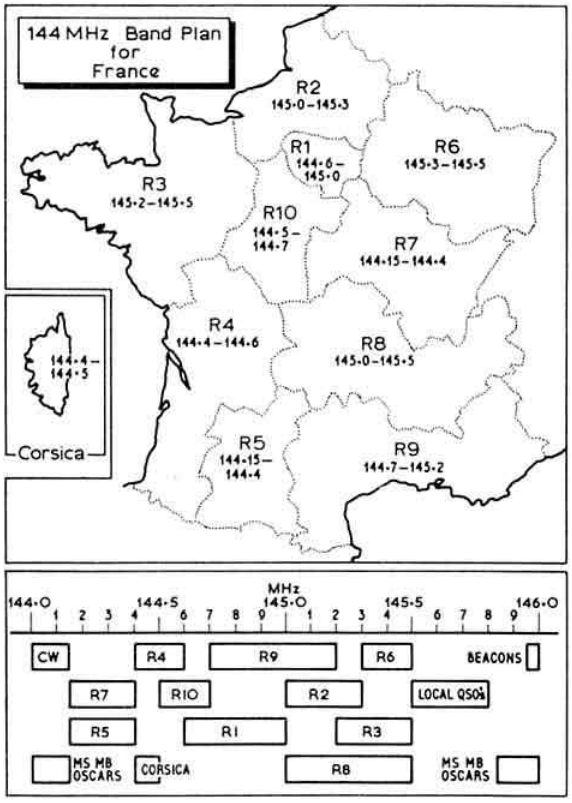
A monthly account of vhf activities and news compiled by JACK HUM, G5UM*

The essential "Callbook"

After the soldering iron, the *RSGB Amateur Radio Call Book* is the most used item of equipment in one's radio room. This is probably true of most other UK metre-wave men, for whom it is indispensable because the majority of QSOs are with stations listed in it.

Congratulations to G2BVN and his helpers for providing in the 1971 edition a list of UK and EI calls as comprehensive as press deadlines allow, plus all those essential items of information at the back for use during an operating session.

In the few weeks between closing for press and the book's publication several dozen additional callsigns will have been issued, and several hundred more will be coming up before the 1972 edition. All will be "ex-Callbook" until then.



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

New licensees who will be "ex-Callbook" for the next twelve months will help both themselves and their listeners if they invariably state location with each CQ, and perhaps also when signing over during the course of a contact. "This is G8XYZ beaming south and calling CQ". Yes, but *where from?* Paragraph 2 of "The Metre Wave Man's Code" covers this point.

The 36 of us

In addition to the RSGB *Callbook*, the tireless typewriter at G2BVN has much to do with another *opus*, the IARU *Region 1 News*, for Steve is secretary of the Executive Committee of Region 1, and editor of its journal.

When it is remembered that 36 national societies are subscribing members of IARU Region 1, extending from the Faeroes in the north to South Africa in the south and taking in every worthwhile society on the way, some idea may be had of the very considerable collective power which they hold for wielding in amateur radio's cause. And *Region 1 News* is their mouthpiece. This, like many another newsletter, has developed from what was a budget of duplicated sheets through to what is now a well-presented pocket-sized journal properly printed.

There is plenty of metre-wave material in the latest edition to appear, that for August 1970. From Ray Flavell, G3LTP, there is a contribution about the work of the RSGB Scientific Studies Committee, while on the satellite front there is a detailed technical description of the "innards" of Australis-Oscar 5.

Region 1's VHF Working Group has been busy, and preparations are reported to determine policies to be followed when the ITU space conference comes up in June of next year. There is a meaningful phrase to the effect that ". . . the future of amateur allocations above 30MHz depends on our efforts." Quote *that* to anybody who bellyaches mindlessly about RSGB contributions to IARU.

Did you know that the French have a bandplan for 2m? There is a map about it in the August *Region 1 News*. We reproduce it here as a matter of general interest.

This is "Seventy"

"You are my sixth contact on 70cm tonight, and it's only . . . let me see . . . ten to ten. People who moan there's no activity on 432 don't know what they're talking about. Yes, certainly this QTH is better than the old one and I can work old Les, G3BNL, down in his hollow behind the hills at Cheltenham, but even allowing for this factor there's plenty to work, especially on Mondays and Thursdays. I'd welcome skeds on 70cm with the four northern counties of England

and with GM."—G8AUE, now at Farm Close, Pentrich, Derbyshire.

* * *

"Those of us in low television-signal areas would welcome more 432 activity on Sunday mornings when tvi doesn't raise its ugly head. I now have 150 watts in and 64 elements out. I work in close co-operation with G8BBY, and he too would welcome more Sunday morning activity on 70cm."—G8BTN, Daventry (which is one of the most difficult tv reception areas in the country with megawatts from GBR on one side and BBC short wave overseas service on the other competing with microvolts of video).

* * *

"In view of the fact that the commercial grabbers are again aiming their talons at 70cm I thought I'd better let the outside world know (via *FMD*) that we in the south-west are doing our best to populate this band. Stations currently *active* (not just equipped) on 70cm include G8AII, Chepstow; G8AQZ, Bristol; G8AGI of Locking; G8BKR also of Bristol, along with G3TZN and G6GN of the same city; G5QA in Exeter; G5ZT, Plymouth; GC2FZC in Guernsey (a useful man to know about if you want to get those three countries for the 70cm Award); G8BCH, Portland; G8ANZ of Portishead; G8AFA, Sparkford, and G8AVG of Swindon.

"Others, including G8CKC of Uffculme and G3XFW of Yeovil, are actively building for this band.

"Several of these stations operate from 1930gmt onwards and frequently tune between overs for any others wishing to join in. Most of us run fairly low power from locations that range from moderate to downright rotten—my own for instance—and this creates the impression, quite wrongly, that there is little doing on 70cm in this area. As has been pointed out in *FMD*, there are many large pockets of activity between 432 and 434, not counting television, but because 70cm is a semi-local band these are not always evident to listeners farther afield."—G8AFA (near Yeovil).

* * *

"I'm operating from a rather lower site in Flintshire tonight, but last Monday I was up at Moel Fammau and conditions on 'Seventy' were marvellous . . . worked 27 stations during the evening, including three PA Zeros."—GW8AWS/P.

* * *

"August has been quite a good month for me on 70cm down at this sea level QTH . . . the longer hauls included G8CUE of Rotherham; G8BBY, near Rugby; G3NWU/A, Hartlepools in Co Durham; GI8AYZ/P in Co Antrim; G8BMD and G8AEV in Shropshire; and G8CVK down at Stourbridge in Worcestershire. Skeds include the regular one with G6FK who is 70 miles across the mountains, and GM3TLA/P has copied me at S8 . . . I had my preamp battery disconnected at the time (ugh!). I also have a schedule set up with GM8BKE of Glasgow."—GW8AHI of Prestatyn, North Wales.

* * *

"Both G2BHW and myself would like to thank all the operators who turned their 70cm beams to the south-west during VHF National Field Day. To work 20 stations from Cornwall on 432MHz is no mean achievement. But many stations heard calling 'CQ Seventy' did not seem to beam our way nor to tune our zone."—G3LPB of the Cornish Radio Club and second operator at G2BHW/P during VHF/NFD.

* * *

"Had quite a day on Sunday working the 70cm stations during VHF/NFD . . . plenty of activity."—G3EHM, Stoke on Trent.

September's first weekend

Forget the favourite Saturday night show on the telly. Forget the obligatory Sunday afternoon visit to Aunt Maud for tea. Forget the lawn mowing. Blow the weeds in the garden—and blow the wind southerly to bring calm and balm to VHF National Field Day.

This is how it was four weekends ago. Never before has the first weekend of September produced a wall of QRM on "Two" like that which was raised as 1970's metre-wave field day got under way. Down on 70cm there was G8AWS/P knocking them off at a rate of a dozen an hour from north Derbyshire, and G3WGC/P in Herts aiming for a dozen on "Twenty-three" with the target handsomely exceeded by 1800gmt on the Sunday close-down. Up on 70MHz handsome signals from GM, GI and EI were offered to those who had not forgotten the art of using a morse key.

Predictably, the GW mountain-top operators were returning huge serial numbers towards the end of it all. But high altitude was by no means the whole secret. Knowing how to operate under high occupancy contest conditions counted just as much.

Less centrally situated, many remoter groups ended up short on points but long on enjoyment. Typically, this from the far south-west: "On behalf of a small group out on a limb, the Cornish Amateur Radio Club operating 2m, 4m and 70cm proffer a big thank you to all stations worked during Field Day, which was enjoyed in spite of fog, rain and wind."

For the Cornish and for many other groups the wind blew southerly to bring not balm but alarm as weather conditions deteriorated sharply, presaging the gales which were to roar across the country for the rest of the week. Did radio conditions improve as the barometric pressure dropped? It

A miniaturized history of VHF National Field Day

1962 (for 2m only and held in July): 39 entries, winners Wolverhampton Group, GW3KMT/P.

1963 45 entries, winners Surrey Radio Contact Club G2RD/P-G3ODY/P, using 70, 144 and 432MHz. Three contestants used 1,296MHz.

1964 54 entries, winners Wolverhampton Group in conjunction with Severn Valley ARC, GW3KMT/P-G3SVR/P, using 70, 144, 432 and 1,296MHz. Ten contestants used 1,296MHz.

1965 54 entries, winners The GB2GC Group, using 70, 144, 432 and 1,296MHz. Twelve contestants used 1,296MHz.

1966 57 entries, winners The GB2GC Group, using 70, 144, 432 and 1,296MHz. Fourteen contestants used 1,296MHz.

1967 66 entries, winners The GB2GC Group, using 70, 144, 432 and 1,296MHz. Sixteen contestants used 1,296MHz and one contact was reported on 2,300MHz.

1968 91 entries, winners Mid Essex VHF/UHF Contest Group G3VPK/P-G3ORL/P-G3LTF/P, using 70, 144, 432 and 1,296MHz Twenty contestants used 1,296MHz, three used 2,300MHz and one (G3WZR/P) the 10GHz band.

1969 105 entries, winners Mid Essex VHF/UHF Contest Group G3VPK/P-G3ORL/P-G3LTF/P, using 70, 144, 432 and 1,296MHz Twenty-three contestants used 1,296MHz, four used 2,300MHz and one (G3RPE/P) the 10GHz band.

was difficult to tell when there were so many strong signals about.

Who will be next for the VHF/NFD Honour Panel? The winners should be known by this time next month if the VHF Contests Committee process the results with their accustomed alacrity. Meanwhile, watch GB2RS on Sundays for the news in advance of publication.

CW contest on "432"

It has never seemed worth while organizing a cw contest on 70cm for the very good reason that Class A users of the band are far outnumbered by the non-telegraphy Class B occupants. In many Continental countries 432MHz and 144MHz telegraphy contests are frequently operated concurrently. The RSGB VHF Contests Committee felt that it was about time we in the UK tried out this arrangement too. Next month we are going to. Accordingly . . .

The 144MHz CW Contest, which has figured in the "Contests Calendar" panel these last several months, is to be extended to embrace 432MHz.

The dates: 7-8 November. The times: 2000-0800. The rules: in this issue.

The scores on the two bands will be combined. With a multiplier of three in respect of 70cm there should be a strong incentive to Class A men to make quite sure there is a keying socket in that rig.

For this, believed the first-ever 70cm telegraphy contest, full use should be made on 2m after exchanging serial numbers of the phrase "QSY 70?" as an indication that a 432MHz contact is on offer.

Equally important, if time is to be used to maximum advantage: confine searching to the bottom 100kHz of the 70cm band. The cw segment is 432·0 to 432·1MHz. There is just a month left to order that new crystal—but perhaps the 2m one will do: if it puts you on 144·035 you can count on being noticed by cw searchers on "Seventy".

M-S gives the twenty-seventh

Bursts of rapid telegraphy coming off the last kilohertz of the 2m band generally mean that Johnny Stace, G3CCH, is making the meteor showers work for him. Over the years he has devoted many man hours of patient work opening up dx paths of increasing length via M-S, making the most of the big predictable showers such as the Perseids in August when the meteor count is up in the hundreds, but seeing in addition what can be done under sporadic meteor conditions. Example of the latter: on 3 September G3CCH worked TF3EA on "Two" when the number of bursts/pings per hour was only 36, that is to say, about one burst/ping per minute of reception.

This particular contact took three hours to complete. The longest burst lasted a bare eight seconds to produce an S9 signal that decayed rapidly to S3 and stayed there for several more seconds.

It was during the Perseids, however, that G3CCH achieved an ambition he had long cherished, and for which many schedules had been set up. This was to work UR2BU. The date was 13 August; this was Johnny Stace's 27th country worked on "Two". The report was "25". And from TF3EA a report of "27" was forthcoming for a contact during the same meteor shower.

Another observer who made the most of the Perseids was Ron Ham, BRS15744, at his Sussex Downs listening post. He gives the peak day as 12 August with an hourly average of 332. On 13 August, when the G3CCH-UR2BU contact took place, Ron Ham noted the hourly rate as 208. It declined to 198 on 14 August and 126 on 15 August. During the build-up period the following were noted: 9 August, 182; 10 August, 220; and 11 August, an hourly rate of 202.

Before the Perseids manifestation Ron Ham noted some high meteor rates on the path from Gdansk 70·31MHz. Although the hourly average over much of late July and early August was 134, a peak day occurred on 23 July when a meteor count of 203 coincided with a solar storm detected on the BRS15744 radio telescopes. Ron Ham's comment is:

"I would suggest that the increase in rate on 23 July was caused by solid particles from the solar storm entering our atmosphere, burning up and leaving the same ionized trail as a meteor particle. The radio equipment would record the reflection from these as well as the meteor trails. One cannot read too much into one event but I think it is a result that warrants further investigation."

Using phone for M-S

Meteor trails will yield dx when they are hit hard with good sharp quick spurts from a telegraphy transmitter with plenty of power and aerial gain available. Because ssb also answers this requirement in some measure, M-S contacts by this mode are feasible. Johnny Stace again:

"Tests with OK1VHK over several periods using ssb showed that although I did receive some very good bursts containing both calls and report, he did not read me well enough at any time to get complete copy. This one test has certainly shown that to use ssb even over moderate path lengths requires maximum possible power and aerial gain. Frequency stability becomes important too! One early burst copied and recorded did not make sense until played through my ssb exciter and retuned on the receiver! With longer bursts I found it easy to tune in the OK for 'natural' voice".

Tripartite transatlantics?

The attempts to break down the difficult North Atlantic path on 50-70MHz by G3JVL, TF3EA and VE2AIO continue with unabated determination. With transmitter set up to within 100Hz by counter, VE2AIO sends automatic transmissions on 50·055MHz which read: "DX test de VE2AIO VE2AIO VE2AIO QSX 70,250kHz." He listens on 70250kHz for replies from the east.

Hours of patient listening by all three with nothing but "Nil results" to put in the log are punctuated by moments when it seems that the path is about to open up. At 2307gmt on 7 August the figures "02" (part of "QSX 70,250"?) suddenly pinged out of the void into the G3JVL receiver exactly on the VE2AIO frequency and beam heading. Early next morning the TF3VHF beacon on "Four" was so strong that it awakened Mike Walters with its S9 plus signal. He hastened down to the radio room to put out a call towards Canada. No reply on 50MHz. Then at 0128gmt the Iceland beacon on "Four" faded out.

That evening (8 August) during the note-comparing session on 20m, VE2AIO enquired whether TF3EA or G3JVL had been transmitting at 0111gmt on 70,250kHz that day. He had

heard a short weak burst of unidentifiable cw on that frequency at about 18wpm. It *could* have been the G3JVL call towards Canada.

Mike Walters observes: "I take this mainly as an extremely encouraging result that nobody would really believe but ourselves. I must stress that the mode of propagation is not one we are familiar with. It has at times M-S characteristics and ties in with auroral events."

Further evidence that the path was on the point of "giving" came next day when TF3EA heard a ping which read "de VE2A . . ." exactly on schedule. Time 2319gmt. An hour later the Canadian heard pings on the 4m frequency of TF3EA. And on 5 September at 0203gmt he got the ".F3VH." part of the Iceland beacon's callsign on 70,275kHz.

All these events were associated with solar flares and Ar, sometimes on one side of the Atlantic, sometimes the other. Indeed, many days in August produced dx television and fm broadcast signals in the receiver at TF3EA.

And as a final significant coda to the above, it is reported that OY2BS in the Faeroes heard Swedish and German beacons on "Two" as well as our own GB3DM at various times during the afternoon and evening of 16, 17 and 18 August, all by auroral propagation.

To Holland by 4429

Until 27 August the best dx worked on 23cm by Phil Reynolds, G3PQR, from his Essex coast site at Frinton was over a 60km range to G3LQR to the north and G3LTF to the south. That day he extended the range to 250km by working PA0DTL.

Conditions seemed propitious. Shoals of PA, ON and DJ had been worked both on 70cm as well as on 2m, and there was every hope that 23cm might also be open. Reports of RS5 7-9 both ways with PA0DTL proved that it was.

While not claiming anything special for the contact as such, knowing that the Continent has been worked several times before on 23cm, G3PQR wonders nevertheless if it has been done using such low power (1W out of a 2N4429) and with an all-solid-state rig. In the nbfm transmitter there is a 2N4012 pa at 70cm taking 8W input. For 23cm this drives a BAY66 tripler which in turn is followed by a 2N4429 pa delivering 1W at 1,296MHz.

On the receive side G3PQR mixes in a 1N21C, with a BFY90 preamplifier in grounded emitter mode. The aerial is a 5ft dish 10m above ground with a mesh reflector. Soon a 7ft solid dish will go up for 23 and 13cm. Yes, Phil Reynolds is equipped for 2,300MHz, and even for 3cm. It almost goes without saying that he is particularly interested in setting up schedules on any of the microwave allocations.

Points about parchments

The secretary of a well-known affiliated society has asked if a /P claimant for a Four Metres and Down Operating Award should stay put in one place or whether it is in order for a claim to be made covering operation from several sites.

No, you do not need to stay put. In fact, if a G-man took the rig on holiday and worked some normally inaccessible counties from and in GM and GW these would legitimately count towards his claim. If the home station were, for example, G8LM, it would become G8LM/P or GM8LM/P or whatever, when portable operation was undertaken, ie it would rate in the portable mode as *one* station irrespective of prefix so long as the basic callsign did not change.

The point is specifically covered in the rules, copy obtainable from HQ or G5UM if a long sae is sent.

Apropos SAEs, there is no need to send one with QSL cards sent in with FMD Certificate applications. All cards after scrutiny are returned to their owners by Recorded Delivery. This is normally done fairly quickly after receipt of a claim by the VHF Certificates Manager. Actual issue of the parchment may wait a week or two pending ratification by the VHF Committee and the adding of the President's signature.

BEACON STATIONS

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

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

Visitor to DL

Profiting by a business visit to Munich of some months, G8BUR, Andrew Marshall of Hertfordshire, has sent back to *FMD* his first impressions of the German vhf scene.

Comparing the availability of surplus components there with the situation in the UK, he finds the supply both more precarious and much more expensive. This has led to much popularity for printed circuit kits, eg the much-used DL6SW converter for 2m, and a greater readiness to try ssb on "Two" than exists here, simply because ready-to-build equipment is available.

In spite of this trend G8BUR noted that home-built transmitters predominated. He says: "It seems that many people build one rig, vfo-controlled ssb for 2m and 70cm—vfo-controlled means 144-146MHz and 432-434MHz, not just 145·41 plus or minus 50kHz. This seems to me to be the right approach, avoiding any hint of an ssb clique on their own special frequency, and facilitating cross-mode contacts anywhere in the band (thus maybe encouraging more people to take up ssb who have not already done so)."

G8BUR was intrigued by the wholly home-built transmitter used by DL2QV (Ludwig Geiger). It develops ssb at 9MHz and mixes 135-137MHz from a crystal mixer vfo to give 2m output. The intention is to utilize the image at 126–128MHz to mix with a further CO chain to produce ssb/cw at 70cm with a 4X150 linear.

Apart from this, DL2QV like many others uses nbfm mobile on 145·15 where ex-taxi rigs, mainly Bosch or Siemens, are pressed into service. They cost from £9 to £15 according to age, make and source.

Operation on National Trust property

No radio amateur who has any feeling for the charm of the British countryside would quarrel with the ban which the National Trust imposes on the erection of tents or masts on its property. Even so, the keen portable operator will still gaze longingly at those marvellous hilltop sites which abound in NT areas and wish that permission could be had to use them. Whether any variance of the regulation is either possible or desirable is something the VHF Committee will have on its agenda at an early date.

Meanwhile, if contemplating /P operation, do not venture into National Trust territory either by accident or intention. This, in the words of Malcolm Pritchard, G3VNQ, is what is likely to happen: "I had just set up G3VNQ/P on the top of the Long Mynd in Shropshire (1,690ft) when a National Trust ranger arrived and informed me in the nicest possible way that I would have to take the 20ft mast down. He seemed quite used to people going up the mountain to operate, so lots of others besides me must have been caught out. Anyway, I ended up 100ft further down, just over the boundary of the National Trust park."

Tech corner

From G6AEV/T-G3VZV (Graham Turville of Dunstable)
Here are some notes on the G6AEV/T video modulator (405-line positive modulation) which uses only two transistors. It is suitable for all power amplifier valves such as the QQVO3/20s and 6/40s and even 4X150As. It should be built in a well-screened box adjacent to the pa grid lines. The distance from point X on the drawing to the connection with the grid lines should be as short as possible, ie not more than one inch.

The 100Ω input potentiometer should be a carbon type (available from Henry's Radio, Edgware Road, London W1). The ht supply can be derived from the transmitter main supply and regulated by means of an OB2 or similar. Anodes and screens should be bypassed at video frequencies with 8μF capacitors of suitable voltage ratings.

The frequency response of this modulator on 405 lines is such that 3·5MHz can easily be seen "off air". Increased frequency response could probably be obtained by varying the values of the emitter bypass capacitors.

This modulator was used by G6AEV/T at the outside broadcast station at CAT70 at Cambridge, as reported here last month.

From G8CXN (E. W. Earnshaw, N. Jesmond, Newcastle)
Tired of images, i.f. breakthrough, bad calibration and lack of bandspread on my 2m tunable i.f., I decided to look around for a suitable replacement. The Eddystone 888A seemed to fit the bill perfectly, offering double conversion for low image response, full dial tuning for 2m on a 28-30MHz i.f., good calibration and a beautifully smooth tuning dial.

One small drawback which experience showed this receiver to possess was a background hiss even on signals of an RS59 plus 30 level. I discovered that the i.f. stages were the cause, and that if the rf stage was set at maximum gain, the i.f. at minimum gain and the audio turned up, the noise level was bearable. However, the snag with this technique was that as the audio stages were not controlled by the agc and if one happened to be tuning the band for weak signals and a strong local came on he boomed out of the loudspeaker and woke the whole household!

Apart from this one snag the receiver was perfect as an i.f. strip, and a very simple modification effected a cure. The agc is taken from the anode of the last i.f. via a 20pF silver mica capacitor to the agc diode anode. I removed this and instead connected a 50pF silver mica capacitor from the agc diode anode to the detector anode. I now possess a very good tunable i.f. with a much better signal-to-noise ratio. I am sure that other amateurs using the 888A will be glad to know about this simple but effective modification.

Here and there

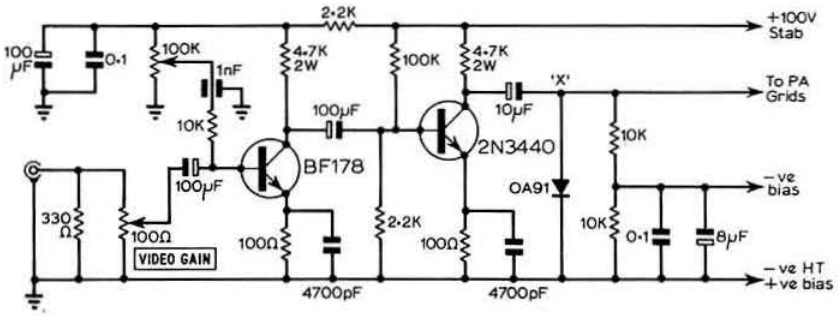
"A lot of recent contest activity prompted a search for an alternative to the Ordnance Survey map (one-tenth inch) for measuring distances, as this map is rather cumbersome unless mounted on a wall. Bartholomew publish a *British Isles Motoring Map* at 6s. This includes the whole of Ireland. Since the scale is 1:1,000,000, a ruler marked in millimetres gives distances directly in kilometres"—G3VNQ.

* * *

Ruling off his 2m log for August, G8VZ (Princes Risborough, Bucks) noted that on 31.8.70 he completed Contact No 2708 with G3JWQ at Ripley (or G3JWQ/A from the holiday haunt at Skegness). This schedule began on 1 November 1955. Contact No 138 was reached by the end of 1956. And it is still going strong. Input at G8VZ, always 12W.

* * *

"Please convey my thanks to all concerned with GB3SC and GB3GEC. These beacons really are most useful here, being audible 50 per cent of the time, averaged over a 12-month period. Long may they—and 70cm—flourish!"—G8AFA.



The G6AEV/T video modulator

THE MONTH ON THE AIR

A monthly feature by JOHN ALLAWAY, G3FKM*

LETTERS are still being received listing stations which have failed to QSL in response to addressed envelopes and return postage. FR7ZU/E, 4S7DA, FM7WD, 9H1M, 8R1J, VU2DK, VP2VI, TU2BK, 5U7AK, 9G1GD and many others are reported to have appropriated IRCs and refused QSLs. It is difficult to believe that all communications to these stations become lost in the mail but it is noticeable that some of the other calls listed by correspondents have been known to be reasonably reliable QSLers. Some complaints have been received about stations which are known to have efficient QSL managers and it seems possible that application has been made direct. However, there is no reason why these should not ultimately have been forwarded to the QSL manager for attention. The question of QSL managers is a thorny one—in the case of dxpeditions and stations situated in remote places they perform a vital and very useful service, but the situation seems to have arrived when some quite ordinary European stations are saying "QSL via . . ."

BRS20439 (5 Polbroc Place, Kirkconnel, Dumfriesshire) has so far cleared 820 QSLs for MP4TCQ and points out that all sending IRCs receive reply by air mail. Listener reports are also most welcome and John says that all cards received are answered within two weeks.

Congratulations to G3SXW, G3TXF and F5QQ who scored 211,950 points during a joint effort from 4U1ITU during the weekend of the WAE CW Contest. They wrote out all QSLs, too!

Congratulations are also due to **G3NMH** who, as world-wide winner of the phone section of the 1970 Bermuda Contest, has won a week's free holiday for his wife and himself in Bermuda during late October.

Top Band news

G3OIT reports that he is now in Germany and has been re-issued with his former DJ0MR callsign. He has asked for (and has been granted) permission to operate on 160m and may use a maximum of 10W input in the segments 1,825–1,835 and 1,985–1,992kHz. Ssb permission extends from 1,832 to 1,835kHz. Keith will be on special look-out for UK stations who wish to work Germany and, if needed, skeds may be arranged by writing to him—K. P. Jillings, 5060 Bensberg-Frankenforst, Froschpfad 11, W. Germany. The aerial which worked so well at G3OIT—a 105ft vertical with 160ft top sloping down to 30ft—will most probably be used.

G3SVK and G3XTJ will be visiting Scotland in October and operating as GM3SVK/P and GM3XTJ/P, respectively, from a number of counties and rare WAB areas. Their schedule will be as follows: 10 October, Stirlingshire; 11 October, Aberdeen; 12 to 15 October, inclusive, Shetland; 16 October, Clackmannanshire; 17 October, Roxburghshire. All-band operation is planned and cards should be sent to G3SVK. QSLs not claimed in the month following the expedition will be sent out via the bureau.

News from overseas

9M6BA has informed BRS17567 that his callsign is being pirated and that he is not on the air at present. He has held a number of previous calls including XZ2EX, G3BIV, VS7BA, VS1GQ, and 9V1GQ, and he hopes to use his 9M6 call in the near future. The pirate 9M6BA gives his name as Mak.

Dxpedition of the Month *Bulletin 3–70* says that cards for DJ6QT/CT3 and GD6UW contacts are now being accepted by ARRL for DXCC credit. Einar, LA1EE, will be on the air from Svalbard for about a year with the call JW1EE, and his QSL cards will be sent out via DOTM. QSLs for C31CX, K1OTA/LX and K1OTA's other calls which he used from 3A2, 9H1 and 3V8 or 9K2 during July–August will also be handled by DOTM. *Bulletin 4–70* will be issued in the autumn and will list all stations for which confirmations are handled and the dates of their operation. This may be obtained by sending a 9in by 4in sae and irc to W2GHK/4, Box 17316, Raleigh, NC, 27609, USA.

According to *NARS News*, Doris Murray-Stone (ex-5N2DMS) is now on the air from Ghana with the call 9G1GV. Her husband is Angus Murray-Stone, 9G1GG (formerly 5N2AMS etc).

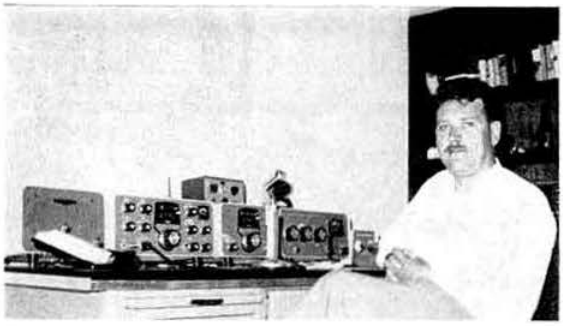
John Bower, VE7TL (and formerly G3OSM and EI9AI), writes to say that there are three ex-G officials of the Kamloops Amateur Radio Club at present. These are Don Woods, VE7BVO; Colin Curtis, VE7BMK; and himself. The club issues an award which is detailed in the *Awards* section.

ZC4RAF will be on the air during "Akrotiri At Home Day" which will be Saturday 10 October. Two stations will operate between 1100 and 1500 on 28,560, 21,260 and 14,260kHz, and while one looks for UK and RAFARS contacts the other will be looking for all other callers. All contacts will be confirmed with a special QSL card.

9H1CB says that he can be found nearly every afternoon around 21,354kHz working his QSL manager G3LQP. If not there he uses 14,160kHz, and on cw he usually confines himself to the lower 30kHz of any band 80 to 10m. Ken makes the special request that stations calling him should give his callsign only once and their own several times—long callers only cause excessive QRM. He also suffers from calls from Continental stations during established contacts and wonders why they do it—he is not alone in this respect!

John Dunnington, G3LZQ, is now in South Africa and awaits his ZS4 call. He has been listening around and finds that 21MHz peaks into the UK at 1800. Forty metres is full

* 10 Knightlow Road, Birmingham B17 8QB.



Alf Wilson, GI3PGG (formerly ZD1AW) is now in Teheran and licensed as EP2TW

of European signals from 1830 but phone copy is difficult because of commercial QRM, and on 80m plenty of Europeans are heard after 2000. So far only 5Z4 and OK have been heard on 160m.

C21GB seems to be having hi-fi interference troubles and is temporarily off the air because his signal appears to be entering gramophone amplifiers in a nearby block of flats. He has been in touch with VR2FT and is hoping to effect a cure with Les's help.

Awards

The Urbs Aeterna Award

Awarded for contacts with Rome since 1 January 1968. European applicants need 15, others 10 QSOs. Any band/mode may be used. No QSLs are required, log extracts and eight IRCs should be sent to: ARI, Sezione di Roma, Urbs Aeterna Award, PO Box 361, Rome, Italy. Listeners may apply on a "heard" basis.

The Worked All Zones (WAZ) Award

Since the publication of the article Certificates and Awards in the August issue of *Radio Communication*, a number of enquiries have been received concerning this certificate. Applicants are reminded that they should use the official application form for their claims and that this form, together with the relevant QSL cards, should be sent to G3FKM (together with sae and return postage) for endorsement. The completed form should then be sent to K4IIF together with eight IRCs. WPX claims should also be made on official forms which are available from your scribe.

The FIRAC Award

This award is issued for contacting members of the Federation Internationale des Radio Amateurs-Cheminots (railwaymen) since 1 January 1966. Class A is for 150 QSLs, including confirmations from at least 12 groups with not more than 20 QSLs per group; Class B 100 QSLs in nine groups with not more than 15 per group; and Class C, 50 cards from at least six groups with a maximum of 10 cards per group. Groups exist in DL, F, G, HB, I, LA, LX, OE, OH, ON, OZ, PA, YU and SM. Rules and membership lists are available from LX1BW, Secretary FIRAC, Clervaux, Luxembourg.

CHC Chapter 8 Awards

These include the **Worked Chapter 8** (issued in seven classes requiring contacts with from eight to 200 members); the **British Counties Award** (for working 50, 75 and 98 counties since the second world war) in the case of UK applicants this must have been on one band only; **Worked Surrey Towns** (for contacts with 5, 10 or 20 of the larger Surrey towns); and the **Worked Welsh Prefixes** (for confirmed contact since the second world war with GW2, GW3, GW4, GW5, GW6 and GW8—five GW3s may be submitted in place of a missing prefix, but once only). Each award costs 5s or eight IRCs, and certified lists should be sent to Mrs Ruth Uwins, G3TNN, 18 Clarendon Road North, St Annes, Lancs. Fuller details may also be obtained from this address. It should be pointed out that all these awards are free to blind and paralysed applicants and are available to listeners.

Kamloops Amateur RC Award

Issued by the KARC for working 10 British Columbia stations of which at least two must be in the Kamloops area. Any band/mode may be used and mode endorsements may be applied for. A list of stations worked, plus three IRCs, should be sent to the award custodian, Brian Curtis, VE7AZC, 605 Balsam St, Kamloops, BC, Canada.

The International DX Association

This is a new organization in the USA whose primary objective is to furnish amateur equipment to stations located in out-of-the-way dx places which are not able to obtain it otherwise. During the past few years 27 such projects have been undertaken, and recently Niue and Manihiki have been activated. The president is WA5REU, and the secretary/treasurer is K3RLY. Membership costs $2 (16s 8d) per

Some of the more active Iranian amateurs recently visited the home of Alf, EP2TW. Left to right, EP2BF (President, Amateur Radio Society of Iran), EP2TW, EP2HL, EP2BI, EP2BQ, EP2BA, EP2JP, EP2YL, EP2FB, and EP2JZ

annum and applications should be sent to Bud Kellam, K3RLY, 6536 Allview Drive, Ellicott City, Md, 21043, USA. The association meets at 2330 every night on 14,218kHz.

Slow-scan television

G3IYG and G3ZGO (G6ADJ/T) wish to point out that there is activity on sstv on 14,230kHz at 1900 every evening. UW6LC reports reception of pictures from Italy, Sweden, Finland, Switzerland, Belgium, Greece, USA, Alaska and Antarctica. I1LCF and SM5DAJ appear to have good signals in the UK. G3ZGO hopes to publish details of his sstv monitor in an early issue of *Radio Communication*.

The thirteenth Jamboree-on-the-Air

This starts at 0001 17 October and ends at 2359 on 18 October. Official frequencies are: 3,590, 3,740, 7,030, 7,090, 14,090, 14,290, 21,140, 21,360, 28, 190 and 28,990kHz. Scouts in many parts of the world will be taking part and this is in no sense a contest but a worldwide get-together. Participation certificates will be issued to all who send in reports of their activity to: Boy Scouts World Bureau, Att: L. F. Jarrett, 1211 Geneva 4, Switzerland.

Contests

The RSGB 28MHz Telephony Contest
0700 10 October to 1900 11 October
For full rules see page 337 May *Radio Communication*.

The RSGB 7MHz DX Contests
1800 24 October to 1800 25 October (cw)
1800 7 November to 1800 8 November (phone)
For full rules see page 404 June *Radio Communication*.

The 1970 CQ World Wide DX Contest
0000 24 October to 2400 25 October (phone)
0000 28 November to 2400 29 November (cw)

This contest covers all bands 1·8 to 28MHz, and the object is for amateurs throughout the world to contact as many others in as many different countries and zones as possible in the 48 hours. QSOs between stations in the same continent count one point, in different continents three points. Contacts between stations in the same country do not count for points but may be made for country and zone credit. Entries may be single-operator, single- or multi-band, multi-operator single-transmitter (all band only and only one signal permitted), and multi-operator multi-transmitter (only one signal per band allowed). Contest exchanges consist of RS/T plus zone number (the UK is in zone 14). Two types of multiplier may be gained—one for each zone worked per band and one for each different country worked on each band. The CQ Zone map, DXCC and WAE country lists are the standards to be followed. Only one contact with a station per band is allowed for points credit. To qualify for an award single-operator entrants must show at least 12h, and multi-operator stations 24h participation. First-place certificates will be awarded to winners in each category in each country and in the different call areas of the USA, Canada, Australia and UA9/UA0. Zone maps and summary sheets may be available from G3FKM, but no log sheets are available at present and interested parties are advised to apply direct to CQ Contest Committee, 14 Vanderventer Ave, Port Washington, NY, 11050, USA, for a supply (enclosing return postage) or to use home-made sheets (40 QSOs per sheet, one side only) listing the following details: Date, time (gmt), station worked, number sent, number received, zone (if for first time), country (if for first time) and points. Total zones, countries and QSO points claimed per sheet should be listed at the foot of the page.

The International OK DX Contest
0000 to 2400 8 November

Cw and phone but no cross-band/mode QSOs allowed. A station may only be worked once per band and contacts with one's own country count only as a multiplier and not for QSO points. Contestants should exchange RS/T plus a number indicating their ITU zone (the UK is in zone 27). Contacts with OK stations count three points, with others one point, and the total of QSO points is multiplied by the total of ITU zones from all bands to arrive at the final score. Separate logs should be submitted for each band and should show date and time, station worked, numbers sent and received, points claimed, and ITU zone (if multiplier). The log must indicate in which category it is entered (A = single-operator multi-band, B = single-operator single-band, C = multi-operator multi-band) and be accompanied by a declaration that local and contest rules were obeyed and that the log is true. The entry should be sent to C.R.C., PO Box 69, Prague 1, Czechoslovakia, before 31 December. The "100 OK Award" will be issued to those working 100 OK stations and the "S6 Award" to those working all six continents—both awards will be issued in reply to a written request with the log.

Results of the **1969 CQ WW DX Phone** contest are now available and are as follows:

Single operator, single transmitter

G3RRJ	**859,747**	**points**	**(All bands)**	**G3HCT**	**832,016**	**points**	**(21MHz)**
G3XYP	853,523	,,	,,	**G3LZQ**	**210,295**	,,	**(14MHz)**
GW3NWV	**723,840**	,,	,,	**GD5APJ**	**178,090**	,,	,,
GM3BCL	**404,096**	,,	,,	G3NSY	27,412	,,	,,
G3XYB	229,672	,,	,,	**GI3YDO**	**9,620**	,,	,,
GW3POD	174,472	,,	,,	**G3NLY**	**62,880**	,,	**(7MHz)**
G3YBH	91,800	,,	,,	G5HZ	11,856	,,	,,
G2AJB	75,818	,,	,,	**G3IGW**	**21,775**	,,	**(3·5MHz)**
GC3XOJ	**37,366**	,,	,,	**GM3VTB**	**10,584**	,,	,,
G3WOU	9,280	,,	,,	GM3YCB	1,080	,,	(1·8MHz)
GW3NNF	**240,870**	,,	**(28MHz)**				
G2BOZ	**217,504**	,,	,,				
G3WJN	178,669	,,	,,				
G3KMA	96,672	,,	,,				
GD3AIM	**59,680**	,,	,,				

Multi-operator, single transmitter

G3SSO	**2,330,781**	**points**	G3VUM	462,234 points
G3WYX	2,287,090	,,	G3FVA/A	404,584 ,,
G3TXF	1,534,390	,,	GM3YRK	192,993 ,,
G5YC	1,404,656	,,	**GW6GW**	**116,602** ,,
G3KMI	846,351	,,	G3EEO	76,245 ,,
GM5AME	**719,104**	,,		

Congratulations to the winners (listed in heavy type). It is interesting to note that the callsigns of over eighty UK amateurs appear among the logs submitted in this contest. In the **1970 IARC CPR Contest** (phone) UK listeners featured prominently and the Zone 27 all band leader was **BRS27806** (109,620 points). On 3·8MHz **G-6903** was zone leader (11,591 points), and on 14MHz **A6248** with the very high total of 419,723 points. On 28MHz **A5489** also topped zone scores with 133,952 points. Congratulations to all on their very fine efforts.

Dxpeditions

It now seems likely that CE3ZN will be visiting CE0X (San Felix) and CE0Z (Juan Fernandez) during November, and

Martin, OH2BH, with the transceiver used during his OH2BH/ZA trip in July

according to the *West Coast DX Bulletin* he has invited Gus, W4BPD, to accompany him. The operation from CE0X may last for four days and that from CE0Z for six days.

W6WLH, W6EJJ and W6GC hope to operate from Haiti using HH9DLs call during the CQ WW DX Contest (phone) and will also be active on cw for three days previous to this. They will use all bands 10 to 80m.

VP1WMU will also be activated from British Honduras during the same period and will use all bands 10 to 80m, with the possible addition of 160m. The operators will be a group of the Lafayette ARC. There is also a report that HC1RF will be operating from the Galapagos Is (HC8) during this same event in October.

Martin, of OH2BH/ZA fame, will be visiting Lebanon for two weeks commencing 17 October, and hopes to visit Iraq and operate from there for five or six days.

KH6SP (via G3NLY) reports that there is a possibility that the group which operated recently as KH6NR/KH6 (Kure Is) may make a further expedition later in the year to a different location. Nothing is yet decided, but KB6 is under consideration.

The HB0AMY expedition to Liechtenstein by HB9AMY was active on all bands from 14 to 16 August

Numerical prefixes

The large number of stations appearing on the air using unfamiliar prefixes may mostly be identified by reference to the following list, eg a station with an 8S prefix would be located in Sweden.

2AA-2ZZ	UK.	6KA-6NZ	Korea.
3AA-3AZ	Monaco.	6OA-6OZ	Somalia.
3BA-3BZ	Mauritius and dependencies.	6PA-6SZ	Pakistan.
		6TA-6UZ	Sudan.
3CA-3CZ	Equatorial Guinea.	6VA-6WZ	Senegal.
3DA-3FZ	Canada.	6XA-6XZ	Malagasy.
3GA-3GZ	Chile.	6YA-6YZ	Jamaica.
3HA-3UZ	China.	6ZA-6ZZ	Liberia.
3VA-3VZ	Tunisia.	7AA-7IZ	Indonesia.
3WA-3WZ	Vietnam.	7JA-7NZ	Japan.
3XA-3XZ	Guinea.	7OA-7OZ	Southern Yemen.
3YA-3YZ	Norway.	7PA-7PZ	Lesotho.
3ZA-3ZZ	Poland.	7QA-7QZ	Malawi.
4AA-4CZ	Mexico.	7RA-7RZ	Algeria.
4DA-4IZ	Phillipines.	7SA-7SZ	Sweden.
4JA-4LZ	USSR.	7TA-7YZ	Algeria.
4MA-4MZ	Venezuela.	7ZA-7ZZ	Saudi Arabia.
4NA-4OZ	Yugoslavia.	8AA-8IZ	Indonesia.
4PA-4SZ	Ceylon.	8JA 8NZ	Japan.
4TA-4TZ	Peru.	8OA-8OZ	Botswana.
4UA-4UZ	UN.	8PA-8PZ	Barbados.
4VA-4VZ	Haiti.	8QA-8QZ	Maldive Is.
4WA-4WZ	Yemen.	8RA-8RZ	Guyana.
4XA-4XZ	Israel.	8SA-8SZ	Sweden.
5AA-5AZ	Libya.	8TA-8YZ	India.
5BA-5BZ	Cyprus.	8ZA-8ZZ	Saudi Arabia.
5CA-5GZ	Morocco.	9AA-9AZ	San Marino.
5HA-5IZ	Tanzania.	9BA-9DZ	Iran.
5JA-5KZ	Colombia.	9EA-9FZ	Ethiopia.
5LA-5MZ	Liberia.	9GA-9GZ	Ghana.
5NA-5OZ	Nigeria.	9HA-9HZ	Malta.
5PA-5QZ	Denmark.	9IA-9JZ	Zambia.
5RA-5SZ	Malagasy.	9LA-9LZ	Sierra Leone.
5TA-5TZ	Mauritania.	9MA-9MZ	Malaysia.
5UA-5UZ	Niger.	9NA-9NZ	Nepal.
5VA-5VZ	Togolese Rep.	9OA-9TZ	Congo Rep (Kinshasha).
5WA-5WZ	Western Samoa.	9UA-9UZ	Burundi.
5XA-5XZ	Uganda.	9VA-9VZ	Singapore.
5YA-5ZZ	Kenya.	9WA-9WZ	Malaysia.
6AA-6BZ	UAR—Egypt.	9XA-9XZ	Ruanda.
6CA-6CZ	UAR—Syria.	9YA-9ZZ	Trinidad and Tobago.
6DA-6JZ	Mexico		

Changes are constantly taking place in these allocations—the latest appears to be the 9B3 which is now being used by stations in Botswana although the above list shows it to belong to Iran. 3BA-3BZ is officially listed as allocated to Canada but is being used by Mauritius.

AX6HD reports that there may be an expedition to Lord Howe Is by VK2BKM during October. VK2ABW/LH was active for a short time from the island in late August. Also from AX6HD comes the news that George, ZL2AFZ, is hoping to visit Manihiki (ZM7) and Niue (ZK2) in January or February. A possible operation from Manihiki (ZK1M) is also under consideration.

DX news

As usual, a number of unusual prefixes are expected to appear on the air during the CQ WW DX contests. ZZ2ETK, ZZ2PH, ZW2SD, ZX2DL, ZY1CLI and ZY2RZ will all be on the air from Brazil and should be QSLd via the address given for ZZ2ETK in *QTH Corner*.

WA6DKW and his wife WN6FSC have been issued with the callsign VR5DK and will be on the air from Tonga after 3 November. They have a Swan Cygnet and dipole aerials and will operate on all bands 10 to 40m on cw and ssb for about one month. An additional vfo will be taken, weight restrictions permitting.

W6LWA/XV5 and W3JZJ/XV5 are reported from Japanese sources to be active from Vietnam and to be found on 20m ssb.

VE7IG (who recently operated as VS5RG and 9V1QE) will probably be in New Delhi or Calcutta by the time this reaches readers and will have the callsign VU2REG. He

1970 Countries Table

	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total
G8VG	3	21	30	35	71	51	211
G3JVJ	4	66	18	37	23	26	174
G3VPS	9	12	10	60	18	10	119
A7006	18	32	28	183	183	138	582
A6265	3	82	77	196	161	128	647
BRS25429	3	101	79	136	130	110	559
A6904	10	36	47	149	145	95	483
A6248	5	59	69	162	133	106	534
ORS31427	—	14	13	181	115	120	438
A5489	—	76	21	95	83	123	398
BRS27880	5	55	45	127	104	60	396
A7054	4	100	18	93	140	20	371
A6553	6	24	30	58	102	57	277
A6278	4	53	47	112	90	43	349
A6148	5	84	19	49	46	68	271
BRS30694	6	24	29	70	61	44	234
A6098	4	21	12	26	37	25	125
A6023	5	38	39	78	37	19	216
A6242	2	19	7	38	26	29	121
A6992	—	—	2	175	—	48	225

(This month's table is in order of 21 plus 28MHz totals.)

hopes to visit Nepal (9N1) and Sikkim (AC3) and will concentrate his efforts on the 40 and 80m bands.

JD1ABO is said to look for European contacts on Tuesdays and Saturdays at 1800 on 14,175kHz. JA1s KSO, MCU and MIN, and JH1s EYB and EXV act as MCs.

Princess Muna, wife of King Hussein of Jordan, is now on the air and has the callsign JY2. She asks for QSLs to be sent to PO Box 2101, Amman.

In a poll conducted recently by *DX News Sheet* Clipperton Is (FO8) was found to be the most "wanted" with 129 out of the 144 DXers who took part needing it. Other wanted countries were Laccadive Is (129), Albania (111), Bouvet Is (109), Maria Theresa (108), Cambodia (105), South Sandwich Is (102), China (100), Spratly Is (93) and Iraq (92).

XT2AA is said to be in hospital at present. VE7BWG reports that he has not yet received any logs from YV0PP who was a member of the last Aves Is expedition. ZK1AA (Cook Is) has a sked on Tuesdays at 0400 on 14,080kHz.

ZK1MA, the resident station on Manihiki Is, is now on the air and appears to favour 0400 on Sundays. His English is not very good and he is as yet rather a slow operator so that a great deal of patience should be exercised when trying to QSO him. ZK2AF is now on the air and is believed to be using a transmitter supplied by IDXA—he asks for QSLs direct to the address in *QTH Corner*.

Band reports

There seems to have been quite an improvement in conditions on 10m since the last report, with signals being received on one or two occasions from the East Coast USA as late as 2300. At the other end of the spectrum the dx group on 80m have been working juicy items such as VS5RG in spite of the continued juvenile interference which is being generated deliberately with the intention of making such feats more difficult. Several readers have commented on the very excellent performance by Roy, ZM1AAT/K, who has made every effort to work all callers with commendable speed and competence.

Many thanks to all correspondents and especially to the following: G2CDT, GW3AX, G3AAE, G3KWK, G3NLY, G3UYM, G3WBT, G3WJN, G5JL, BRS2098, BRS27880, BRS30386, A6148, A6248, A6265, A6947, A6992 and A7054. Stations listed in italics were on cw, the others ssb.

QTH corner

AX3BGB via K4II (see K4II/KS6).
CM3LN Box 6, San Antonio de Los Banos, Cuba.
F6RAC via R.E.F.
FL8BH BP 30, Djibouti, TFAI.
FL8PJ 54 Bd. de Gaulle, Djibouti, TFAI.
FO8DG via KH6BZF, 45-601 Luluku Rd, Kaneohe, Hawaii, 96744.
FO0TB via W6OFF, 4656 Vanalden Av, Tarzana, Calif, 91356, USA.
FO0TC via W9CTY, Richard Helton, RFD 1, Brocton, Ill, 61917, USA.
HB0XKZ via G3TXF, Holt Cottage, Kingston Hill, Surrey.
HH9DL (CQ Contest QSOs) via W6WLH, 1400 St Albans Rd, San Marino, Calif, 91108, USA.
K4II/KH6 (see K4II/KS6)
K4II/KS6 W. G. Baird Jr, 1018 Woodburn Rd, Spartanburg, SC, 29302 USA.
LX2CQ via DK1YK, Sauerbruchstr 5, 863 Coburg, Germany.
OE9ZQJ via G3TXF, Holt Cottage, Kingston Hill, Surrey.
TJ1AX via LA6XJ, Kjell Holen, Wellhavensgt 80, Bergen, Norway.
TY7ATF via K3RLY, 35 Allview Drive, Ellicott City, Md, 21043, USA.
VP1AV via W4VPD, Enos Schera Jr, 8254 SW 37th St, Miama, Fla, USA.
VP1JF via WB6IXC, 4201 Mt Hukee Av, San Diego, Calif, 92117, USA.
VP1WMU via W5WMU (enclose sae), 305 Silverbelle Parkway, Lafayette, La, 70501, USA.
VR5DK via WA6DKW, 7455 Henrietta Drive, Sacramento, Calif, 95822, USA.
YB3AAI PO Box 27, Surabaja, Java, Indonesia.
YB0AAF via DL1SU, Siebenbuchen 10, 2 Hamburg 55, Germany.
YJ8WP via WB4LWX, W. S. Page, Box 871 Kingston, NC, 28501, USA.
ZF1ML, ZF1RL via K9QFZ, Melvin Lehman, 3951, W Albion, Lincolnwood, Ill, USA.
ZK2AF Department of Education, Niue Is.
ZZ2ETK etc via PY2CA, PO Box 281, Sao Carlos, SP, Brazil.

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

3·5MHz. 0000 KV4FZ, VU2BEO. **0100** VP2VI. **0500** *ZL3FZ*. **2100** C31CY, CN8HD, VS6DO, 5Z4KL. **2200** VO1FG, VS5RG, ZB2A, ZS1s JA, MH, ZP3CW, 3V8AB, 9V1PP. **2300** PY7BHW.

7MHz. 0400 PY4UB. **0500** *CE0AE*, HT1BW (QSL via DL8DF). **0600** HB0AMY. **2000** CR7GJ. **2100** CP1CR, CR6GA, PY0AD, ZS1JA, ZS5XA, 5Z4KL. **2200** LU7AAC, VP2VI, VS5RG, VS6DO, 9V1PP. **2400** CO2DC, VP2AA.

14MHz. 0500 FG7TD, FO8BH, VR6TC. **0600** AX9ES (T.N.G.), CE0AE, ZK1AJ (Manihiki), ZM1AAT/K. **0700** AX0LD, *FB8YY*, KP6AL, KS6CG, ZK1AA. **0800** KS6DY, VK9XI. **0900** CR4BS. **1400** YK1AA. **1700** FR7ZW, XW8DK (QSL via WA6NFC). **1800** CR5SP, 9K2AV. **1900** *ST2SA*, 4S7PB, 5A3TB (Box 2325 Tripoli), 5X5MP. **2000** KC4AAD (QSL via W7YMG), ZD7SD. **2100** VS5RG. **2200** *FM0XF*, ZD3K, ZP5PD. **2300** XT2AA. **2400** TY7ATF.

21MHz. 0600 FB8XX (QSL via F2MG). **0700** KS6DH. **0900** VQ9V, VR2EK, ZM1AAT/K. **1000** HM5DY, KL7HBD. **1100** *FK8AH*, KC6JC, KX6VF, VR1L, *VR1O*. **1200** AX9JL, ZD8RR (QSL via W7VZX). **1300** VS5RG. **1400** 5VZWT, 9M8FMF. **1600** CR5SP, KC6WS, YB0AB, 9M2VI. **1700** EA9AQ, JY1, MP4TQD, *XW8CZ*, 3B8CZ. **1800** HS1ACW, VQ9HJB, 9H1T (on am, Gozo Is). **2000** FL8MB, VP8KD. **2100** PY1ZAA/P2 (first reciprocal licensee). **2200** VP2MM, 5H3MC, 9Y4MM.

28MHz. 1000 HB0AMY, 3V8HA. **1100** AX6HD, AX9BJ, AX9RY, KG6AAY, VS6DO, 4S7PB, 9V1OJ. **1200** AX9DM. **1400** JY1, TJ1AZ. **1500** ZD5X, ZS3HF, 3V8CS. **1700** CE8AA, EA9EJ, XW8DU, 8P6CA. **1800** CR6CA, PZ1DX, ZP5DV. **1900** *W5BY*. **2000** LU and PY. **2100** CEs, KP4ZM, KZ5JW.

Many thanks to all who have contributed news items for this month's column, and especially to the following publications: **NARS Newsletter** (*5N2AAF*), **Long Skip** (*VE3DID*), **On the Air** (*ON4AD*), the **West Coast DX Bulletin** (*WA6AUD*), the **Ex-G Radio Club Bulletin** (*W3HQO*),

DX'press (*PA0TO*), **DX News Sheet** (*Geoff Watts*), **International Communications** (*Euradio*), **QUAX** (*G3DME*), the **DX'ers Magazine** (*W4BPD*), **Florida DX Report** (*W4FRO*), and the **DX'er** (*K6YGS*).

Please send all items for **November** issue **to reach G3FKM** no later than **12 October,** for **December** issue by **9 November,** and for January 1971 issue by 11 December.

Propagation Predictions

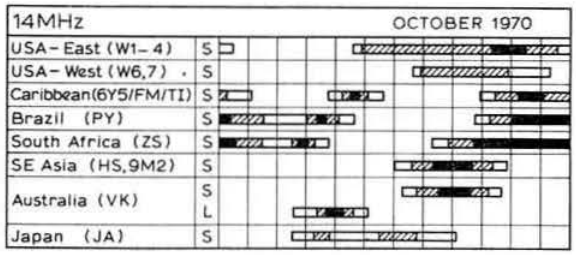
Propagation conditions will reach their maximum in our latitudes during October and November. During the present still relatively high activity of the sun they will be good enough for traffic on **28MHz** to be possible in all directions. Contacts with North America and Japan should be certain on this band, expecially during the latter half of the month, and on favourable days (ie days with above average MUFs) with western North America. Short skip conditions will occur very rarely from this month onward.

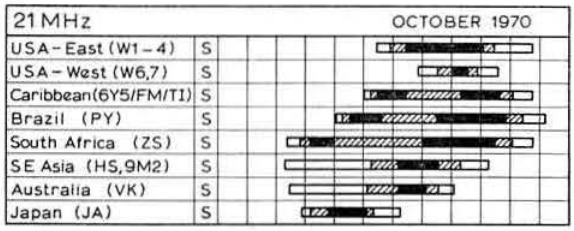
As on 28MHz, contacts with all continents should be possible on **21MHz.**

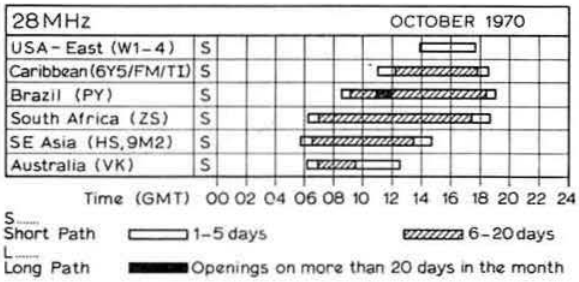
14MHz will offer good dx possiblities during the evening. In daytime it will be suitable for contacts with the Continent as well as dx.

Distances on both **7** and **3·5MHz** will increase during the course of the month. There will be no interference by the dead zone on 7MHz during daytime. The best chances for the dx on this band will come after midnight when the path lies in darkness. Local traffic on 3·5MHz will be interrupted only by QRM during the second half of the night.

The provisional mean sunspot number for August 1970 from the Swiss Federal Observatory was 92·9. The greatest activity was during the second half of the month. The predicted smoothed sunspot number for December 1970, January 1971 and February 1971 are 89, 87 and 85, respectively.







IARU Region 1 calling

INTERNATIONAL AMATEUR RADIO UNION

by R. F. STEVENS, G2BVN

Reciprocal licences

The new address to which applications for France should be sent is Direction des Services Radioelectriques, 5 rue Froidevaux, 75 Paris 14. Forms are obtainable from RSGB HQ. The new address for Belgian licences is M le Directeur General des Radiocommunications de la RTT, Place Madou 1, 1030 Brussels. It is the aim of the IARU to persuade all licensing authorities to accept a standardized licence valid throughout the world. Such a licence would avoid the expense and delay experienced with the present system.

Space Conference, 1971

After considerable correspondence and a number of meetings the countries of Region 1 and the IARU HQ have adopted proposals dealing with space communication on amateur bands. At the present time our participation in space techniques is limited to the band 144-146MHz. If the IARU proposals are accepted the amateur service will then have unrestricted use of exclusive amateur bands for space communication while the shared bands may also be so used subject to non-interference and telecommand facilities. This is a realistic advance on the present position which was adopted in 1963 after considerable opposition and discussion. The position at the 1971 conference will depend upon the amount of support for the proposals that is forthcoming from the national administrations. At this point it is opportune to express appreciation to the UK MPT for their co-operation and assistance.

Intruder watch

Members should note the new address of the Society's intruder watch organizer, Colin Thomas, G3PSM, appearing at the front of this issue. Despite his other commitments on leaving the RAF, G3PSM has continued to collate and despatch reports which are investigated by the PO monitoring station at Baldock.

Frequencies used by intruders and about which action has been taken include 14,146, 14,248 and 21,216kHz. Considerable co-operation has been received from Radio Free Europe concerning the second harmonic of their 7,165kHz transmission on 14,330kHz. The problem has now been cleared, apparently by additional filtering. Among other actions taken by the MPT was one to secure the improvement of an A4 emission on 5335·5kHz, the fourth harmonic of which was printing a reasonable picture on 21,422kHz.

Other Region 1 societies are adopting the pattern of the RSGB Intruder watch (believed to be the first in the world) and there is now greater pressure on administrations to keep amateur bands free from unwanted intruders. Unfortunately many such stations only operate for short periods, making detection and location difficult. This particularly applies to stations of the various diplomatic services.

Although there are now 138 member nations of the International Telecommunication Union this number does not include all countries operating high-power transmitters and potential intruders. Notable exceptions include Albania (believed to contain a Radio Peking relay), China and the United Arab Republic, the latter being responsible for the unwanted noise of Radio Cairo, operating in an exclusive amateur band.

Executive Committee meeting

The annual meeting of the Region 1 Executive Committee, which comprises SM5ZD, F3FA, PA0DD, DL3NE, YU3AA and G2BVN, will take place at The Hague during 16-18 October. There is a long and varied agenda ranging from the proposed IARU HF Bands Contest to a decision on representation at the Space Conference.

SOCIETY AFFAIRS

A brief report of the Council meeting held at Society HQ on 7 August 1970.

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

Apologies for absence were received from Messrs J. O. Brown, A. Hunter, E. G. Ingram and J. W. Swinnerton.

Accommodation for Maurice Child Collection
Mr Yeomanson reported that he had been in touch with Mr A. O. Milne to arrange for the removal of the Maurice Child Collection from Bromley and he hoped to make final arrangements for collection in the near future. Mr Milne had informed him that the collection was fully catalogued.

Membership and affiliation
It was resolved:

(i) to grant life membership to Messrs M. J. P. Evans, GW3UCJ; A. R. Low, GM3GUI; and A. R. Richardson, G8ARL;
(ii) to elect 172 corporate members and 42 associates;
(iii) to grant corporate membership to 10 associates;
(iv) to waive the subscriptions of 10 members due to blindness or other disability;
(v) to grant affiliation to the 73rd Derby (Allestree) Scout Group Radio Section.

Radio amateur satellite corporation
Mr Stevens explained that AMSAT were sponsoring the next transponder satellite, and, in addition, a great deal of work had been done by AMSAT in connection with the Space Conference. He proposed that the Society should support AMSAT by becoming a subscribing member, and Council approved this proposal.

Visit of Michael Owen, VK3KI
Mr Stevens reported on the visit of Michael Owen, Federal President of the WIA. Mr Owen had spent a day at RSGB HQ and another day discussing IARU matters with Mr Stevens, who had been able to arrange for Mr Owen to see Mr Baptiste of the Ministry of Posts and Telecommunications. In addition, discussions had been held with Mr Stone on matters connected with the Space Conference and satellite work.

Region 1 ORM
The Region 1 RR, Mr B. O'Brien, had made arrangements to hold a Region 1 ORM at the Floral Hall, Southport, on 27 September. Mr Petty said he would be present, and Mr Ward was also asked to attend as a representative of Council.

Trophy nominations
Council approved the following awards:

(i) the Founders Trophy to Mr Arthur Milne, G2MI, for his services to the Society and the membership during the many years that he has managed the QSL Bureau with great efficiency;
(ii) the Rotab Trophy to Mr J. D. Kay, G3AAE, for many years of successful dx working. Mr Kay was one of the first UK stations to appear in the Honor Roll of ARRL DXCC members;
(iii) the Calcutta Key to Leslie Ward, BRS27952, for his efforts in promoting international friendship through the medium of amateur radio. Mr Ward had provided operating facilities at his hotel in Guernsey for many visiting amateurs from the British Isles and overseas.

Date of Presidential Installation
Council agreed that the general manager be authorized to make a booking at the Hotel Bonnington for Friday 15 January. Mr Stevens asked that the London Lecture Meeting already arranged for 21 January be noted.

Nominations for Council vacancies and appointment of Honorary Treasurer
Council noted that three vacancies would arise for Ordinary Elected Members with effect from 1 January 1971. Mr Swinnerton had already indicated that he did not wish to seek re-election, and following discussion it was agreed that Council should nominate Messrs Armstrong, Ingram and Stevens for re-election to the 1971 Council.

Council agreed to appoint Mr A. C. Morris, G3SWT, to be Honorary Treasurer for the three-year period commencing 1 January 1971.

Mr H. E. McNally
Council noted with regret the contents of a letter from Mr H. E. McNally, GI3SXG, resigning from Council due to business commitments.

World Administrative Radio Conference for Space Telecommunications
A letter dated 3 August had been received from Mr C. E. Lovell of the Ministry of Posts and Telecommunications inviting the RSGB to provide an adviser for the UK delegation to the Space Conference. Following discussion it was agreed that Mr R. F. Stevens, G2BVN, should represent the Society at the conference, and the general manager was instructed to advise the Ministry of Posts and Telecommunications accordingly.

Dr Saxton stated that he would be present at the conference.

Mullard Exhibition
Mr Stevens reported that Mullard Ltd proposed to hold an exhibition which would include a feature on amateur radio—past, present and future, for three weeks opening on 5 October. The company had approached the RSGB inviting co-operation, and Council agreed that the Society should support the exhibition in principle. Messrs Stevens and Yeomanson agreed to co-ordinate the RSGB participation.

Register of RSGB Groups
Mr Petty reported that the Membership & Representation Committee considered that a short note should appear in *Radio Communication* asking persons responsible for RSGB Groups to register the existence of their groups with headquarters. After discussion, it was agreed that the recommendation from the M & R Committee be endorsed.

Contest rules
Mr Ward asked whether Council had any objection in principle to the use of the RSGB Contest Rules in connection with contests organized by individual clubs. Council agreed that no objection would be raised.

RTTY awards
Mr Yeomanson asked whether Council would be prepared to consider an rtty endorsement for Society awards. The British Amateur Teleprinter Group Contests Manager, Mr Double, had offered to assist in checking any applications received. Council agreed to this suggestion.

VHF Certificates Manager
Mr Stone reported that Mr Frank Green, G3GMY, had asked to be relieved from his duties as VHF Certificates Manager due to pressure of work, and Mr J. Hum, G5UM, had offered to take over these duties. Council approved the new appointment and thanked Mr Green for his past services.

Lucky Draw

The winner of the Lucky Draw at this year's exhibition was **Mr A. Stevens,** a short-wave listener of Stevenage, who is now the proud possessor of a Hammerlund HQ215 communications receiver.

OBITUARIES

M. G. Betty, BRS807
Malcolm Betty held the call 2BMT for several years before the war. He was a member of Bristol & DRS from 1923 until his death earlier this year.

F. A. Boyce, G6DK
Frank Boyce died on 23 July aged 75. His first QSO took place in 1910 and he was still active until shortly before his death.

A. W. Clarke, BRS20732
Alan Clarke died on 23 August at the age of 65. He joined RSGB in June 1955.

A. L. Heighton, G3WQI
Alf Heighton died on 1 September, shortly before his 75th birthday. Putting his Navy training to good use, he took up amateur radio and passed the RAE at the age of 70.

A. E. Hill, BRS26389
Mr A. E. Hill died on 26 August at the age of 81.

R. A. Hiscocks, G6LM
Reg Hiscocks of Melksham, Wilts, formerly of Chippenham, has died. He was licensed in 1927 and will be greatly missed from the top band cw net.

E. J. Pearcey, G2JU
The death of Ernest J. Pearcey, G2JU, took place at his home in West Wittering, Sussex, on 1 July. He was 73 years of age. He became interested in radio at the age of 15, obtained a seagoing radio operator's certificate in 1919, and received the callsign 2JU in 1920. He lectured on radio at Bognor Regis Technical Institute and at Portsmouth Technical College.

G. A. Roberts, GM3NOV
George Roberts of Aberdeen died aged 53 on 2 September. He was a well-known operator in the north of Scotland.

YOUR OPINION

The Editor
Radio Communication
Sir—There seems to be a fast-growing need for representations to be made through IARU to certain member societies, and perhaps to licensing authorities, on the behaviour of many amateur stations disregarding the band plan in the 7MHz allocation. Far too often A3 emissions are to be found below 7,040kHz, even down to 7,025kHz.

To give just one example, on the day this letter is being written (22 July) a continental station started calling CQ using A3 on 7,027kHz at 1457gmt, and was answered by a British amateur at 1459gmt also using A3. They continued in QSO until 1509gmt, by which time another British amateur was calling CQ using A3 about 300Hz above them. Don't these people know that 7,000 to 7,040kHz is reserved for A1?

It is also rather strange that A3J is seldom used by continental stations in this already crowded narrow allocation. Many of them with very strong signals, often grossly over-modulated, seem to congregate in the upper part of the band around 7,080 to 7,100kHz. The interference they cause is appalling, especially for those of us in the south where they come romping in as loudly as their fish-phone brethren do on Top Band.

The buzz-saw jammers also now adopt a new technique of wandering about, some 10kHz above and below the frequency they want to settle on, presumably so that they can carve out a nice large chunk of the band for their broadcasts.

Yours faithfully,
W. E. Thompson, G3MQT

The Editor
Radio Communication
Sir—Please may I offer my services as a mediator between G3SAA and G3YDX?

I would like to split a hair to begin with—a $\lambda/4$ aerial does not radiate at all. To do any radiating it must have radials, as in the ground-plane case; another $\lambda/4$, as in the dipole case; or the earth itself, as in the Marconi case. The electrostatic lines which begin at the tip of the $\lambda/4$ aerial have to go somewhere, or you just can't feed it.

The whole question as to the success of the aerial for dx, or even for local working, therefore depends upon the remainder of the aerial circuit. This may include the transmitter mains leads to earth, the earth lead proper (some part of which can be acting as the other half of a dipole!) and a host of other things. And it is usually the other things upon which the success or failure of the $\lambda/4$ aerial depend. Those who doubt this should try a $\lambda/4$ Zepp operating with its feeders *truly* balanced!

The light dawns when we realize that the bit of wire in the sky is only a portion of the real aerial system.

Yours faithfully,
Harold S. Chadwick, G8ON

The Editor
Radio Communication
Sir—Early in August a North Sea Gas conversion unit set up its portable headquarters in a field very near to my QTH and my aerial systems.

A major part of the NSG installation was its vhf radio system, used to communicate with the multitude of vehicles used for the conversion work. As the site r/t would be in continuous use on frequencies close to mine I was concerned about possible interference from it at such close range.

I contacted the site contractor who was setting up the station and pointed out that I had two radio telescopes observing the midday sun, that each evening I was observing meteors on 70·31MHz, and told him about my concern over possible interference with my equipment.

The following day I had a telephone call from a senior communication engineer of the South Eastern Gas Board who took full details of my equipment, observation times, and working frequencies and arranged to carry out transmitter tests at my QTH the following day. The tests were personally carried out by Mr Edwards, the senior engineer who phoned me, and he went to considerable trouble to make sure that all their transmit frequencies did not interfere with me. A few days later the contractors made the site operational and the Gas Board carried out further tests near and around my QTH to make absolutely sure that their working frequencies were clear of mine.

I would like to place on record in *Radio Communication* my thanks to the South Eastern Gas Board and their engineer, Mr Edwards, for taking so much trouble to see that their temporary station did not interfere with my work and that good public relations prevailed.

Yours sincerely,
Ron Ham, FRAS, BRS15744

The Editor
Radio Communication

IF ONLY!

Sir—As an example of first-class service to the radio amateur fraternity by a commercial firm in conjunction with British Rail, the following surely deserves full praise and credit.

Wednesday morning, 1140am 2 September. Prior to VHF Field Day (5—6 September) I telephoned J-Beam Engineering Ltd of Northampton to enquire whether it was possible to despatch an ex-stock 70cm multibeam or parabeam aerial to Glasgow in time for Field Day. Sorry!—but they only had 8/8 aerials in stock (and these are unsuited to our stacking system).

Early that afternoon their sales manager phoned me in Glasgow—and I now confess to somewhat sceptically accepting Mr Wilkinson's offer of help by manufacturing, packing and despatching by train an 18-element parabeam in time for Field Day. Sufficient to say that at 0840 on the Thursday morning—only 21 hours after my plea for help—I did collect this aerial from Glasgow Central Station.

Well done, J-Beam!

Clearly, one could not expect such service every day—but IF ONLY a few other firms I know who supply radio amateur gear could demonstrate, even occasionally, such obvious goodwill and efficiency . . . ah, well . . . IF ONLY!

Yours truly,
Peter G. Bower, GM3OFT

The Editor
Radio Communication

Sir—I wonder whether we, as a fraternity, have really taken the trouble to think through the implications of the current widespread adoption of ssb? The very fact of its efficiency, whether measured in terms of stations per kilohertz, or talk-power per shilling, ensures that without it no one gets very far on the dx bands today, which is why a.m. as a mode of communication has all but disappeared except on the short-haul bands. This is very pleasant for the manufacturers of ssb transceivers, and has presented new challenges to those of us who prefer to "roll our own", but should we not now take time out to think about the bigger picture? I don't think anyone would seriously try to deny that ssb, being more advanced, is not also considerably more complicated than a.m. or fm, and requires a considerable degree of technical knowledge and ability for its understanding.

And therein lie the dangers.

How many of us had our introduction to the hobby through the chance overhearing of some amateur's conversation on the short-wave band of a domestic receiver? And how likely is this to happen today, when all that can be heard is an unintelligible quacking sound? Who knows how many potential amateurs are being lost to the hobby at the swl stage because they can't resolve an ssb conversation for more than a few seconds at a time due to a "communications" receiver with drifting oscillators, poor selectivity, and an a.m. detector—and can't afford the quite considerable price of a good ssb receiver? It isn't too difficult to build a reasonable a.m. receiver, even with limited technical knowledge, because one of the most intractable problems of the ssb rig—unstable oscillators—is not present in nearly such an acute form. Trying to make a really stable oscillator is a quick way to instant insanity unless one happens to be fairly experienced in this sort of work! And the same applies to transmitters.

In the past, a lot of us got on the air as new licensees with what was little more than an ordinary oscillator with a bit more dc power applied, and when we wanted to modulate it, we added a transformer and an af amplifier, turned the dc down a bit, and hopefully plugged the mike in. It was one of the most wonderful moments of my young life when, after doing exactly this, I got a reply at my third CQ from a G2— and I was in Singapore at the time! My knowledge of electronics was then, as now, minimal, and I had had absolutely no help from anyone in building the rig—it all came out of the ARRL handbook. Try starting that way with ssb! I would probably either have given up, or tried to buy a commercial rig and become yet another box operator, as so many do nowadays.

Yes, I know, we need the box operators to keep up band occupancy and buy a lot of commercial gear so that there is a strong commercial financial interest in the hobby that can pull a few strings for us when necessary, but must ALL new hams go that way, as all but the exceptional few must if ssb forces out the simpler and easier forms of modulation?

Do we really want a future for amateur radio encompassing falling interest and declining numbers because many can't keep up with the technical demands of building their own rigs, and can't afford the financial demands of buying them, coupled with a derogation of the "self-training" aspect to that of communication only, with very few being able to repair or maintain even the simplest equipment?

Luckily, we aren't at this stage yet—but look at the situation in the USA where there is an enormous explosion in the Citizen's Band population, a steady decline in amateur licensees, and even demands by certain CB interests that they should be given some of the amateur bands solely because there are many more CBers than amateurs! It would be unfair to lay all this at the door of ssb, but who is to say that the cheapness and simplicity of the mainly a.m. CB gear has not attracted many who would otherwise have been licensed amateurs? We don't have CB here—yet—but there are straws in the wind already—the "Free Radio" movement has powerful backing from certain commercial interests which can see a lot of money to be made out of commercial radio on the American pattern, and if they achieve this, the precedent is set for the release of frequencies for a Citizen's Band here.

In view of all this, I have a proposal to make that I believe would help matters considerably, even if only adopted in this country.

It is that we should confine ssb operation to certain parts of our bands, in exactly the same way as we protect cw already.

Since it would probably be impossible to get international agreement on the dx bands, let us confine this, initially at least, to those bands where we have some measure of control, and where it is actually more important that it should be done—160m and 80m. Both of these are traditional beginner's bands, and on neither has a.m. yet been completely abandoned. I suggest that ssb should be confined to 1,850-1,900kHz, and 3,700-3,800kHz, thus leaving 1,900-2,000 kHz and 3,600-3,700kHz for a.m., although still shared with cw. This has the advantage of accepting to some degree the existing situation, and although it has been suggested that ssb should be banned altogether on 160m, I feel that this is much too extreme a step.

The situation on the vhf/uhf bands need not be considered, at least while ssb stations are in such a minority as at present.

And, finally, just to forestall the inevitable accusations that I am anti-ssb, I have in the past 10 years designed and built two ssb transmitters, one ssb receiver, and am currently designing a new fully-transistorized ssb transceiver for mobile/portable use—for 160/80m use only—naturally, it will also be capable of producing and receiving a.m.!

Yours sincerely,
W. Blanchard, G3JKV

The Editor
Radio Communication

Sir—You might be interested to hear about the Douai School Radio Society's latest project.

The idea has been to receive the cloud cover pictures taken by satellites, and first, I believe, received on an amateur basis by GM3BST.

We have built a 10-turn Helix with a bandwidth of between about 110MHz and 180MHz. At present, the 136MHz signals are fed from this to a converter with an i.f. of about 26MHz. They are then passed to an Eddystone 770R receiver via the rf amplifier of an AR88D, which also provides an S-Meter readout. The detected signals are then recorded on a tape recorder. These signals consist, when detected, of a 2,400Hz carrier, amplitude modulated by the picture details.

A signal which is to be recorded on film is then full-wave rectified and used to brilliance modulate a television picture tube. Timebases made by the society scan the spot across the tube, four times a second horizontally and once every 800 seconds vertically. The 2,400Hz carrier is divided down to provide sync pulses. Time lapse photography is then used to produce the finished picture.

Next term, improvements will be made, notably a new fm detector. But these will have to be fitted in between building a rig for 70cm, getting the teleprinter active on 2m and organizing a membership drive.

Yours faithfully,
S. Underwood, A6487, Secretary

The Editor
Radio Communication

Sir—In view of the interest being shown in the construction and operation of miniature solid-state fm equipment for use in the 2m band, a number of amateurs in the South Buckinghamshire area have agreed on a common frequency of 145·280MHz for experimental use.

The selection of an out-of-zone channel was deliberate, bearing in mind how easy it is for a signal of a few milliwatts to be obliterated by higher-powered local stations. An added advantage of nominating a spot frequency is that participating stations can readily make contact with others who have receivers capable of properly resolving fm signals. It is anticipated that in the near future a listening watch will be maintained on this channel by a number of stations in the area.

An open invitation is extended to any fm-equipped station within range to join the net, but in fairness to others the only thing we ask is that they do not transmit on the channel unless they are also prepared to listen on that frequency.

Yours faithfully,
D. C. Chapman, G3NGK

Looking ahead

11 October—RSGB Scottish VHF Convention, Dundee.
27 October-1 November—4th International Convention of Radio Amateurs, Barcelona.
4 December—RSGB AGM.
11 December—RSGB Dinner Club, Kingsley Hotel, London WC1.

MOBILE RALLY NEWS

The mobile rally season having come to an end for this year, we give below a few reports which have been received.

Anglian, 20-21 June

Once again this rally at the Suffolk Show Ground was a great success and attracted an attendance estimated by the police to be in the region of 4,000. The number of radio amateurs attending, compared with non-amateurs, increased by an estimated 300 per cent compared with last year.

GB3AMR made 336 contacts during the two days. Demonstrations and lectures by Frank Howe, G3FIJ, Mike Dormer, G3DAH, and Owen Chilvers of Moseleys Aerials took place on the Saturday.

Talk-in station at Anglian Mobile Rally
Photo: G3MWO

Thanet ARC, 3 May

This eleventh annual rally, held at Ramsgate, was the best yet held by the club. Some 70 mobiles attended and the good weather contributed to the success of this event.

Group of SWLs at Thanet Mobile Rally

Torbay ARS, 16 August

This was a successful event despite bad weather, the new venue being ideal for indoor and outdoor use. Over 300 people, 33 mobiles and 102 cars were present; the furthest travelled mobile being G3XTB from Bristol.

Worcester & D ARC, 12 July

Some 350 mobiles attended this rally, giving a total attendance of about 900 people in conditions of glorious sunshine. Furthest travelled was GM4MC from Edinburgh, and the best mobile prize went to G3XFI.

SPECIAL EVENT STATIONS

Jamboree on the Air, 17-18 October

Dunstable
GB3EDS will be operated on behalf of 8th Dunstable Scout Group at their HQ by G3DOT and G3YPP.

Edgware
GB3FES will be provided by Edgware & District RS at the 1st Edgware Scouts HQ. Operation on all hf bands, 160m to 10m and on 2m.

Gravesend
GB3HH will be operated by Gravesend Radio Society from the Gravesend & District Scout Association ground. Activity will be on 80m, the hf bands, and 2m.

Harrow
GB3RSH will be operated by the Radio Society of Harrow for the 1st/3rd Ruislip Scouts Group at their HQ. All bands 1·8MHz to 430MHz simultaneously, plus rtty station.

Leek
GB3CC will be the call of two stations, one on 80m and one on hf ssb, operated by Leek ARS on behalf of Leek & Cheadle Scouts and Ranger Guides. Location: Consall Camp Site near Leek, Staffs.

Malta
9H1BSJ will operate from St Julians, Malta, on ssb cw and a.m. all bands. Operators: 9H1BB and 9H1BX.

Powick, Worcester, 7-8 November

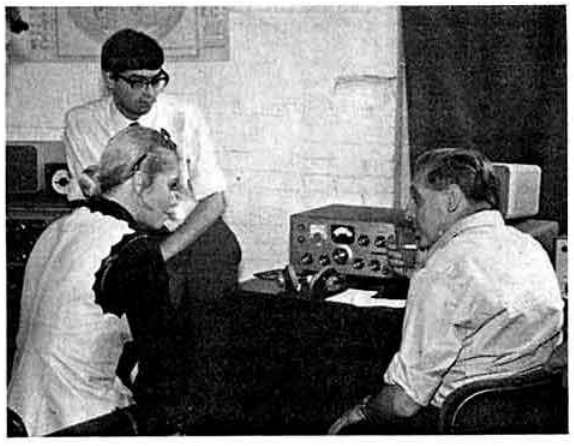
GB3PSC will be operated on 80m and 20m ssb at Powick Primary School, Powick, Worcester, on the occasion of the school's centenary. Special QSL cards. Further information from G3YQX or G3RWQ, QTHR.

Nottingham Festival

The Nottingham ARS station was in operation 24 hours a day throughout the Nottingham Festival, during which it was on view to the public in the courtyard of Nottingham's Wollaton Hall.

The chairman of the society's festival committee in charge of the project was Mr Ivan King, an employee of John Player & Sons who, through Mr King, assisted in providing transport and office equipment for the station as well as arranging for Miss World—Austria's Eva Rueber-Staier—to meet the society's members on duty at Wollaton Hall. During her visit a call was received from a radio amateur based near her home town of Graz in Austria.

During the two weeks of the festival, society members despatched approximately 3,000 QSL's and made contact with over 120 different countries. The society is particularly proud of the fact that the first 100 of these contacts were made within five days of opening the station.



Miss World talking to Mr King during her visit
Photo: John Player & Sons

CONTEST NEWS

July 1970 144MHz Open Contest Results

The 2m Open Contest held on 4–5 July attracted a record number of entries from the 600+ stations known to be active during the event. Fifty logs were received from portable stations alone, and almost the same number from fixed stations with single operators. The fact that the July Open coincided with the Summer Top Band Contest appears to have gone unnoticed by everyone except one G3, whose lone protest was lost in the layers of QRM generated by those who wholeheartedly supported the event.

Conditions were considered generally to be good, although many stations reported having experienced trouble from QSB at times. Continental activity was at a high level, with PA0 and F stations providing the bulk of the Continental contacts. Several stations reported hearing HB9 and I1, although only one HB9 QSO resulted.

While stations using ssb were far from being a rarity on the band, many competitors using this mode seem to have been handicapped by not being able to listen on frequencies other than their own. The inflexibility of "rock-bound" transmitters or of transceiver tuning appears to have been the root cause of many "cloth-ears" accusations.

Operating and signals were generally of a high standard, with only isolated complaints of splatter from neighbouring stations. There were the usual reports of stations working out of zone, but it is difficult to see how this can be avoided when it is known that the distant station is tuning from his end of the spectrum. Stations persistently making long CQ calls out of zone, however, are not operating in the spirit of the contest and should be actively discouraged.

The misprint in the last batch of 427 forms which required the contestant to give the height of his rf mixer stage in feet has not escaped the committee's notice. Further rude comments are quite unnecessary; the error will be corrected in the next printing.

Many competitors complained that the Open was becoming a rat-race, and over a dozen stations suggested that in future open events should either be confined to 432MHz and above, or that a new low-power event should be introduced to give those with more modest equipment a fair chance. There may be something in this suggestion, and the committee will have to give the idea a thorough airing before the rules for next year's events are drawn up.

As usual, many of the more forceful comments on rules and conditions tended to cancel out, and there is little doubt that the huge majority are quite satisfied with the status quo. However, if there was one criticism which was not balanced by favourable comment, it was upon the need to exchange both QTH and QRA Locator. The committee's viewpoint on this matter has been stated many times, but the short answer is that QTH is required by our licence conditions and QRA Locator by IARU agreement. There is no obligation for the competitor to extract both QRA and QTH from Continental stations so long as both are transmitted.

Other comments sent in revealed that there is much more to contest operating than merely recording QTH and QRA, especially when read against the background of the station log.

"There was a bull in our field . . ."—G3MMS/P.

"Apologies for giving our QTH in the sea. . ."—G3SLJ/P.

"A deep depression settled over our operators on Sunday morning . . ."—G3NNG.

"The water tank overflowed . . ."—G3XBY.

"Must get a new receiving set up . . ."—G3LCH.

"We didn't find the rx fault until one hour before the end . . ."—G8CXS.

"The '6-40 tx was used only for the first few QSOs . . ."—G3BRK.

"He that hath ears to hear, let him hear. Matthew XI. 15 . . ."—G8AFA.

In section A, the first and second places go to GD2HDZ and G8BBB, respectively. Both stations are to be congratulated in gaining a handsome lead over their nearest rivals. The Crawley ARC, operating under G3WSC gained a narrow victory over G8BMP in Section B, while in Section C only five points separated the highest claimed scores. Careful checking eventually established GW8BHY/P as the winner with 2,071 points. GW8CEZ/P, with slightly more logging errors, was awarded second place in this section. Check logs, gratefully acknowledged, were received from G8BCI/P, G3SFV/P, G2DP/P and G3WQG. G2SU/P was disqualified under Rule 2.

Section A

Posn	Callsign	Score	QSOs	County	Best dx	Power	Aerial
1	GD2HDZ	1,403	132	IM	—	75	—
2	G8BBB	1,325	176	CE	DK1UV/P 540km	150	10el
3	G3MOT	867	149	OX	PA0UNT/A 470km	100	12el
4	GC2FZC	663	63	GY	G3RHE 607km	60	8/8
5	G3ILO	566	118	GR	—	10	10el
6	G3ONP	532	109	SD	G3WKF/P 360km	25	10el
7	G8CKG	479	99	WR	GM8CVN/P 410km	25	4el
8	G8AFA	457	70	ST	G3NWU/A 408km	85	14el
9	G3WHK	444	119	SY	G3RHE/P 384km	12	10el
10	G3JXN	437	65	LD	GI3VPK/P 515km	100	10el
11	G8CUO	374	68	NM	—	16	—
12	G3ZMD	365	98	BD	—	8	—
13	G3OHH	352	66	SD	G3FIJ 260km	50	11el
14	GC3YIZ	332	43	GY	GW3ITZ/P 440km	15	8/8
15	G3IAR	327	97	KT	GI3VPK/P 570km	10	6/6
16	G8COK	317	103	MX	G3WKF/P 367km	15	4el
17	G8BWW	310	39	LE	G3DAH 385km	20	10el
18	G8BXJ	307	65	GR	—	30	—
19	G8BQA	286	59	KT	GD2HDZ 430km	60	8el
20	G3HS	276	37	BE	—	50	6/6
21	G3XBY	257	53	SD	—	—	—
22	G8CZI	243	53	LE	G3SLJ/P	60	8el
23	G3XKT	239	52	DY	G3WKF/P 417km	24	8el
24	G8DIY	221	42	CE	ON4RY 338km	25	8el
25	G8BCH	219	45	DT	G3RHE/P 420km	—	5el
25	G3VSA	219	29	LE	—	60	—
27	G8BKR	217	53	GR	GD2HDZ 330km	15	10el
28	G8CXK	214	53	NM	PA0CML 320km	12	5el
29	G8CCH	212	48	HE	G3RHE/P 375km	15	6/6
30	G8BVV	205	47	ST	GC2HDZ 380km	40	6el
31	G8ATM	182	46	NM	PA0FHV/P 330km	25	9el
32	G3ZCE	172	37	SX	—	31	8el
33	G8CXS	130	36	YS	G3EFX/P 280km	35	8el
34	G8AKD	123	62	MX	GW3UCB/P 252km	20	6/6
35	G3PKV	118	41	HF	G3SU/P 240km	25	6/6
36	G8BLI	89	54	SY	—	10	—
37	G3LCH	38	33	LD	G3EFX/P 60km	12	4/4

Section B

Posn	Callsign	Score	QSOs	County	Best dx	Power	Aerial
1	G3WSC	1,073	161	SX	DL8KO/P 570km	80	10/10
2	G8BMP	1,049	175	SD	PA0MJK/P 520km	55	10el
3	G3GJY	861	100	YS	G8BEJ/P 413km	18	14el
4	G8BJR/A	564	96	KT	DL9AA/P 420km	100	8el
5	G8CSA	547	138	LD	—	30	8el
6	G3UHF	455	102	LE	G2JF 342km	29	8el
7	G3BRK	417	122	KT	—	110	—
8	G3YZS/A	402	76	EX	G3XAC/P 333km	—	8el
9	G8BQB/A	380	100	WK	—	40	—
10	G8CHW/A	305	62	DY	PA0PRY/P 450km	40	8el
11	G8COA/A	283	80	SY	G8CUW 305km	60	8el
12	G8CRP/A	264	79	SY	G3XAC/P 340km	15	6/6
13	G8BHL/A	261	33	YS	G2JF 345km	35	4/4
14	G3YPP/A	183	48	BD	—	8	—
15	G3WKH/A	179	49	—	G3SPL/P 310km	—	8el

Section C

Posn	Callsign	Score	QSOs	County	Best dx	Power	Aerial
1	GW8BHY/P	2,071	274	DB	PA0RCG/P 558km	30	10/10
2	GW8CEZ/P	2,063	273	MG	—	150	10/10
3	G3EFX/P	2,012	269	SX	F8XT 597km	25	8/8
4	G3SLJ/P	1,857	246	HE	ON5EW/A 490km	25	10/10
5	GW3UCB/P	1,811	235	DB	PA0RCG/P 572km	90	10/10
6	GW3OXD/P	1,756	245	RN	PA0RCG/P 560km	90	10el
7	G3XAC/P	1,741	215	YE	PA0RCG/P 525km	70	8/8
8	GW3ITZ/P	1,623	225	DB	PA0JHM/A 545km	25	8/8
9	G8AUN/P	1,502	171	NK	GI3VPK/P 495km	48	10el
10	G8BQX/P	1,446	163	SX	F1KCH/P 901km	25	8/8
11	G3RHE/P	1,395	158	CD	GC2FZC 530km	21	10el
12	G3GBU/P	1,393	201	SD	PA0FHV/P 550km	70	10el
13	G3AOS/P	1,374	205	SD	—	40	6/6
14	G8AJC/P	1,358	142	KT	DJ6UJ/P 525km	25	9/9
15	GI3VPK/P	1,060	76	AM	G2JF 610km	17	10el
16	G8DEN/P	1,010	145	LN	—	35	—
17	G3XUS/P	987	155	SX	GD2HDZ 470km	30	8/8
18	G3WKF/P	936	90	CL	G3NEO 430km	50	8/8
19	G3PIA/P	903	157	BE	PA0MJK/P 487km	30	10/10
20	G8DBO/P	896	162	DY	ON4RY 475km	12	8el
21	G3LXP/P	795	—	HF	—	20	—
22	G8CKC/P	754	108	ST	G3JYP 395km	15	10el
23	G3SOU/P	723	121	HE	PA0UNT/A	12	14el
24	G3UES/P	712	160	HE	GI3VPK/P 522km	25	10el
25	G8BWF/P	690	100	YS	PA0JHM 438km	25	8el
26	G8AGU/P	608	77	DN	PA0VD/P 610km	20	8el
27	G3WIR/P	605	123	WE	PA0CML 480km	16	8el
28	G8CGX/P	573	136	BD	GI3VPK/P 493km	5	14el
29	G3TQF/P	545	110	NR	PA0MJK/P 460km	25	8el
30	G8AN/P	518	128	SY	—	25	—
31	GW8BEB/P	474	85	FT	G3SLJ/P 205km	25	10el
32	G8DBW/P	441	101	GR	—	14	—
33	GM8AZS/P	435	50	KE	G8AUN/P 480km	25	14el
34	G8BGA/P	433	98	WE	F1UZ/P 420km	48	12el
35	GM6ZV/P	413	63	BW	G3TQF/P 420km	25	8/8
36	G8DLC/P	412	83	WE	GI3VPK/P 460km	40	6el
37	G3UBP/P	403	121	SY	PA0RCG/P 403km	3	8el
38	G8DKU/P	384	61	YS	G3SLJ/P 400km	3	8el
39	GW8AZU/P	318	67	CV	G8AUN/P 350km	0.5	8el
40	GW3UUS/P	299	79	MH	G8BJR/A 275km	12	6/6
41	G8BPS/P	243	70	AL	G3XAC/P 350km	25	8/8
42	G3ZEF/P	242	59	OX	PA0WJK 485km	25	10el
43	GM8CVN/P	233	28	BW	G8CKG 394km	30	14el
44	G3MMS/P	225	43	LN	G8CKC/P 325km	8	6/6
45	G8ASX/P	202	53	HE	F1UZ/P 360km	—	8el
46	F0UJ/P	135	24	—	GW3ITZ/P 402km	5	8el
47	G2WS/P	123	30	ST	—	15	—
48	G8DEA/P	82	23	YS	GD2HDZ 210km	10	5/5
49	GW8DBL/P	67	19	BR	GW8AZU/P 160km	10	8el
50	G8DUK/P	63	20	HD	—	2	—

August 1970 144MHz SSB Contest

The second 144MHz SSB Contest in 1970 showed a marked improvement in activity over its predecessor, with the leading stations' scores more than double those in the January event. G3USB comments that his total for this contest equalled his score for the 16 hours he was active in the March Open. The joint winners, G3GZJ and G8BBB, made more points than the leading fixed station in the Open. Average points per QSO are shown in the table, and the figures speak for themselves. Even G8DKN, with a mere watt p.e.p., made three contacts worth 10 points each.

The leading portable station had to be content with fourth place, contrary to the expectations of one of the leaders. Among the portables, GM8AGU/P (Moray Firth ARS) deserves mention for a log in which the only contacts nearer than 300km were two comparatively local GMs.

As usual, the adjudicator's task was brightened by some of the errors found in the entries. One operator in Kent listed two stations in QRA rectangles YZ and AZ which would put them on the Arctic Circle between Iceland and Norway! One entrant employed a computer to calculate his score but even this was shown to have a weak point: one QRA Locator in his log gave a position in the middle of the English Channel; a simple human brain would have rejected this faulty information, but the computer quite cheerfully accepted it and gave the number of points to be claimed! The old chestnut of "Seattle" for "Settle" appeared in one log, while the location of G3DY was spelt in various ways. In these cases no points have been deducted if the spelling appears phonetically correct.

Two stations suffered a 10 per cent penalty for giving the wrong locator on the cover sheet, while another operator narrowly escaped disqualification under Rule 22.

Most entrants agreed that conditions were above average, although several mention deep fading. G3RND on the Isle of Wight offers to supply beam rotators without the stop at south, and G3PBV in Devon also felt that a lot of stations did not beam his way. G3XMG suggests a longer contest, while G3VNQ feels that stations should spread out more.

Subject to Council approval, Certificates of Merit will be awarded to G3GZJ and G8BBB.

Posn	Callsign	Points	QSOs	Average pts /QSO	Best dx	Pwr	Aerial
1	G3GZJ	573	41	14·0	G3VER/P	125	6/6slot
	G8BBB	573	66	8·7	GM8AGU/P	400	10el
3	G3BHW	560	57	9·8	DC6KX	250	6/6slot
4	G3XAD/P	451	53	8·5	G3GZJ	100	
5	GW3BA/P	438	57	7·7	GM8AGU/P	50	10el
6	G3VER/P	362	39	9·3	G3GZJ	240in	
7	G3DY	332	47	7·1	G3GZJ	250	6/6
8	G3JWZ	316	50	6·3	PA0DMT	300in	8el
9	G6RH	311	41	7·6	PA0DMT	300	9el
10	G3USB	297	42	7·1	G3GZJ	60	10el
11	G3UDA	290	45	6·4	GM8AGU/P	120in	10el
12	G3EGK	283	49	5·8	G3GZJ	160in	10el
13	G3OXD/A	274	48	5·7	PA0CSL	120	10el
14	G3JLA/P	246	41	6·0	G3GZJ	10	10el
15	GM8AGU/P	245	19	12·9	G3VKV	150	8el
16	G3RND/P	232	27	8·6	PA0MOT	50	4el
17	G8CJY/A	228	40	5·7	G3GZJ	200	14el pb
18	PA0PCD	222	19	11·7	GW3BA/P	200	8/8
19	G3COJ	202	34	5·9	PA0PCD	150in	8/8
20	G3HS	201	35	5·7	PA0VD	50	6/6slot
21	G8AWO	196	32	6·1	G3GZJ	120	
22	G8APV/P	186	32	5·8	PA0KHS	120	14el pb
23	G3LQB	185	36	5·1	G3GZJ	100	10el
24	G3XMG	165	34	4·9	G3GZJ	200in	8el
25	G3PBV	126	13	9·7	G3DAH	100	10el
26	G3VNQ	125	18	6·9	G3GZJ	100ir	8el
27	G8DKN	82	17	4·8	G3GZJ	1	10el
Listeners							
	A 5032	248	42	5·9	G3GZJ		6el
	BRS 15822	116	25	4·6	G3XAD/P		6el
	BRS 31172	46	10	4·6	PA0DMT		4el

June 1970 Microwave Contest Results

The first Microwave Contest held on 14 June attracted a total of 22 entries of which seven operated on other bands besides 23cm. Judging from contestants' comments, the contest seems to have been enjoyed by all—a very gratifying result.

Overall winner (he would also have won on his 23cm score alone) was Les Sharrock, G3BNL/P, assisted by C. Halling, G3RPQ. They operated from a site near Cheltenham using the 23cm, 13cm,

9cm and 3cm bands. Runner-up was A. Wakeman, G3EEZ/P, assisted by T. Jones, G3OAD, using the same bands from a site near Ludlow. These two competitors contacted each other on each band.

On 23cm the best QSO was between G3BNL/P and G3FP at a distance of 152km.

Comments on conditions varied from "above average" to "average, sinking occasionally to abysmal". Two stations used rf stages in their receivers; G3BNL/P a 2N3570, and G8DDC/P two BFY90s. Aerials in use were mainly dishes with some scaled Parabeams, 8 over 8s and corner reflectors. Most transmitters used 2C39As or variants, and there were three straight varactor systems.

Seven contestants used the 13cm band, best QSO again being between G3BNL/P and G3FP. Nearly everyone commented on the heavy QSB on this band. All receivers used crystal mixers and all but one contestant used a dish aerial. On the transmit side the following were in use: three varactors, two DET22s, 2C42, EC157 and an ML4001.

One contact was made on 9cm between G3BNL/P and G3EEZ/P. Details of equipment used: G3BNL/P—726 transmitter (50mW), 1N21 mixer and 4ft dish; G3EEZ/P—2C40 transmitter, 1N21 mixer and 6ft dish.

Four stations had equipment for 3cm but only one contact was made, between G3BNL/P and G3EEZ/P. Details of equipment used: G3BNL/P—2K25 transmitter (10mW), 2144 mixer and 4ft dish; G3EEZ/P—2K25 transmitter, 1N23 mixer and 2ft dish; G3RPE/P—723A/B transceiver, (10mWRF) CV2154 diode (30MHz i.f.) and 9in dish, alternative—Gunn diode oscillator (10mWRF), CV2154 mixer fed from 10dB cross-coupler and 12in horn, 2N3819/BF180 cascode; G5FK—transmitter 40mW rf out (9W in), 10in horn aerial, CV2154 mixer.

The lining-up band used seems now to be generally accepted to be 70cm, this band having the advantage that the narrow beamwidth of the aerial can be used to get an accurate beam heading before proceeding higher in frequency where beam alignment is all-important.

Comments on the rules were remarkably constructive, the main ones being that more time was needed and that the contest should have included "opening times" (late evening and early morning). It should be pointed out, however, that the event is a contest and some of the times taken to establish a contact were very long, not really contest operating. Only two competitors wanted the contest to be 23cm only. Many people were confused by the cross-band rule 7b and this will be more sharply defined in future. Many other comments and helpful suggestions were made and are noted for discussion by the VHF Contests Committee.

Subject to the approval of Council awards will be made to G3BNL/P and G3EEZ/P.

		Score						Best QSO Km	
Posn	Callsign	Total	23cm	13cm	9cm	3cm	Cnty	23cm	13cm
1	G3BNL/P	3,064	1,555	789	360	360	†	152	152
2	G3EEZ/P	1,457	521	216	360	360	SE	†	72
3	G3OBD/P	1,389	1,149	240			WE	85	80
4	G3RPE/P	961	575	386		0	†	†	66
5	G8AOL	918	918				†	65	
6	G8DDC/P	897	837	60			BD	103	43††
7	*G3NNG/P	875	875				BE	78	
8	G5FK	808	427	381		0	†	†	81
9	G8AUE	751	751				DY	53	
10	G8ARM	600	600				†	40	
11	G8ADP/A	560	560				†	68	
12	G8BAV	529	529				†	50	
13	*G3PIA/P	518		518			BE		79
14	G8AKE	504	504				LR	53	
15	G3TDM	363	363				LD	39	
16	G6XM/P	326	326				†	40	
17	G2WS	321	321				ST	92	
18	G3NKL	279	279				LE	79	
—	**G8AYN	260	260				SY	33	
19	G3WDG	133	133				†	54	
20	G3KQF	62	62				†	16	
21	G3JKY	36	36				KT	14	
22	G8BGX	33	33				†	14	

† Information omitted from cover sheet
* Stations were operated in conjunction
** Adjudicator claimed score
†† Cross Band QSO

The following stations are also known to have been active during the contest:
23cm: G8AZM, G8BYV, G8AAA, G3FP, G8AII, G3XPT, G8DBO, G2FNW, G3KQF, G3PSH/P, G3FNQ, GW8AWS/P, G3UQK, G3MRA/P, G2AKQ, G3NIL/P, G3EGV/P, G8ARL, G5DT, G3GDR, G8AOD, G8ACJ/P; **13cm**: G3FP, G3MRA/P, G3GDR.

July 1970 432MHz Open Contest Results

This contest, held on 26 July, was notable for very poor conditions and a generally low level of activity. In spite of this there was a very good tally of 42 entrants, no doubt deliberately to confound the VHF Contests Committee which had decided, as a result of previous disappointing entries, to run this event as a single-section one. The resulting protests from the poor old "fixed" ops were proved to be justified, since portables occupied the first 12 places.

The winner was G8ARL/P, by only six points from GW8BVP/P (GW3NUE/P in disguise). This seems to prove that if conditions are really poor on 70cm, the Welsh mountain goats are just too far from the London activity area. In fact, 'BVP did not make a single contact with the home counties, while G8ARL/P and two others in the first six were located on the Berkshire Downs.

Congratulations are also due to G8AUE, as the leading fixed station; to GM3TLA/P, who soldiered on for five hours working the only two stations he heard; and to G3VNQ who made the best QSO of the contest at 300km. This was achieved on cw, a mode sadly neglected by 70 centimentals.

Comments mainly were directed at the conditions, and by fixed stations at the single section rule. It is interesting that two portable stations which were strongly criticized by several entrants for poor quality signals refrained from submitting an entry. Let us hope they can clear things up by next time.

A receiving log was entered by BRS28005. Surely he is not the only listener with a 70cm converter!

Posn	Station	Points	Contacts	Best QSO Km	Power	ASL
1	G8ARL/P	193	52	242	10	974
2	GW8BVP/P	187	43	—	50	2 600
3	G3NNG/P	155	42	217	—	900
4	G3ZEF/P	152	45	—	30	785
5	G3GBU/P	149	47	220	60	1,600
6	G8BCG/P	125	41	—	12	1,640
7	GW8ARM/P	107	32	214	12	1,000
8	G8BGC/P	101	31	186	11	656
9	G3UBX/P	96	36	138	30	700
10	G3TTV/P	92	34	162	10	850
11	G3SLJ/P	90	28	152	5	813
12	G8APZ/P	87	35	170	30	738
13	G8AUE	86	35	162	50	488
14	G3XEB	70	36	190	26	280
15	G8DDC/P	66	31	177	4	650
16	G8AWO	64	31	185	100	271
17	G3OHH	57	25	140	10	1,050
18	G8BGQ	56	36	90	150	400
19	G2RD	54	34	107	30	625
20	G8AVG/P	50	16	160	20	900
21	G8BAV	49	27	150	24	250
	G8BGX	49	26	152	35	350
23	G8ADP/A	48	18	120	12	240
24	G8ATA	47	16	—	25	—
25	G3FJE/P	46	20	122	12	250
26	G2WS/P	42	14	212	19	—
	G3BRK	42	28	—	30	270
28	G8BWO	41	21	124	12	420
	G3VNQ	41	16	302	25	—
30	G3WXI/A	37	17	—	100	—
	G5UM	37	15	102	16	560
32	G3EHM	35	19	—	—	850
	G8CQX	35	25	—	25	—
34	G8BQH	30	22	80	50	260
35	G3WJG	27	21	88	20	—
36	G3OWA	25	19	75	3	530
37	G8AQZ	24	12	119	28	140
38	G8BKR	19	11	78	8	190
39	G8BHL/A	16	8	—	6	1,100
	G3NKL	16	10	103	30	380
41	GM3TLA/P	10	2	124	5	1,480
42	G8ATM	6	5	60	18	59

G3EEZ/P disqualified under Rule 2.

1970 High Power Field Day Results

The third High Power HF Field Day Contest, held on 11–12 July, attracted 10 entries this year, compared to a total of 12 in 1969. Examination of the logs showed a further seven stations working /P that did not submit entries.

Guildford & DRS, G3IAF/P, was the winner with a total of 1,200 points, thus repeating its success of last year. A newcomer to the contest, North Riding ARG, G2KK/P, was runner-up with a score of 1,056 points, while Bristol ARC, G3TAD/P, another newcomer, was third with 800 points.

Last year Guildford scored nearly half its total on 14MHz, whereas this year 21MHz yielded the same proportion. North Riding found 7MHz its best band, while Bristol found the three lower bands more

favourable than 21MHz which yielded less than 10 per cent of their total.

As could be expected, transceivers were the order of the day in most cases feeding the usual assortment of aerials. Guildford had its rhombic with 270ft per leg with an inverted dipole (7MHz) and a long wire 565ft long. North Riding relied on a TH6 beam with 40m and 80m dipoles; while Bristol used quads on 15m 20m, inverted Vees on 20m and 40m, and a dipole for 80m.

Once again the logs submitted were of a very high standard which made checking quite a pleasure.

From the comments of contestants it would appear that all stations except one had an enjoyable time and are looking forward to next year. Cardiff ran into bad weather and generator trouble and packed up in the early hours of the morning. The HF Contests Committee will be taking a good look at the publicity, scoring system and date of next year's contest (all the subject of adverse comments) should it be decided to run it in 1971. It is not easy to fit it into the Contests Calender, bearing in mind summer holidays for both contestants and committee members, other contests requiring to be checked (mainly NFD) and the spacing of two field-day events.

The committee would appreciate it if secretaries of all clubs/groups would write to Mr R. Biggs, G2FLG, 29 Lord Avenue, Clayhall, Ilford, Essex, by the end of the year suggesting a date for next year's contest when they would consider setting up a station.

A check log from YU1SF is acknowledged with thanks.

Posn	Club/Group	Callsign	3·5	7	14	21	28	Total
1	Guildford & DRS	G3IAF/P	15	258	351	576	–	1,200
2	North Riding ARG	G2KK/P	54	513	375	111	3	1,056
3	Bristol ARC	G3TAD/P	213	308	204	75	–	800
4	Oxford & DARS	G3JLE/P	72	270	291	150	–	783
5	Southgate RC	G3BWQ/P	66	264	177	156	–	663
6	Addiscombe ARS	G3VYI/P	108	186	180	120	6	600
7	Crystal Palace & DARS	G3VCP/P	69	128	267	99	–	563
8	Cardiff (Radio) Contest Club	GW3XEJ/P	33	33	174	173	–	413
9	Dundee Group	GM3NHQ/P	9	134	156	96	–	395
10	Pudsey & DRC	G3XEP/P	27	150	171	15	–	363

Chelmsford DF Qualifying Event Results

Twenty teams assembled in glorious weather at the start near Chelmsford to take part in the last qualifying round for 1970, and the first to be run by the Chelmsford Amateur Radio Society.

Station "A", G3KPJ/P, was situated in thick undergrowth approximately five miles from the start. A quarter-wave aerial was used and the signal proved to be even stronger than expected.

Station "B", G3WMM/P, was nine miles from the start, located on a small island one mile west of Maldon and intentionally provided a much weaker signal.

Most competitors decided to locate station "A" first as expected, with Bill North breaking through the undergrowth to be first in at 1432, and a further 10 teams arriving at approximately one minute intervals.

At the "B" station the first to arrive was Paul Tyler at 1449, followed by the winner, Brian Bristow, at 1501 beating the old master Eric Mollart by one minute.

As the results show, 17 teams successfully located both transmitters, with the three remaining teams locating only the "A" station.

After the event 47 persons sat down to tea at Le Pimpernel Cafe, Maldon, where Mr G. T. Peck thanked the organizers on behalf of the RSGB and commented on the high standard achieved in DF contests in 1970 and the enthusiasm of the competitors taking part.

Posn	Competitor	Club	Time of arrival Stn "A"	Stn "B"
1	B. M. Bristow	Chiltern	1440	1501
2	E. L. Mollart	Oxford	1433	1502
3	W. J. North	Chiltern	1432	1510
4	A. Simmonds	Oxford	1434	1513
5	B. J. Mahony	Rugby	1450	1521
6	P. T. Tyler / P. G. Wells	Oxford	1528	1449
		Dartford Heath	1442	1528
8	O. L. Harding	Lincoln	1440	1530
9	T. C. Gage	Oxford	1433	1544
10	P. Woollett	Edenbridge	1441	1552
11	G. T. Peck	High Wycombe	1449	1553
12	J. E. Drakeley	Slade	1434	1554
13	G. L. Mills	Chelmsford	1530	1611
14	B. Pope	Dartford Heath	1520	1616
15	D. Newman	Rugby	1621	1528
16	W. A. Dix	Chelmsford	1512	1627
17	A. H. Wreford	Chelmsford	1443	1628
18	R. J. Worbey	Dartford Heath	1439	—
19	P. Homer	Dartford Heath	1615	—
20	J. R. Reynolds	Grimsby	1625	—

1970 Summer Top Band Contest Results

This year's event attracted 56 entries, compared with 44 in 1969. It is interesting to note its popularity with the more recently licensed members, an indication perhaps that enthusiasm for cw shows no sign of waning. Mention, too should be made of two school entries: Cheltenham Grammar School ARS, G3YKV; and Bishop Wordsworth School ARS (Salisbury), G3XVB/A.

There were few comments about the rules; indeed, there were few comments at all. G3CCD said "A most enjoyable contest as usual"; GC5ANX—"First RSGB contest entered . . . thoroughly enjoyed it"; G3TXF—"Looking forward to the next one"; G3BFP—"Very enjoyable but very tiring—must be getting old!"; GW3XJC—"Very much enjoyed the contest"; G3ZDY—"A very enjoyable contest—as far as I am concerned, the time and length could not be bettered"; G3WRR—"Scoring system seems pretty fair. Operating standards good".

Most logs were well kept, some exceptionally so. However, there were a few logs which were untidy and difficult to decipher. Two competitors scored their logs wrongly. Several entrants failed to use the official log sheet; this made the task of the adjudicators much more difficult.

The leading station, G3YFW, used home-built equipment—the transmitter had a 5B254M in the final the receiver was a G2DAF, and the aerial was a quarter-wave. At GC5ANX a KW2000B with a ½-wave dipole at 60ft was used. An analysis of the gear shows that home-built transmitters were employed by more than half the entrants; it seemed particularly appropriate that one member whose QTH was given as the Red Lion, described his transmitter as "home-brew".

Posn	Callsign	Score	Posn	Callsign	Score
1	*G3YFW	555	28	G3HQT	365
2	GC5ANX	494	29	G3ZDY	362
3	G6BQ	487	30	G3UQW	345
4	G3BMY	482	31	G3YCP	342
5	*G3FM	478	32	G3XVB/A	320
6	*GM3FXM / G3TXF	475	33	GI3VGZ	317
			34	G3IGU	315
8	G3BFP	472	35	G3KZR	312
9	G3CGD/P	464	36	GW3GWX	305
10	G3XDY/P	444	37	G3RQI	281
11	GM3OXX/A	440	38	G3VYI	275
12	G3TIR	439	39	*G3WRR/A	270
13	G3GMK	432	40	G3XFG	260
14	G3WPO	426	41	*G3RB/A	251
15	G3SQX/A	423	42	G3KPT	248
16	G3YRO	421	43	GM8MJ / G3WDF/M	235
17	GW3UWC	413			
18	*G3YKV	411	45	G3IQF	223
19	G3SKC	409	46	G3VLX	216
20	G3ORY/A	401	47	G3UNV	201
21	GW3XJC / G2DC	400	48	G3GOX	190
			49	G3WDS	178
23	G3XSV	390	50	G3GRK/A	160
24	G3SRA	389	51	GM3YOR	141
25	G3YUV	386	52	G2FNK	117
26	G3YMH	383	53	G3LCH	87
27	G3ULO	378			

*Multi-operator station.

Disqualified: G3WTA and GW3WRE/A [General Rule 8 (f). G2FJA—General Rule 8(d).

Second 1·8MHz Contest 1970

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

2. **When:** 2100 gmt on Saturday 14 November 1970 to 0200 gmt on Sunday 15 November 1970.

3. **Contacts:** CW (A1) only in the 1·8–2·0MHz band. County code letters, as published on page 48 of the January 1970 issue of *Radio Communication*, must be sent after the report/serial number group, eg for a contact from Surrey 579001 SY.

4. **Scoring:** Six points for each of the first six 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 D. Thom (G3NKS), 6 Bracken Close, Copthorne, Crawley, Sussex.

6. **Trophies:** The Victor Desmond 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 First 1·8MHz Contest 1971.

November 1970 144/432MHz CW Contest

2000gmt 7 November to 0800gmt 8 November.

All entries and checklogs must be sent to the adjudicator addressed to: VHF Contest Committee, c/o G3VPK, Maple Leaf, Great Braxted, Witham, Essex.

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

A multiplier of 3 will be applied to the score on 432MHz.

Separate logs must be kept for each band. Only one scoring contact may be made with a given station in each band.

December 1970 144MHz Fixed Station Contest

0700 to 1500 gmt on 6 December.

All entries and checklogs must be sent to the adjudicator addressed to: VHF Contests Committee, c/o G3USB, 32 Harbour Avenue, Comberton, Cambridgeshire.

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

Bermuda Contest results

Due to the wide interest in this year's Bermuda Contest it has been decided to divide it into two sections and to have separate phone and cw winners for the UK and North America.

The UK phone winner is Mr H. E. Perkins, G3NMH, of Swindon with 10,983 points; second was Mr F. E. Garrett, G3MVZ, of Croydon with 9,405 points; and third, Mr A. O. Milne, G2MI, of Bromley with 3,672 points.

The UK cw winner is Mr W. E. Russell, G5WP, of Guildford, with 15,708 points, second, Mr A. J. Slater, G3FXB, of Southwick with 14,940 points, and third, Mr J. M. Robson, GM3CFS, of Glasgow with 7,632 points.

Complimentary travel and accommodation arrangements have been made so that each winner with a companion may fly to Bermuda to receive his prize at the annual banquet of the Radio Society of Bermuda on 22 October.

Each participant will receive a complete list of the results in due course.

GM3CFS and GW3MPB, as area winners, will each receive a certificate signed by HE the Governor of Bermuda.

NFD RESULTS
Corrections

The HF Contest Committee greatly regrets two errors which occurred in the compilation of the NFD 1970 Results published in the September issue of *Radio Communication*.

The Barnsley & DARC (G5IV/P) was omitted from the single-station table on P629 and should have been placed in 21st position with 789 points. All other groups below this in the table therefore move down one place.

In the 3·5MHz write-up on p628 it was stated that Guildford (G3KMO/P) came second with 530 points. Runner-up was, in fact, the Loughton & DRS with 585 points.

Apologies to all concerned.

Contests calendar

10–11 October—28MHz Phone; Rules in May issue
24–25 October—7MHz CW; Rules in June issue
24–25 October—CQ WW DX Contest
7–8 November—7MHz Phone
7–8 November—144MHz CW
14–15 November—Second 1·8MHz
20–21 November—Malta Independence Day Contest (cw/phone)
27–28 November—CQ WW DX Contest
6 December—144 MHz Fixed Station
1971
9–10 January—AFS
13–14 February—1st 1·8MHz
6–7 March—BERU
4 April—LP 80m
5–6 June—NFD
3–4 July—Summer 1·8MHz
10–11 July—HP FD
12 September—80m FD
9–10 October—21/28MHz
23–24 October—7MHz CW
6–7 November—7MHz Phone
13–14 November—2nd 1·8MHz

RADIO AMATEUR EMERGENCY NETWORK

by S. W. LAW, G3PAZ*

Let it be known that even this year's IoW pop festival was covered by a RAEN standby. More than that, the Press gave over four inches of space to the Hampshire Group and the work of RAEN in the area. It could have been quite a sticky business if something drastic had gone wrong with that enormous crowd when the existing communications were as strained as reported at one time.

Insurance

We would like to refute the curious rumour that seems to have arisen about the alleged demise of the RAEN insurance. This has not been dropped and your controller should be able to reassure you on this point as the RAEN Committee have taken steps to ensure that all registered controllers have the details.

Still they come

Once again we have proof of the wide-spread reputation that RAEN has gained outside the UK, this time in the form of an enquiry from South Africa. Needless to say the RAEN Committee has been pleased to supply the relevant information. Germany has already sent thanks and we hope to give some news about any developments from this and other interested countries in due course.

Nearer home, the position seems a little fluid in the west, Wales in particular. We understand GW3ACF has made a move to Australia, and he carries our very best wishes for every success. Meanwhile the reins appear to be in the hands of GW3KUY in the Glamorgan area. Also, GW4CG has, we understand, moved down to Devon and we hope to hear more from that county once he has settled in. GW3VNO has had to relinquish his connection with RAEN owing to other commitments, but we feel sure that the good work he has put in will be continued. The terrain in Wales is some of the most difficult in the UK and all praise is due to those who tackle the problems in that area. Now that G3FKO has gone GW, we have some new blood in the area and it is to be expected that some re-shuffling will occur. As to Monmouth, GW3JBH no doubt still has problems but there is obviously a field for 2m in the border counties as in mid-Wales due to the 4m versus Channel 5 tv impasse.

To the north, GM3VAP has, we believe, handed over to GM3VQJ. Good luck Terry, keep up the good work in the Glasgow area.

As to the much-troubled counties of Northern Ireland, GI3AOB has a group forming in Co Antrim, centred on Ballymena, but nothing has been heard from certain other groups of late (a delicate position, no doubt). Try 160m or 2m for Co Antrim, anyway. Any reports to GI3AOB will be welcome.

Crystals for 4m

We are indebted to G2ABC for the information that G3UGY (QTHR) has a large supply of 7,820kHz crystals at a reasonable price. As these should triple-triple to 70.38MHz they should be of interest to the 4m groups.

RAEN Committee

The RAEN Committee met on 5 September and a quorum conducted such business as was reasonable in view of the apologies for absence from a number of members. The holiday season and the clashing of VHF Field Day weekend was no doubt responsible for the gaps around the table. Nevertheless many points were covered, among which was a resolution that the re-registration of members would be better covered by sending cards via the relevant controllers in batches on staggered dates to be arranged via the hon registrations secretary, thus easing the work-load and the postal charges.

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

Honorary secretary, RAEN Committee: **Mr. E. R. L. Bassett. 57 Upper St Helens Road, Hedge End, Southampton, SO3 4LG. Tel Botley 4462**

* 130 Alexander Road, Croydon, Surrey CRO 6EW

CLUB NEWS

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

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

Region 1 Regional Lecture

Welman House (NWGB Headquarters), Moss Lane, Altrincham

8pm 23 October 1970

"Why vhf", by T. P. Douglas, G3BA

Admission free by ticket obtainable from B. O'Brien, G2AMV, 1 Waterpark Road, Prenton, Birkenhead, Cheshire; or W. M. Furness, G3SMM, 16 Coniston Avenue, Sale, Cheshire. Applications must be accompanied by stamped addressed envelope.

Ample car parking facilities.

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

Merseyside Luncheon Club—First Monday in every month, 1230 for 1245, HMS *Landfall*. Please advise G3VQT or G2AMV of attendance.

Ainsdale (ARC)—7, 21 October, 4 November, 8pm, "Morris Dancers," Scarisbrick.

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

Blackburn (East Lancs ARC)—1 October (Film show), 5 November (Talk by R. Higson, G2HFP), 7.30pm, Edinburgh House, Shearbank Road, Blackburn. Further details from *G4JS*.

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

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

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

Cheshire (Mid-Cheshire ARC)—Wednesdays, 7pm, Technical Activities Centre, Winsford Verdin Grammar School, Grange Lane, Winsford.

Chester (C & DARS)—Tuesdays, except the first Tuesday in the month which is net night, 8pm, YMCA, Chester.

Douglas (D & DARS)—Second and fourth Wednesdays each month, 7pm, 19 Rosemount, Douglas. Further details from W. J. McEvoy of that address. Tel Douglas 6146.

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

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

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

Liverpool (NLRC)—9, 23 October, 6 November, 8pm, Labour Party Headquarters, 13 Crosby Road South, Liverpool 22.

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

Manchester (SMRC)—2 October ("Fault finding," by G3WFT), 9 October ("RAEN", by G3MBQ), 16 October (Demonstration of modern ssb equipment by G3FNM), 23 October (The club will meet at the Regional Lecture—see "Special regional events"), 30 October (Annual hot-pot supper at Woodcourt Hotel, Brooklands Road, Manchester 23), 6 November (Technical Topics). All at 8pm, Conservative Divisional Office, 449 Palatine Road, Northenden, Manchester. The vhf section of the club meets on Mondays, 8pm, at the club shack, "Greeba," Shady Lane, Manchester 23. Secretary: G3WFT.

Preston (PARS)—1, 15, 29 October, 12 November, 7.30pm, "Windsor Castle," (private room), St Pauls Square. Secretary: George Windsor, 26 St Gregory's Road, Preston.

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

Southport (SRS)—Further details from the secretary, A. White, 97 Portland Street, Southport.

Southport (73 SSB Society)—Will all former members of this society note that its activities have ceased.

Southport (SRS)—Second and fourth Wednesdays, 8pm. The Blossoms Hotel, Wellington Road South, Further details from secretary, G8BCG.

Thornton Cleveleys (TCARS)—14, 28 October, 11 November, 8pm, St John Ambulance Brigade Hall, Fleetwood Road North, Thornton, Blackpool.

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

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

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

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

Wirral (Wirral DX Association)—Last Thursday in each month at members houses. Further details from Secretary; G3OKA.

REGION 2 **RR K. Sketheway, BRS 20185**

Durham (DCARS)—8 October (Meeting to be arranged), 22 October (Quiz time, with teams chosen on the night), 7pm, Room 146, Durham University's Elvet Riverside Arts Block, New Elvet, Durham City.

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

Halifax (NHARS)—7 October (W1BB Mk1 lecture), 17-18 October (Scout jamboree), 21 October (Morse practice and ragchew), 11 November (Mr Craven's lecture), 7.45pm, Peat Pitts Inn, Ogden, Near Halifax.

Paul Allen, G3USH, has been elected as the new chairman in place of A. D. Benn, who is leaving the district. For the annual JOTA weekend the callsign to be used will be G2SU/P and a station will be put on for the Keighley scout troup. *G3MDW*.

Hull (H & DARS)—2 October (Open night with film show of club activities and junk sale), 9 October ("Where are you? The QRA Locator." by G3SSA), 16 October (Swl night), 23 October ("2m tx," by G3AGX), 30 October (Construction night), 7.45pm, 592 Hessle Road, Hull.

A course of lectures for the RAE is now in progress. The course lecturer is J. Lawrence, G3PQY. Morse classes are also being held every Friday. *M. Longson.*

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

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

South Shields (SS & DARC)—Fridays, 8pm, Trinity House, Social Centre, Laygate, South Shields.

Spen Valley (SVARS)—8 October ("Amateur tv," by R. Harrison, G8AYI), 15 October ("Adjusting amateur tx," by L. M. Dougherty, at Huddersfield Polytechnic College), 22 October (Natter evening), 29 October ("Civil aircraft aids," by G. Binns, G3MGI), 7.30pm, The Grammar School, High Street, Heckmondwike.

Sunderland (SARS)—First and third Tuesdays of each month, 7pm, Sunderland Polytechnic. *G3XID.*

York (YARS)—Thursdays, 7.30pm, in British Legion, 61 Micklegate, York. *J.A.Rainbow.*

REGION 3 — RR R. W. Fisher, G3PWJ

Birmingham (MARS)—20 October (AGM), 7.45pm, Midland Institute, Margaret Street, Birmingham 3.

Dudley (DARC)—6 October (AGM), 20 October ("Toys-transistors-tx", by Mr Bond, G3XGP), 8pm, Central Library, St James' Road, Dudley. *G3PWJ.*

Redditch (EWARC)—8 October ("Radio interference suppression in the car," by G3AYJ), 26 October (Natter night), 8pm, Old People's Centre, Park Road, Redditch. *G3EVT.*

Rugby (R & DAR & EC)—Every Tuesday evening, 8pm, 10 Drury Lane, Rugby. *G3YQC.*

Shrewsbury (SARS)—Every Thursday, 7.30pm, Harlescott Youth Centre, 218 Sundorne Road, Shrewsbury. *G3UDA.*

Stoke on Trent (NSARS)—Every Monday evening, 7.30pm, Harold Clowes Community Association Centre, Bentelee, Stoke.

S-o-TARS—Every Thursday, 7.30pm. 2a Race Course Road, Oakhill. Stoke.

Solihull (SARS)—20 October (AGM), 7.30pm, The Manor House, High Street, Solihull. *G3YOY.*

Stourbridge (STARS)—6 October ("Knots, aerial rigging and splicing," by G8DSC), 8pm, Longlands School. 20 October (Informal), to be held at the "Shrubbery Cottage," Heath Lane, Stourbridge. *G8CVK.*

Wolverhampton (WARS)—5 October (AGM), 12 October (Nightnite), 19 October (Members slide and film show), 8pm, Neachells Cottage, Stockwell End, Tettenhall, Wolverhampton. *G3UBX.*

Telford (WARS)—7 October ("RSGB matters," by Mr R. W. Fisher G3PWJ), 8pm, Ketley Bank Youth Club, Main Road, Ketley Bank, Telford, Salop. *G3YEW.*

Worcester (W & DARC)—Every Wednesday and Saturday evening, 7.30pm, Perdiswell Park, Droitwich Road, *G3VJN.*

REGION 4 — RR T. Darn, G3FGY

Chesterfield (CADARS)—Meetings held on the second and fourth Wednesday of each month, 7.30pm, Hunloke Adult Educational Centre, off Derby Road, Chesterfield. Hon secretary: Roy Nelson, G3ZLF, 52 Hucknall Avenue, Ashgate, Chesterfield. It is hoped to have speakers and demonstrations as often as possible during the coming months.

Derby (DADARS)—Wednesdays, Morse tuition every Tuesday. 7 October (Surplus sale), 14 October ("Simple ssb," by J. Anthony, G3KQF), 21 October (Seventh df practice run), 26 October (Df contest for the president's trophy), 28 October (Film night), 7.30pm, 119 Green Lane, Derby. Visitors are always most welcome.

Derby (NHCAARG)—Fridays. 2 October (Df practice run), 9 October (Night on the air), 16 October ("Introduction to the oscilloscope," part 2, by G3OZ), 23 October (Film show by G3ALA), 30 October (Surplus sale), 7.30pm, the clubroom, Nunsfield House, Boulton Lane, Alvaston, Derby. *G3LCV.*

Grimsby (CARS)—Thursdays, the clubrooms of the North Lincs Photographic Society, rear of 50 Welhome Road, Grimsby.

Nottingham (ARCON)—8 October (Bring and buy sale and junk sale), 15 October (Talk by a member of the GPO Radio Interference Dept about frequency and power measurements with respect to the amateur licence), 22 October ("Any questions?"; a member of the club will try to answer), 29 October (Demonstration of scope measurement in a high power ssb station, tune-up, etc. by Ivan King, G3VVU). The club now has its morse practice sorted out and will be conducting sessions for various speeds in the clubroom.

REGION 5 — RR S. J. Granfield, G5BQ

Bedford (B & DARC)—Thursdays, 7.30pm, "The Dolphin," Broadway, Bedford. For further information apply to John Bennett, G3FWA, 47 Ibbett Close, Kempston, Bedford. Tel Kempston 2427).

Bishop's Stortford (BS & DARC)—Meetings held monthly at the British Legion Club, Windhill, Bishop's Stortford, Herts. Full particulars may be had from P. J. Toynton, G3RGA, "Wildhern," Old Mead Lane, Henham, Herts.

Cambridge (C & DARC)—Fridays, 7.30pm, Club HQ, Corporation Yard, Victoria Road, Cambridge. The hon secretary is L. A. Luff G3XAK, 17 Campkin Road, Cambridge.

Dunstable Downs (DDRC)—Friday evening, Chew's House, High Street, Dunstable, Beds. Details of programme from the hon secretary: A. C. Don, G8BWZ, 51 Manor Park, Houghton Regis, Dunstable.

Luton—It is hoped to form a club, membership of which will be open to all group employees of George Kent Ltd. The headquarters will be at Luton, and further information is available from Roy Crawley, G3TLE, or John Allen, G3DOT, QTHR. Please contact as soon as possible if interested.

March (M & DRAS)—Tuesday evenings at the Old Police Headquarters, High Street, March, Isle of Ely.

Peterborough (P & DARS)—Meetings are held on the first Friday in each month, 7.30pm, Electronics Section of Peterborough Technical College, Eastfield Road, On other Friday evenings they meet at the club headquarters and station in the Old Windmill, behind the Peacock Inn, London Road.

Shefford (S & DARC)—Thursdays, 8pm, Shurch Hall, Shefford, Bedfordshire. The hon secretary is C. W. Stedman, G3XWS, 10 Wychwood Avenue, Luton, Beds.

REGION 6 — RR L. W. Lewis, G8ML

Cheltenham RSGB Group—First Thursday, 8pm, Great Western Hotel, Clarence Street, Cheltenham.

Gloucester (GRS)—Second and fourth Thursdays in each month.

South Bucks VHF Club—6 October (RSGB tape lecture on 2m), 3 November (Sales demonstration of vhf equipment), 8pm, Bassetsbury Manor, High Wycombe.

REGION 7 — RR P. A. Thorogood, G4KD

If you do not receive any notice in these events could it be you have not notified me of the change of address of your secretary or press representative at the last AGM?

Acton, Brentford & Chiswick (ABCRC)—20 October ("Amateur radio in France," by F5TK), 7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick.

Addiscombe (AARC)—Second Monday and last Thursday in each month, 7.30pm, Toc H Hall, 158 Lower Addiscombe Road.

Ashford, Echelford (ARS)—Last Thursday of month, 7.30pm, St Martin's Court, Kingston Crescent, Ashford, Middx.

Barking (B & DREC)—Tuesdays and Thursdays, 7.30pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking.

Bexleyheath (NKRS)—Second and fourth Thursdays. 8 October (Natter evening and club station), 22 October ("Operating portable," by G3VFD), 7 November (Annual dinner and dance—joint venture with CVRS). Venue: The Woodman, Blackfen), 7.30pm, Congregational Church Hall, Chapel Road, Bexleyheath.

Cheshunt (CRDC)—First Friday of month, 7.30pm, Methodist Church Hall, opp Theobalds Station, Cheshunt.

Chingford (RSGB Group)—Fridays. Telephone 01-524 0308.

Chingford (SRC)—Fridays, 7.30pm, Friday Hill House, Simmons Lane, Chingford, E4. AGM and election of new committee. Final date

to be made shortly for judging the best piece of home-constructed equipment in the club. Winner will be presented with G3NJL trophy.
Civil Service (CSRC)—First and third Tuesdays, 6.30pm, Civil Service Recreation Centre, Monck Street, Westminster.
Croydon (SRCC)—Third Tuesdays, 7.30pm, Swan & Sugarloaf, South Croydon.
Crystal Palace (CP & DRC)—17 October ("Simple transistor circuits," by T. Knoppett, G3XFT). Plans for new uhf/vhf contest for bands of 432MHz and above for 3-4 October are being discussed, perhaps with another group. 8pm, Emmanuel Church Hall, Barry Road, SE22.
Dorking (DR & DRS)—Second and fourth Tuesdays. 13 October (Informal meeting), 27 October (Junk and surplus equipment sale), 8pm, "Wheatsheaf," Dorking.
Ealing (E & DARS)—Tuesdays, 7.30pm, Northfields Community Centre, Northcroft Road, W13.
East London—18 October (Discussion and lecture), 2.30 for 3pm, Wanstead House, Wanstead. (100yds from Wanstead station, Central Line).
Edgware & Hendon (E & DRS)—Mondays. 12, 26 October, 8pm, St Georges Hall, 51 Flower Lane, Mill Hill, NW7.
Farnham, Bucks (Burnham Beeches RC)—Fortnightly, Mondays, Farnham Common, Village Hall, Victoria Road.
Gravesend (GRS)—Thursdays, 7.30pm, Northfleet Recreation Centre, Springfield Road, Northfleet, Kent. Further details available from the secretary: A. Moules, 166 Darnley Road, Gravesend.
Guildford (G & DRS)—Second and fourth Fridays, Guildford Engineering Society Stoke Park. G3ARM the hon secretary, reports that attendance has shown a slight increase over the last four months compared with 1969. Now his redecorated shack and redesigned station will be available any time any hf QRG. Ideas for annual dinner are needed, also simple talks on your experiences.
Hampton Court (TVARTS)—First Wednesday, 7.30pm, The Three Pigeons, Portsmouth Road, Surbiton.
Harlow (DRS)—Tuesdays (General); Thursdays (CW practice); Fridays (Junior), 7.30pm, Mark Hall Barn, First Avenue.
Harrow (RSH)—Every Friday. 2 October (Lecture by Veroboard), 9 October (G3LBA talks on his home-brew 25MHz frequency counter using integrated circuits), 16 October (Practical evening and bring and buy sale) 23 October (Talk on vhf fm techniques by G3FZL and G3OOU), 30 October (Practical evening and W1BB tape slide lecture Mk2 on working dx the hard way), 8pm, Harrow County School for Boys, Sheepcote Road, Harrow.
Havering (H P DARC)—Fortnightly, 8pm, British Legion House, Western Road, Romford.
Hemel Hempstead (HH & DARS)—First and third Fridays, 7.30pm, "Addmull" Sports Club, Hemel Hempstead.
Holloway (GRS)—Mondays (RAE), 7pm; Wednesday (Morse), 7.30pm; Fridays (Club), 7.30pm; Whittington School, Archery School Annex, Highgate Hill. N19.
Ilford—Every Thursday, 8pm, 50 Mortlake Road, (off Ilford Lane), Ilford.
Kingston (K & DARS)—Second Wednesdays. 14 October (AGM), 8.00pm, Penguin Lounge, 37 Brighton Road, Surbiton.
Leyton & Walthamstow—Thursdays, 7.30pm, Leyton Senior Institute, Essex Road, E10.
London (UHF Group)—First Thursday, 7.30pm, Whitehall Hotel, Bloomsbury Square, Holborn, WC1.
Loughton—Fortnightly on Fridays, Loughton Hall, Rectory Lane, (nr Debden station).
New Cross (Clifton ARS)—Wednesdays and Fridays, 8pm, 225 New Cross Road, SE14.
Paddington (P & DARS)—Thursdays, 7.30pm, Beauchamp Lodge, 2 Warwick Crescent, W2.
Purley (P & DRS)—First and third Fridays, 8pm, Railwaymen's Hall, side entrance, 58 Whytecliffe Road, Purley.
Reigate (RATS)—First Wednesday, 7.45pm, George and Dragon, Cromwell Road, Redhill.
Romford (R & DRS)—Tuesdays, 8.15pm, RAFTA House, 18 Carlton Road.
Scouts ARS—Third Thursdays of month, 15 October (Aircraft radio), 17, 18 October (Jamboree on the air), 7.30pm, Baden Powell House, Queensgate, South Kensington, SW7.
Sidcup (CVRS)—1 October ("Aerials," by C. Usher, G2CCP), 15 October (Natter night), Congregational Church Hall, Court Road, Eltham, SE9.
Southgate (SRC)—Second Thursday of month. 8 October (R. A. Joyce of Mullard Ltd will talk on integrated circuits. Visitors are most welcome), 7.30pm, Civil Defence Hut, Bowes Road, N11.
St Albans (Verulam ARC)—21 October, 8pm, Town Hall, St Peters Street, St Albans.
Sutton & Cheam (SCRS)—Third Tuesdays. 21 October ("Digital frequency meters," by B. Coleman, G8AZU), 8pm. The Harrow Inn, High Street, Cheam.
Welwyn (Mid-Herts ARS)—Second Thursday of month, 8pm, Welwyn Civic Centre, Welwyn.
Wimbledon (W & DRS)—Second and last Fridays, 8pm, St John Hall, 124 Kingston Road, South Wimbledon, SW19.

Endeavours are being made to build up SLM again and plans are afoot for a mobile rally. Some of the original members are to give talks and film shows on mobile operation. Coming events: Construction competition, junk sale, talk by ITV.
Wembley (GECARS)—Thursdays, 7pm, Sports Club, St Augustin Avenue, North Wembley. (This club is open to non-GEC employees by invitation. Telephone 904 1262 for details).

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

Worthing (W & DARC)—Every Tuesday. 13 October (Grand junk sale), 25 October (Df contest), 8pm, Rose Wilmot Youth Centre, Littlehampton Road, Worthing. The new secretary is P. J. Robinson, G6KFH/T.
Canterbury (EKRS)—Details of meetings from G3MDO, QTHR.
Maidstone (M YMCA ARS)—Meetings held Tuesdays and Fridays, 8pm, at 'Y' Sports Centre, Melrose Close, Loose, Maidstone.
Thanet (TRS)—2 October (Bring and buy sale), 9 October (Tape and slide lecture—RSGB), 16 October (Visit to vhf meeting at Wye), 23 October (Talk by hospital broadcasting service).
Mid Sussex (MSARS)—All meetings and club station at Marle Place, Leylands Road, Burgess Hill.
Eastbourne (SARS)—All meetings held at 7.30pm, Victoria Hotel, Latimer Road, Eastbourne.
Dover (SEK YMCA RC)—Meetings held every Thursday, 7.30pm, at the YMCA Leybourne Road, Dover.

REGION 9 — RR J. Thorn, G3PQE

Axe Vale (AVARC)—Now have a permanent QTH in the Village Hall, Axemouth, Nr Seaton, Devon.
Bristol, City & County (BARC)—Every Tuesday and Thursday. 22 October (Postal mechanisation," by G3WLZ), 19 October (AGM) Club HQ, G3TAD, 41 Ducie Road, Barton Hill, Bristol 5. *G3SXY*.
Bristol, City & County (RSGB)—13 October (Visit to army radio unit), 26 October (Annual film show for guests, ladies and friends welcome), 7.30pm, Becket Hall, St Thomas Street, Bristol 1. *G3ULJ*.
Bristol, City & County (Shirehampton)—Every Friday at Twyford House. *G3YIQ*.
Bristol, City & County (University ARC)—Meets each Saturday, 2.30pm, Dept of Physics, Royal Fort, Tyndall Avenue, Bristol 8. 160m to 23cms are covered by the club calls, G3KAC and G8CXH. Secretary: G8ADP.
Cornish (CRAC)—Meetings at SWEB Club Room, Pool, Camborne. *G3UCQ*.
(Falmouth)—G3OJN.
(Newquay)—G3THT.
Exeter (EARS)—First Tuesday in each month. 6 October (Talk on capacitors manufacture), 3 November (Feature film show), 7.30pm, YMCA, St Davids Hill, Exeter. *G3HMY*.
North Devon (NDARC)—14 October (Technical talk), 28 October (Rag chew), 7.30pm, "Grinnis," High Wall, Sticklepath, Barnstaple.
Plymouth (PRC)—6 October (Talk on naval exploits by G3VCN), 20 October (Open meeting to all), 3 November (Slide show of club events), 14 November (Annual dinner and dance, Davey Hall, North Hill. Tickets). *G3SPI*.
Saltash (S & DARC)—2, 16, 30 October, 7.30pm, Burraton Toc H, Warraton Road, *G3XWA*.
South Dorset (SDARS)—9 October, 13 November, Room E2, Weymouth Technical College, Newstead Road. *G3RZG*.
Torbay (TARS)—Every Tuesday and Friday. 31 October (Talk by Mr Cordingly of GPO), Club HQ, G3NJA, Bath Lane, rear of 94 Belgrave Road, Torquay. *G3NQD*.
Taunton (T & DARC)—Contact acting secretary, G3DTB.
Weston-super-Mare (WSMARS)—First Friday in each month. The meeting venue had been changed as from August to the new technical college, enter by the main door as the room has not been settled yet. Talks are being arranged for each meeting, and a new film on aerials in three parts will have one part shown at the next three meetings, followed by a talk. 7.30pm, 2 October, 6 November, 4 December. *G3GNS*.
Wells—Contact G3MVA.
Yeovil (YARS)—Wednesdays, the Park Lodge, Yeovil. *G3NOF*.

REGION 10 — RR D. Thomas, GW3RWX

Blackwood ARC—Fridays, 7pm, Blanche Cottage, off High Street, Blackwood, Mon. *G6BK.*
Barry College of Further Education ARS—Thursdays, 7pm, College of Further Education, Colcot Road, Barry, Glam. *GW3VPB.*
Cardiff RSGB Group—12 October (AGM. Talk by H. Bedford, GW3HPS, on the Sommerkamp transceiver), 7.30pm, TA Centre, Park Street, Cardiff.

A visit is being arranged later in the month, details of which will be given at the 12 October meeting.

Glamorgan Raynet Group—Please note change of title. Meetings being re-organized. Full details from GW3ZFG, tel Cardiff 62411.
Hoover ARC—Mondays, 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, Nr Merthr, Glam. Secretary: Mr F. E. Tribe.
Port Talbot ARC—Meetings on second Tuesday of each month, 7.30pm, Trefelin Club & Institute, Port Talbot. *GW5VX.*

Congratulations are extended to the club for their excellent performance in winning NFD.

Pontypool ARC—Tuesdays, 7.30pm, Educational Settlement, Rockhill Road, Pontypool, Mon. A full programme has been arranged for the winter, including Raynet training and practice. *GW3JBH.*
Pembroke ARC—Last Friday of each month, 7.30pm, Defensible Barracks, Pembroke Dock. *GW3LXI.*
Rhondda ARS—Meets at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glam. *GW3PHH.*
Sully & District Short-wave Club—Tuesdays, 7pm, The Annexe, Sully Bowls & Social Club, 59 South Road, Sully, Glam. Secretary: Mr Glyn Maggs, 3 Thorley Close, Cyncoed, Cardiff.
Swansea Telephone Area ARS—Tuesdays, 7.30pm, Telephone Engineering Centre, Gors Road, Swansea. Callsign of the club is GW3ZTK. Secretary: Mr M. D. E. Connor, 7 Glanmon Park Road, Sketty, Swansea, Glam.
University College, Cardiff, ARS—Details of meeting times and places available from the secretary, Student Union, Dumfries Place, Cardiff.
University College, Swansea, ARS—Full details of activities available from the secretary. Students Union, University College, Singleton Park, Swansea.

REGION 11 — RR P. Hudson, GW3IEQ

Conway Valley (CVARC)—15 October (Talk on tvi by Dr L. D. Last, GW3MZY), Parade Hotel, Church Walk, Llandudno. At the September meeting an open forum was held to discuss the club's future policy and activities. The following officers were elected at the AGM: chairman, F. Wiseman, GW3GRY; vice-chairman, R. Jones, GW3MDK; treasurer, S. Watson, GW3CW; hon secretary, G. Liebert.
Rhyl (R & DARC)—Second Tuesday of each month. 13 October (Talk on amateur television by J. T. Lawrence, GW3JCA/T), 7.45pm, the Mona Hotel, Market Street, Rhyl. The club has a top band net at 1100 every Sunday and amateurs in the area are invited to participate. At the last meeting on 8 September a talk "An introduction to amateur radio" was well received. The club has now been allocated its own callsign, GW4ARC, when this is issued in the coming year.

REGION 12 — RR A. W. Smith, GM3AEL

Aberdeen (AARS)—Fridays, 7.45pm, 6 Blenheim Lane, Aberdeen. *GM3HGA,* telephone Aberdeen 33838.
Dundee RSGB Group—Thursdays, 8pm, 3 Magdalen Place (off Roseangle), Dundee. *GM3KYI,* QTHR.
Inverness (IRS)—Thursdays, 7.30pm, 4 Falcon Square (near railway station), Inverness.
Lerwick (LRC)—Tuesdays and Thursdays, 8pm, Annsbrae House, *GM3XPQ,* telephone Bixter 249.
Lhanbryde (MFARS)—Wednesdays, 7.30pm, St Andrews School, Lhanbryde, by Elgin, Morayshire. *GM3UKG,* telephone Clochan 225.

REGION 13 — RR V. W. Stewart, GM3OWU

Lothians Radio Society—8 October ("Vhf receivers," by GM8BJF) 22 October (Visitors night when once again we extend a warm welcome to all who attend), 7.30pm, Theatre Workshop, 66 Hanover Street, Edinburgh.

REGION 14 — RR N. G. Cox, GM3MUY

Ayrshire (AARG)—11, 25 October, 8, 22 November, 7.30pm, YMCA, Howard Street, Kilmarnock.
Ayrshire (Ardeer Recreation ARC)—6, 8, 13, 15, 20, 22, 27, 29 October, 7.30pm, Ardeer Recreation Club, Amateur Radio Section, Stevenston, Ayrshire. Details from J. F. McCreight, GM3DJS, 10 Auchenharvie Road, Stevenston, Ayrshire.
Greenock (G & DARC)—2, 9, 16, 23, 30 October, 7.30pm, Watt Library, Union Street, Greenock.
Mid-Lanark RSGB Group—16 October, 7.30pm, YMCA, Brandon Street, Motherwell.

REGION 15 — RR J. Thompson, GI3ILV

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

REGION 16 — RR W. J. Green, G3FBA

Basildon (VARS)—Thursdays, 7.30pm, The Scout Hall, Fairview Road. Vange, Basildon. *G3VOP.*
Chelmsford (CARS)—Firxt Tuesday in each month, 7.30pm, Marconi College, Arbour Lane, Chelmsford. *G3VCF.*
Colchester (CARS)—Wednesdays, 7pm, NE Technical College, Colchester. *G3VAG.*
Gt Yarmouth (GYRES)—Fortnightly, 7.30pm, 98 South Market Road, Gt Yarmouth. *G3HPR.*
Ipswich (IRS)—Details from G3YWM, QTHR.
Norwich (NARC)—Mondays, 7.30pm, The Brickmakers Arms, Sprowston Road, Norwich. Secretary: Gary Purcell, tel Drayton 459.

REGION 17 — RR Cliff Sharpe, G2HIF

The secretaries of those clubs from whom I have been pleased to receive meeting notices several months in advance of publication are reminded that their events calendars have now been completed. Brief last minute details of meetings for the forthcoming month can be accepted by telephone up to and including the first of the month preceding publication.

Basingstoke (BARC)—Meetings on the first and third Saturday in each month. 3 October (Construction and newcomers evening), 17 October (Constructors competition with two awards: novice cup and senior cup), 7.30pm, Chineham House, Popley Way, Basingstoke, Hants. *G3CBU.*
Farnborough (FDARC)—Meetings on the second and fourth Tuesday in each month, 7.30pm, Railway Enthusiasts Club, 310 Farnborough Road, Farnborough, Hants. Visitors and new members are always welcome. *G8BVM.*
Maidenhead (MDARC)—5 October ("Logic," by G8BUQ), 20 October (Informal), 2 November (Junk Sale), 7.30pm, Victory Hall, Cox Green Lane, Maidenhead, Berks. *G3VMR.*
N Berks (AERE, Harwell, ARC)—Informal meetings and junk sales every Friday lunch time in the clubroom. Formal meetings on the third Tuesday in each month, Social Club, AERE, Harwell, Didcot, Berks.
Reading (RDARC)—Meetings on alternate Tuesdays. 27 October ("The G3NNG receiver," by Colin Desborough, G3NNG: a talk and demonstration), 7.30pm, Victory Public House, Meadway, Tilehurst, Reading. *G3NBU.*
Southampton (SURC)—The Southampton University Radio Club invites any prospective members to join the club nets: 3·75MHz + 10kHz at 1830 Mondays and Fridays: and 1·875MHz at 2100 on Mondays only. Further details of the club are obtainable from GC3XZC, QTHR. *GC3XZC.*

MEMBERS' ADS

These advertisements are accepted free of charge as a service to members of RSGB. They must be submitted on the members' Ads order form printed on the penultimate page of each issue of *Radio Communication*, or on a post-card similarly laid out. Each must be accompanied by a **recent** *Radio Communication* wrapper addressed to the advertiser, as proof of membership.

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

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

The closing date for each issue is the 7th of the preceding month, but no guarantee of inclusion in a specific issue can be given. No correspondence concerning this free service can be entered into.

See the current order form for further details.

FOR SALE

Cannonball ssb 80m tx, as new, £23 or exchange 3in astronomical refractor. G3OGD, 20 Bevan Ave, Talke Pitts, Stoke on Trent.

AR88LF, gd wkg cond, £30. will deliver 20 miles radius of Ripon, Yorks. G3JLZ, QTHR.

Tiger 200 tx, perf wkg order. Trio 9R59 rx, almost new. G3LES, QTHR. Tel Southport 68064.

Exchange DL6SW 2m convtr for commercial gdo or sell for £10. G2HFI, 18 Newlands, Langton Green, Kent. Tel Langton 2647.

Codar CR70A, spkr and PR30 preselector, 14 months old, all in gd cond, £20. Would deliver to 25 miles. Richardson, 58 Grenville Ave, Wendover, near Aylesbury, Bucks.

Hammerlund HQ170A and 2m convtr, £80. G2DAF Mk2 tx and psu, £40. Lin amp containing 2 by 4CX250Bs and 2000V psu, £25. G3LYP, QTHR.

TW-2 tx, convtr, psu, 4 ele 2m yagi and 3 xtals. G3VWC, QTHR. Tel Bishops Stortford 4796.

Heathkit RA1, £28. JXK 2m fet convtr, 28–30MHz i.f., £12. Rough low band Reporter, offers. G3VQQ, QTHR. Tel Leeds 54122.

AR22R rotor plus 50yd of 4-way cable, gd cond, £25. Prefer buyer coll. G3VMY, 3 Stanlake Park Cottages, Twyford, nr Reading, Berks. Tel Twyford 226 evenings.

KW hf bands convtr, 4–6MHz i.f., with R107 in lash-up cabinet but includes S meter and Q mult, £15 ono. G3HDB, QTHR. Tel OWA6 53524.

Circuits, mods and details etc for Invicta Radio PCR2 comm rx, Loan or buy. Cranage, 842 Chester Road, Erdington, Birmingham. B24 OEH.

KW77 rx, ldspkr and hndbk, mint, £75. J Beam 6/6 2m ant type 2/12, unused, £4 10s. G5RS, 20 Hedgeway, Guildford. Tel Guildford 61786.

Avometer model 7, £7 10s ono. Gd cond. Wanted: 23MHz xtal HC6/U fundamental. G3UYM, QTHR.

KW Viceroy tx. Minimitter rx, modified, perfect. High and low pass filts. 4-band KW dipole. Will split. Offers. G5NG, QTHR. Tel Chertsey 2502.

HRO modified for ssb. Half-lattice xtal filt, xtal bfo, product detector and envelope detector, fast/slow agc, 12 coils inc 80, 40 and 10m bs, noise limiter. Fitted psu. £16 buyer coll. G3JNM, QTHR. Tel Macclesfield 2668.

SL610, SL612, SL630, 35s ea. SL641, SL640, 54s ea. SL621, 46s ea. £12 the set. Alsop, 151 Leeds Road, Kippax, Leeds, LS25 7DZ.

HRO MX with psu and 9 coils in cases, ex cond, £25 ono. G3VUL, QTHR.

B40, £12. High-band Ranger with transistor psu, £6. BCC 100G rx, £5. Re-entrant spkr, £1. Electroniques gc coil pack, £5. 3 speed tape recorder, amp faulty, £15. G8DBA, 341 Walton Road, West Molesey, Surrey. Tel 01-432 3233 ext 280.

Practical Wireless, 1966, 1967 and 1968. Radio Communication, 1967 and 1968. All vols bound. Latter 1969 and 1970 unbound. £2 ono. Smillie, 150 Millhouses Lane, Sheffield, S7 2HE.

Codar CR70A with PR30 preselector and matching spkr, less than one year old, £20. Pref buyer coll or post extra. Webb, 123/B Lower Cippenham Lane, Slough, Bucks.

Quantity of heavy duty chokes around 2H, rated at several amps, large and heavy, 25s the lot. Prefer buyer coll. G3VMK, QTHR.

KW E-Z Match, £8. KW swr bridge, 75Ω, £8. KW dummy load, as new, 75Ω, £4. Emsac CN2 2m convtr, 28–30MHz i.f., as new, £10. G3YEL, QTHR. Tel Uxbridge 30137.

Jason scope. Jason vtm. Heathkit R & C meter. Heathkit transistor gdo. Single track tape recorder. Any offers. G3PPK, QTHR. Tel 01-573 0496 (day), Uxbridge 36989 (evenings).

KW2000A with ac psu and Shure mic, ex cond, £100 ono. G3ELJ, QTHR.

Star SR550 hamband comm rx, 1·8-54MHz, double conv, xtal calib, bfo, S meter, hardly used, £35. Washington, 24 Westbrook Ave, Margate, Kent.

Number of large chokes about 2–3H, 25s ea or offers. G3VMK, QTHR.

Super pro SP400SX and psu, £30 ono. HRO 5T, fitted nl, 6 coils, psu, £20. Bantex fibre-glass helical whip, 7ft, resonant 2·3MHz, £7. Ssb xtal filt usb, £8. Pref buyers coll. G3JMJ, QTHR. Tel Edenbridge 3467.

Heathkit RA1, xtal calib and spkr, £25. DX40U, VF1U, Z match, KW 1pf, £25 (but less audio section). All gd cond, G3WRT, QTHR. Tel Marlow 5310.

Tape amp, playback chassis and other items. Full of useful comps. Sae list. Pyatt, 23 Arundel Drive, Orpington, Kent.

Lucas ac gen, 12V 16ARC, £15, brand new. Sh Pye car radio P100T/L, slight fault, £7. Will exchange for 2m convtr, teleprinter 7B, Pye Reporter, R107 or why. Chapman, 83 Courtenay Road, Birmingham B44 8JB.

Transistor tx, 160m, +ve earth 12V, 10/12W, small, £15. Labgear 160 and 80m twin tx, miniature, mobile, £12. Labgear 12V +ve or —ve psu, £5. Ac psu, 6V lt 300V ht, £5. 80m mobile convtr, tunes on car radio, £2. G3VCJ, QTHR.

BC348, orig and unmodified, comp in case, with dynamotor, £10. G3KOU, QTHR.

4m /M: 12V at 8A tx/rx, 35W input p.a., xtalled for 70·15, 70·26 and 70·48MHz, rx can be tuned over entire band. Offers to G3NGK, QTHR. Tel Beaconsfield 3109.

AR88LF with switched am/fm/prod detectors, fast/slow agc, realigned, white enamel front panel, gd cond, offers over £30. G8CEC, QTHR. Tel 021-236 8901 daytime.

813, 30s. 4CX250B, 30s. Coiled retractable mic cable. Audio matching trnsfmr 600Ω line into valve grid. Wanted: 12 electrolitics about 200mF at 400V. G3KH, 133 Station Road, Cropston, Leicester LE7 7HH.

Must dispose of R1392 rx (100–150MHz) and psu type 234A. Both in ex cond. Rx requires int attention, but should be slight, £11 ono for both. Manning, 5 West Park Road, Kew Gardens, Richmond, Surrey. Tel 01-876 6842.

Pye PTC703 fixed tx/rx, modified for 4m. National NC100X rx with spkr. RME DB20 pre-amp. AR88D rx. Panda Explorer tx with atu,

150W. All in gd cond. Offers considered. Buyers coll. G3ICX, QTHR, Tel Pershore 3165.

Pye Rangers type 2107, boot mounting, high band, transistor, 10W, with control boxes and 2nd local osc xtals, £10. G8CNP, QTHR. Tel Brighton 503980.

Comp station: 2000A, ac psu, E–Z match, Shure mic, TA33jnr, AR22 rotator. All perfect, £180. CR100, £10. Tiger 100 tx, £25. AR88LF, £35. Buyer coll. G3NIM, QTHR. Tel Hamble 2025.

Heathkit HD10 electronic keyer with manual, £15. KY102 mech filt (new and unused), £3. HC6/U xtal, 7450kHz (for 160m on FR100), 5s. G3RJS, 47 Gerald Road, Wollaston, Stourbridge, Worcs.

R209 comp with headphones, handbook, spare valves, vibrator and all connecting leads. Offers. Sanders, The Sconce, Badley Wood, Whitbourne, Worcester.

G3HBW fet rx as in Dec '68 and Jan '69 *Bulletin*. Comp except for case. Untested, £20. Components alone worth more. Includes new 898 dial. Brownlee, 127 Main St, Carnwath, Lanarks, Scotland.

Polaroid camera model 104 with flash and close lens in exchange for rx or linear or why. G3COI, QTHR. Tel Wombourne 2288.

Panda PR120V, gd cond, with handbook, £25. Delivered NE area. G3JMO, QTHR.

R1155L rx, £4. A 1 valve sw rx, £4 10s. Graves, 2 Banchory Road, London SE3. Tel 01-858 7912.

Marconi TF144G sig gen, 240V ac, 85kHz–25MHz, perf wkg order. Will swop for scope or why. G8BLI, 11 Chestnut Ave, West Wickham, Kent. Tel 01-462 5094.

Geloso G212TR 10-80m tx plus psu, £25 ono. Buyer coll. GW8CCA, QTHR.

KW Vespa Mk2 with 6LQ6 pa, fitted alc, with solid state psu, ex cond, little used, £100 ono. G3XWC, QTHR. Tel Cleethorpes 63862.

Codar CR70A, little used, cond as new, £10. Dingley, 14 North Down Road, Chalfont St Peter, Gerrards Cross, Bucks. Tel Chalfont St Giles 3458 (6–7pm).

Hansen SWR3 bridge, ex cond, with connectors, £2 10s. G3XSJ, 72 Nicholls Lane, Winterbourne, nr Bristol.

KW 2000B with ac and dc psus, £200. G3PNQ, QTHR. Tel Parbold 2797.

R107 with Q multiplier, £10 delivered Greater London. G3XMV, QTHR. Tel 01-360 6537.

2 and 4m xtals. Also 60 other xtal freqs. Wearite, Weyrad coils. 6V vib psu. Sae list. G3NNO, QTHR.

R1155, built-in psu etc, £8. BC342 and 110V trnsfmr, £10. Hambands Quoilpax, valved, £6. Double-beam, £10. Admiralty wavemeter, no charts, £2. Darling, 80 Seaton Gardens, Ruislip Manor, Middlesex. Tel Ruislip 39576 evenings and weekends.

30ft 2 section lattice tower with prop pitch motor and indicator, £15 Buyer collect. G3WPB, 76 Southfield Road, Hinckley, Leicestershire. Tel Hinckley 6520 weekends only.

Swan 350 trnscvr with matching remote vfo, ac psu and spkr. Fitted xtal calibrator and cw sidetone. Spare new p.a. valves. Unmarked cond. Special tvi suppression, £200 ono. G3WLX, QTHR. Tel Beaconsfield 4965.

Exchange Raditec radar detector in mint cond for Codar mains or mobile psu in gd cond. For sale: Low band Pye Reporter, £6. GW3KZX, QTHR. Tel Cardiff 755309.

R1475 rx, £10 ono. 2m 6CW4 convtr, 3–5MHz i.f., £4. TT21, 15s ea. Sae for valve and component list. G3NPZ, 7 Somaford Grove, E Barnet, Herts. Tel 440 6219.

Canadian 52 rx, faulty on 160m, £4. Class D wavemeter, ok but requires calibration, handbook, phones, £4. All carriage extra. GM3YYY, 94 Larkfield Road, Lenzie, Kirkintilloch, Glasgow. Tel 041-776 4833.

Vespa Mk2 and psu, gd cond, will deliver 100 miles, £90. G3RFN, QTHR.

Galaxy 5 Mk2, 400W with 12V mobile G1000DCPU and home-built ac psu, mint, air tested only, £175. Will del reasonable distance. G3KPO, Jersey House, Eye, Peterborough, Hunts. Tel Eye 351.

Jennen multi-meter 220S, 4000Ω per volt, 2·5kV, 250μA movement. DX100U manual. Pair 5R4GY. Offers. G3BRT, 10 Burlington Road, Redland, Bristol 6.

Transistorized el-bug by Electronic Devices, £3 5s. G2YS, 29 Beacon Way, Rickmansworth, WD3 2PF. Tel 76864.

HRO fitted with polyester capacitors and noise limiter, 9 gc coils, ldspkr, psu and manual. Also Codar PR30X. £25. G8AHE, QTHR.

Mosley 3 band TD3 dipole with 50ft coax but less aerial wire, 35s. post paid. GM2HFV, QTHR.

Three boxed new QQVO3-20As, £1 ea. 3 unboxed new ditto, 15s ea. 3 unboxed new QQVO6-40As, £1 ea. Will swop the lot for 2m aerial. G3JDN, 2 Castle Drive, Reigate, Surrey.

Electronic keyer using mos ics, mains op, paddle input socket, reed relay output, side tone, £18. 7/6d post and packing. G3RVM, 27 Kingsthorpe Grove, Stratton St Margaret, Swindon, Wilts.

Tri-band G whip, 10, 15, 20m plus coils for 40 and 80m. Comp with base mount, £9. Also CSE xtal mic for /M, £1 10s. Prefer buyer coll. G3KYF, QTHR.

Swan 350, £165. AR88D, £25. S27, £10. Onan 110V 350W petrol gen, £10. Wright and Wearie G200, £5. Leisegang Unirax enlarger, £20. G3HBN, QTHR. Tel Winslow (Bucks) 2228.

AR88D, vy stable, spare valves, alignment instructions, prefer buyer coll. G3KGM, QTHR. Tel 01-300 0767.

KW Viceroy tx with ac psu, mint, £70. GM3UWX, QTHR. Tel 041-482 2817.

Mains trnsfmr: 6·3V 22A 14lb, £2. Potted chokes: 15H 250mA 8lb; 20H 150mA 5lb; 10H 180mA 4lb, £1 ea. All post extra. Wanted: Barograph and S27 or S36. G3KSU, 11 Grange Ave, Ryde, IOW. Tel Ryde 5551.

Freq meters, sig gens, Watt meter, audio osc, scopes, echo box, spectrum analyser, freq counter and other army surplus precision testing equipment. In gd cond. All offers considered but cannot despatch equipment. Clive, 30 Cyprus Road, Finchley N3 3RY.

30ft by 2in dural mast outrigger plain bearings carrying 35ft by 1in steel tube. 4 ele 4m beam. 5 ele 2m beam. 430MHz Skybeam, £10 the lot. Magslip No 5 transmitter, Magslip indicator 8in dial, £3. Buyers coll. G3EJA, QTHR.

Professional built ssb lin amp, 1000W pep, 80-10m, 4 811As in grounded grid class B, immac cond, £32. KW Vanguard, 160-10m, £18. G3MCG, QTHR. Tel 01-303 9252.

EA12, 1 year old, unused, box, books, all at £150 carriage inc. GEC BRT400, £25 to be collected. G3BQZ, 19 Station Road, Tadcaster, Yorks. Tel 2253.

Lafayette HA600, am/cw/ssb, spkr, anti-surge fused, mint cond, owner going overseas, 12 hours use only, £38 ono. Buyer coll or arrangement made. GW3KLF, 12 Warren Drive, Prestatyn, Flints. Tel Prestatyn 3286.

Valves for vhf: QQZO6/40, 40s. QQVO2/6, 20s. YL1130, 20s. CV408, M8248, RL18, 6AM4, 6BQ7A, PC88, 6J6, 6AK5, 6J4, A1714, 6140, PCC89, 5s ea. Many others, pse enquire with sae. G2XV, 165 Cambridge Road, Great Shelford, Cambridge.

Brand new 4CX250Bs, 30s ea. Collins mech filts, 500kHz for lsb ssb type F5002-5, £8 ea. A.m. type, 6kHz bw, £4. G3WXO, 9 Calverton Road, Stony Stratford, Wolverton, Bucks. Tel Stony Stratford 3346.

2m home brew convtr (28–30MHz i.f.), may need slight attention, with transistor pre amp, £3 ono. Wanted: 2m /M halo, will swop or buy. G8DNT, Barclays Bank Flat, Bank Court, Hemel Hempstead, Herts. Tel HH 52469.

KW Viceroy Mk3a tx, extra ½ lattice filt, 6146Bs in final. Also KW77 rx, Dowkey coaxial ant changeover relay and interconnecting cables, recent KW checkover, owner going transceive, £150, may consider separating. G3VIE, 35 Brookside, Wokingham, Berks. Tel West Forest 4048.

Heathkit RA1 rx, 160–10m, as new, with built-in xtal calib, £28. Q mult to match above rx, £3. G3XMH, QTHR. Tel Beccles 2360.

AT5, T28, 12RC, 12MS and some extras, fb cond, £35. 813 and bases, 35s. Homebuilt 160m tx/rx, ac mobile psu, fair cond, £12. Jap S meter, new and boxed, 30s. Coll or carr extra. G3YHB, 86 Max Road, Liverpool, Lancs, L14 4JB. Tel 051-228 1321.

2m Communicator, slightly modified, ex cond, full wkg order, offers. G4JJ, QTHR. Tel Barnsley 3704.

Equipment late G3OCX. G2DAF tx built by G2DAF. G2DAF rx, aligned by G2DAF (*Bulletin* articles 1967), mech filts, power units, £60 ea ono. G8GG, QTHR. Tel OFY15 25717.

Eddystone 870A rx 1·3MHz to 24MHz + long and med wave, exc cond, £14 ono. Williams, 204 Dysart Road, Grantham, Lincs.

Swan 350 trnscvr with extras and power unit, used daily, £145, carr extra. GM8AT, QTHR.

LG300 rf unit, circ notes, spare 813, £12. HRO-MX gc coils, psu, spkr, spare valves, hndbk, £12. HRO bandspread coils, 80, 40, 20, 10m, 50s ea. Wanted: SR200 rx; Hamgear preselector. Part exchange welcomed. G3JFC, 39 Purrett Road, Plumstead, London SE18. Tel 01-854 6646.

AT5 with mains psu, perfect cond, £15, plus carr. Wanted: spare UX based valves for HRO. G3ZCF, 15 Dane Close, Stotfold, Hitchin, Herts. Tel Stotfold 510.

Microphones: BSR ribbon studio type with transfmr to high impedance, chrome hydraulic floor stand and desk stand. Also dynamic type with floor stand and trnsfmr. Offers nearest £8 10s and £3 10s respectively. Signey, 50 Sturdee Gardens, Newcastle upon Tyne, NE2 3QT. Tel Gosforth 852020.

Venner time switch in metal case, full wkg order, £3. 20mf 260V ac and 6500Ω relay, offers. Macrae, 8 Lealholme Road, Newcastle on Tyne 7. Tel Newcastle 602837.

2m JXK fet convtr, 12–14MHz i.f., £10. 2m tx (rf unit only), 3/10pa, £4. HW30 2m trncvr and dc psu, £18. Model 7 avo, £7. G8ANU, QTHR. Tel Stafford 62533.

Metvick AD 3in cro, wkg, £6 ono. EMI AD407 gdo, £5. EMI AD408 absorption wavemeter, £4. Both 1·5–30MHz. Wanted: *Radio-TV Servicing*, 1959–60 and 1962–65 inc. Joystick ant. G8SP, QTHR. Tel Silchester 513.

Going home-brew: 888A, £60. Marconi 52 Set with Codar preselector and psu, £10. Vanguard tx, £20. B44 convtd to 70·26MHz, £8 10s. 2m G & D convtr, £3 10s. Key operated c/o unit, £4. G3TYO, QTHR. Tel Shoreham by Sea 4107.

R107, £10 local. 35Ts, £1. RG1, £30. Woden 10V ct 10A hv paper capacitors. Also compact nitrogol. Pair 117V ge selsyns ok series field, £3 pair. RCA fm tuner mon, hndbk, £8. Plenty capacitors tx variable. Jennings fixed vacuum 150pF, £3 ea. Write for lists or w/e phone. GW3HEU, 97 Ruabon Road, Wrexham. Tel 0978 4507.

G2DAF lin, needs 2 QY3–125s, built in KW G-line cabinet, £30 ono. 2kV psu for same, £10. The pair £35. Modernised HRO comp with bs coils, filt, u/lsb and fm, plus 4–6MHz coil for convtr, £25 ono. Bush radio, mw/sw in walnut cabinet, 10W hi-fi, ideal swl/overseas traveller, comp with hndbk, £15 ono. G3LCS, QTHR. Tel Wolverton 3379.

829B (3EZ9) unused, 15s. 4242A (805), 10s. 5/6CH6, 2/6BE6, 12AH7GT, 5s ea. 4/RK34, 5/VR92 diodes, 2s ea. 2/726A klystrons in unit, 15s. QCC 100kHz vacuum, 10s. Spares, valves, ex Command rxs, TCS tx/rx, TU5B etc, TR1900 tx/rxs. G2ACT, 14 Station Road, Upper Poppleton, York YO2 6PY. Tel U Popp 4366.

GEC tv transient test set. Sine, squared pulse gen and display unit, 250V ac with hndbk, £10. Teletype model 15 less motor and key tops, £2. Bendix tx TA12C, 3–12MHz, £5. G3RBY, 2 Blackthorn Close, St Albans, Herts. Tel St Albans 54009.

SB101 and HP23 psu, £190. SB640 external vfo, £45. £230 the lot. All factory built, only 10 months old and in perf cond. G3NLY, 20 Bridge Cross Road, Chase Terrace, nr Walsall.

Panda PR120V, fb appearance and performance, £35 buyer coll. G3UQP. St Neots 2236.

HRO coils, two 3·5–3·8MHz b/s, 60s ea. 3 xtals type FT241A, channels 50, 51 and 465kHz. Woden DT1 trnsfmr. G3KTH, QTHR. Tel Bromsgrove 5554.

Normende Globetrotter batt/mains portable, 15 ranges inc amateur, £60. Belcom 2 channel 15 transistor walkie-talkies, 1·2W, £39. Teac A20 stereo hi-fi cassette deck, advanced spec mic, new, £50. East, 41 Avenue Close, London NW8. Tel 01-722 7040.

KW Viceroy Mk3 ssb tx, comp with manuals and circuit, £75. Eddystone EA12 with manual, just overhauled by Eddystone, all new valves, £135. Delivered up to 100 miles free. G2CXR, 20 Windmill Balk Lane, Woodlands, nr Doncaster, Yorks. Tel Adwick-le-Street 2485.

RSGB *Bulletin* from 1950 onward. Also *Radio Communication* single copies, 1/6d post free. UK quantity 1s ea plus post. Also LS5.A.B.DE5.B. Offers. G6PV, QTHR.

KW Vespa Mk2 with ac psu, £85. Trio JR500S with spkr, £45. KW E-Z match, £8. TTC swr, dual meters, 75 £3. KW 1pf, 75 £3. Under one year old, as new, the lot £135. G3YYG, 10 Roseheath, Hemel Hempstead, Herts. Tel 57547 after 6pm.

HRO comp with lw/mw/4 bs coils, psu and spkr. Modernised (HRO 50) front end, manuals, £16. Geloso 4/104 3·5-28MHz driver, unused, £4. 3·5–21MHz cw/a.m. 50W tx, £3. G3KZR, 13 Hall Drive, Burton on the Wolds, nr Loughborough, Leics LE12 5AD. Tel Wymeswold 880576.

Hammarlund HQ180AX gen cover plus 11 switched xtal freqs, electrical bandspread calibrated amateur bands plus vernier tuning, slot filter, usb/lsb/dsb, atu, handbook, beautiful reliable rx, £125. Nicol, 63 Marlpit Lane, Coulsdon, Surrey. Tel Downland (71) 55868.

AR88D with hndbk and S meter, £25. HRO rx, 6 gc coils, 3 bs coils, £25. Panda Cub, 60W, 160–10m, £25. GM3MUR, 17 Brunstane Road, Edinburgh 17. Tel Por 3264.

Codar T28, modified with internal mains unit and spkr, can be used either on 230V ac or 12V dc, tunable bfo. £15. GI3RNY, Avonmore, Antrim Road, Ballymena, Co Antrim. Tel 41468.

Eagle transistor tester TT145, £2. Tech gdo model TE15, £5 10s. Eagle 5mA meter, new, 15s. Valves, EF184, EF91, CV1331, 2s ea. Many others, sae for list. Butterfield, York House, Sharlston Common, Wakefield, Yorks. Tel Crofton 353.

AR88D, class D wavemeter, 100–150V stabilised variable psu dual outlets, auto cutout, 150mA, fully metered, plus 6·3V ac 15A fused input, £10. Sae further details or telephone evenings only. Barnes, 105 Godstow Road, Wolvercote, Oxford. Tel Oxford 57697.

Marconi TF852 alignment oscilloscope (wobulator and scope combined), £12 10s or would consider exch for OS2 oscilloscope or similar with cash adjustment. G3MNV, QTHR. Tel 021-353 3012.

HRO rx, miniature valves, band spread coils, with spkr/psu, £15. BC221 with internal psu, £12. G3PLX, QTHR. Tel Waterlooville 51372.

25ft triangular tower. G8BUT, QTHR.

1155 rx with official manual, £5. Constructor parts early broadcast period, may interest collector. 50W audio output and speech trnsfmrs, pair, £2. Buyer coll, sae. G3ICT, 45 Sandhurst Road, Edmonton, N9.

2m transistor convtr, 24–26MHz i.f., £5 post paid. G8BCA, QTHR.

Eddystone EC10, mains and batt psus. Codar PR30 preselector, perf cond, £40 ono. G2RW, QTHR.

Pye low-band Ranger, £4 + carr or will exchange for 4th edition *Handbook*. G8BXO, QTHR.

Scope tube DG7/6, 2¼in, new and unused, £3. Johnson, 87 Esther Grove, Wakefield, Yorks.

RSGB *Bulletins*, vols 32, 33, 36 except Oct, 37, 38, 42, 43, 44. *QST* 1956 except May, 57, 61, 62, 64, 65, 67, 68. ARRL *Handbooks*, seven editions, 1927 to 1935. G6XL, QTHR. Tel Harrogate 81360.

19 Set, gd wkg order, on 160m and 80m. B Set and transmitting sections comp, £21, buyer coll or carr £1 extra. Roberts, 29 Pentland Drive, Huntington, York. YO3 9PQ.

2m tx and convtr, pc board construction, 5MHz i.f., buyer coll and insp. G3UCM, QTHR. Tel 71-55342.

RSGB *Bulletins*, 27 issues, 1951–1955, £1. Vols 31 and 32, two missing, £1. Vols 33 and 35, five missing, £1. Vols 34, 36, 37, 38, £1 ea. Vol 39, six issues, 10s. Harris, 20 Westgarth Gardens, Bury St Edmunds, Suffolk. Tel 2307.

G3HSC morse records, up to 14wpm, £2 ono. G3YBH, QTHR.

CR100, £12, buyer coll. Unbound Vols *SWM*, 10, 11, 18, 19. *PE*, 1 and 3. Any offers. G3KJU, QTHR.

Electroniques QP166 amateur band convtr, vgc, consider exch for general coverage unit. 7010kHz 10XJ xtal, 7/6d. Walsh, EI5CD, Ballylynch, Carrick on Suir, Eire.

Cossor 1052 double beam scope, £5. Pye rf sig gen, £3. Two power selsyns, will turn any beam, £5 pair. S44OB 70/144MHz tx, £3. W/S 19 psu, vibrator/rotary, £1. G5HB, QTHR. Tel Steeple Morden 315.

KW Vespa Mk2 and psu, in as new cond, 11 mths old, £100. Waylett, 71B Wickham Way, Beckenham, Kent. Tel 01-650 8654.

KW Viceroy Mk3 with extra ½ latt filt, recently checked by KW, £85. Buyer coll. G3UCS, QTHR. Tel Kidderminster 64393.

Viceroy Mk3, £80. 1131, £5. Woden trnsfmrs, chokes, UM3, £4. Labgear wbc unit coil turret, £4 ea. Ant noise bridge, £4. Contents shack inc 150W tx, £10. 1000V psu, £6. G2QT, QTHR.

HRO rx, 9 coils, perf cond, £25. Pedelty, 46 Brinkburn Road, Darlington. Tel Darlington 68593.

Tx relay thermo-couple meter 0—5A, var comps, valves etc. Buyer coll, no post. Webb, 42A Marina, St Leonards-on-Sea. Tel Hastings 7159.

KW2000B, 3 months old, hardly used, with ac psu, £200. G3RKZ, QTHR. Tel Derby 32180.

KW2000B, mint cond, Shure 201, TA33jnr beam, 30ft mast with guys etc, comp station, £220. Fowler, 593 London Road, Earley, Reading, Berks. Tel Reading 67800.

Heathkit HW17, factory modified and aligned to HW17A, comp with manual, £55. G8AQE, QTHR.

KW pep meter, as new, £10. Swr match, 75Ω 52Ω switched, £5. E–Z match, £8. Lpfs, 75Ω 52Ω, £3 each. Dummy loads 75Ω 52Ω, 70s ea. AR10, £13. J Beam 2m 8 ele, unused, 50s. Culling, 25 Kingsand Road, London SE12. Tel 01-857 2593.

Pye Ranger, boot mount, £8. Eagle FMT640 tuner, £10. Sansui MP2 decoder, £4. BCC 69D on 4m, tunable rx, psus, offers. Pentax 51A + 135mm lens, meter, cases, etc, £75. G3XJS, 6 St Stephens Rd, Hounslow, Middx. Tel 01-572 2311.

Clearing shack, odd tx/rx units etc, very cheap or give away for callers. Wanted: xtal 4·013 to 4·031MHz, HC6U or FT243. G8CBE, QTHR.

Hallicrafters SX146 rx (current model costing £169), ex cond, 2·1kHz filt, 9MHz i.f., 20dB s/n, 80–10m, £75 ono. Part exch rx accepted. Snowden, Swainsea Lane, Pickering, Yorks. Tel 2560.

Telefunken Microport Jnr remote radio mic, sender and convtr. Also Telefunken TD11 mic and floor stand (folding telescopic), £25. Sae for details. King, 12 Towers Avenue, Maghull, Liverpool L31 0AJ.

2m station, TW2 tx, psu for tx/rx, Bendix RA1J rx, mosfet 2m convtr, comp and wkg, £30. BC221, gd cond, £18. HW30 2m tx/rx, £20. buyer coll G8BOV, QTHR.

WANTED

Homebrew Z match or why. Also TA33, TA32 or quad. GM3WOJ, QTHR.

Manuals or circuits for Cossor 1035 Mk3 scope and for radar scope type 301. Will buy or hire for copying. Your price paid. DL5YP, Kent School, Hostert, BFPO 40.

Codar AT5 tx and 250V psu. G3PXJ, QTHR. Tel 021, 444 4312.

HC6/U xtal 18·02 to 18·06MHz. Will exchange for 24MHz HC6/U xtal. G8BTY, QTHR. Tel Taunton 7247.

B2 set circuit data to borrow. Also suitable product detector circuit for HRO. Walker, 15 St Lukes Mews, London W.11.

EA12 or sim rx. Must be fb cond. Also G2DAF or sim tx. GM3VAR, 15 Greenlaw Drive, Paisley, Tel 041-889 7710.

RF 1U sig gen or sim. State range, accuracy etc and price required. G8WN, QTHR.

Drake MN4 matching network. G3GHB, QTHR. Tel Wythall 2036.

Pye radio-telephones and walkie-talkies on either 27 or 28·5MHz. G3PHS, QTHR. Tel Caterham 46692.

Circuit and/or handbook for 22 set. Also circuit and/or handbook for BC348L rx. Whiteley, The old School House, Lilford, by Peterborough PE8 5SG.

2m convtr with 9·5 or 18MHz i.f. for use with domestic valve rx. Must be wkg. Brett, 34 Willersley Ave, Sidcup, Kent. Tel 01-300 4012.

Samson ETM2 electronic keyer. Details pse to G3WET, 104 Stonnall Road, Aldridge WS9 8JZ.

455kHz xtal. Prefer B7G base or 2 pin. G2BQZ, 19 Station Road, Tadcaster. Tel Tadcaster 2253.

Minimitter /M tx for 160, 80 and 40m. Details of price and cond to G3VMI, QTHR.

Eddystone 750 rx and HA350 rx unmodified. LM14 or BC221 with charts. Xtals HC6/U 11·2583MHz or close. G8BTP, QTHR.

S meter for 888A, 12AVQ and cheap 2m convtr. State price. G3VUF, 37 The Kylins, Morpeth, Northumberland.

B2 tx psu plug. G3IOZ, QTHR.

G2DAF ssb Mk2 tx, less psu. Top quality construction only. G6RF, Farm Cottage, Callestick, Truro, Cornwall. Tel Perranporth 2047.

RTTY equipment in wkg order. Full details pse to G3XFZ, Hall Place, Fen Ditton, Cambridge.

Any mods/improvements for Eddystone 358X (B34) rx (eg S meter). Taylor 52 Beaulieu Ave, Sydenham SE26.

Vintage rx (xtal, valve or combination). Also books or descriptive literature, period 1920 to 1928. Purchase or exchange. Neale, 11 Pine Drive, Wokingham, Berks. Tel Eversley 2626.

Urgently wanted by schoolboy: CR100, B40C or BC348. Price limit around £10. Will collect up to 50 miles. Robertson, 31 Greenways, Bow Brick Hill, Bletchley, Bucks. Tel Bletchley 2463.

Agfa super silette 35mm colour camera with F4.5 lens, coupled r/finder etc offered in exchange for JR500SE, JR310 or 9R59DE. Cash adj in respect of 500 or 310 to be agreed. G2ANX, QTHR. Tel 01-979 3701 evenings.

RF26 unit for conversion to 4m. McNamara, 125 Cooley Road, Dublin 12.

Blueprints of radio control units for model boats, both tx and rx sections, for control of steering and power. Also the loan of a portable sw rx for approx one year. Green, 38 Heath Park Road, Romford, Essex RM2 5UH.

70cm fet convtr, pref JXK type with high i.f. AR88 S meter, 5mA with rh zero. Also two 12·7MHz local osc xtals for Pye Ranger. Sae guarantees reply. Evans, Glendale, Mount Pleasant, Drury, Buckley, Flintshire CH7 3ET.

Ssb filter with carrier xtals, pref 465kHz. Alternatively set of xtals to build exciter. Also simple oscilloscope, can be homebrew if wkg order. G3XKM, QTHR. Tel Stourbridge 5546.

RAF psu type 114. Also sw coils for Hermes aircraft tx. Tel G3MLN, QTHR. Tel Gerrards Cross 84230.

Radiola V111 superhet 1925. Norden-Hauck 10 superhet 1925 or Remler 9 superhet 1025. For private collection only. Jamieson, 'Rosehaven', Pitsligo St, Rosehearty, AB4 4JL.

T & R Bulls, July 1933 (with covers), May and August 1929, January 1930, August 1937 (covers not necessary). *Television & SW World*, 1935–1937. RSGB log book, 1928. G3IDG, QTHR.

RTTY emers or manual (WO code 11787) on rx adapter C.F.S. No 1 (believed same as ZA39384 terminal unit). Borrow or prefer buy. Jolly, 68 Liverpool Road, Chester. Tel Chester 29403.

AR88D, int cond must gd. G8BYV, "Inter-nos', Swanton Morley, Dereham, Norfolk.

FT241A xtals channel 58, 59. G3TOI, QTHR. Tel ORE92-65247.

Hallicrafters S27 in gd cond. Gd price paid. Tilly, 54 Ashton Drive, Bristol 3.

Eddystone EC10. State cond and price. G3SJX, QTHR. Tel 01-656 9054 weekends only.

HRO bandspread coils for 80, 40 and 10m. Must be in gd cond. Battersby, 20 Barrow Road, Cambridge Road, Cambs. Tel Cambridge 63799.

Bantam, Rambler and Cambridge radio telephones in any cond. G3HKV, 16 Abbey St, Crewkerne, Soms. Tel Crewkerne 2662.

Base station or other tx for 2m. Absorption meter to 230MHz. G8ECT, 26 Stagbury Ave, Coulsdon, Surrey, CR3 3PD. Tel Downland 54130.

LG300 with orig psu in gd cond. Can collect 100 miles. G3RFN, QTHR.

Russian language phone net, anyone interested? G3PBL, QTHR.

Ferrograph model G200 navy type recorder by Wright & Weare, circuit details or any info. G3XXJ, QTHR. Tel 021-351 2370.

Info on Siemens G11 and G12 rxs. Buy or borrow.. Also drive for AR88D. Perrott, 222 Chislehurst Road, Petts Wood, Orpington, Kent, BR5 1NR. Tel Orpington 33901.

Handbook and circuit diagram for HRO rx (old model approx 1930–1935). Will buy. Alcock, 20 Barrie Drive, Sheffield, S5 8RQ.

Handbook or any info on Geloso R209 rx. Will buy or borrow. Butler, 12 St Mary St, Latchford, Warrington, Lancs.

Partially-sighted school-children require office recorder or cassette. Repairable would suit. G3IDD, QTHR. Tel 01-539 5235.

Xtals: 10X 1917, 1970, 1970kHz. HC6/U 4546·8 to 4562·5kHz. For sale: 1MHz HC6/Y with wire leads (new), 12/6d ea. G3NXT, QTHR.

£100 offered for ssb trnscvr. GM3MUQ, 17 Brunstane Road, Edinburgh 15. Tel Portobello 3264.

2m tx or high band base station, No fancy prices. Can collect if near. Castles, 62 Ferncroft Ave, Eastcote, Ruislip, Middx. Tel 866 6215.

Circuit, handbook etc for R210 rx and type 13A scope. All expenses refunded. Jackson, 38 Haslemere Road, Thornton Heath, Surrey CR4 7BE.

Mullard Jubilee Exhibition

As part of their Golden Jubilee celebrations, Mullard Ltd are to stage a three-week public exhibition in the electronics centre of their London headquarters

Mullard House, Torrington Place, London WC1.

The exhibition opens on 5 October and will run until 24 October, opening every day (except Sundays) between 1000 and 1800 (2100 on Thursdays). Admission will be free.

The exhibition will trace the history of electronics—linked with the company's own history as pioneers in the field—over the past 50 years. Many interesting examples of vintage and modern electronic equipment will be shown.

One of the main attractions will be a radio transmitter built and operated by Mullard radio amateurs. Some of the company's earliest valves will be used in its construction, and it will be on the air daily on all bands, including two metres.

RSGB members will be very welcome.

Circuit or manual for ex-Govt WS B47. Willing to pay reasonable price. G8BXE, 15 Somerset Cres, Melksham, Wilts.

Needed for AR88LF: Block of 3 4mF smoothing capacitors, perspex front panel, illuminated S meter. Must be in gd cond. Also mains switch for same. Jones, 14 Park side, Park Road, Buckley, Flintshire CH7 2HB.

Scottish VHF Convention

The Scottish VHF/UHF RSGB Convention will be held at the Queen's Hotel, Dundee, on **Sunday 11 October**, commencing at 2pm.

Afternoon programme

"Latest developments at vhf", by G. M. C. Stone, G3FZL, CEng, MIEE, RSGB vhf manager.

"Cascodes, Q and you", by M. C. Hately, GM3HAT, BSc, MIEE.

"Space flight communications", by A. W. Smith, GM3AEL, RSGB regional representative for North-east Scotland.

Guest speaker at dinner

Group-Captain A. H. Dormer, G3DAH, CEng, MIERE, RAF (retd).

Tickets

Full convention; including dinner: 35s.

Afternoon session only: 7s 6d. Dinner only: 30s.

Tickets and information available from Mr G. C. Somerville, GM3KYI, 73 Balerno Street, Dundee.

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TW Matching PSU **£34 0 0**
TWOMOBILE AM/FM instant transmit 4–8 or 9MHz xtal **£57 10 0**
TWOMOBILE AM 12vdc. Complete Tx's 12 × 4½ × 8in **£42 10 0**
FOURMOBILE **£42 10 0**
QQVO3–20a Tx. 2m or 4m models. Less PSU Mod. and xtal 8MHz. Inc. AE relay. Built into diecast box. **£14 10 0**
less P.A. valve. Post 4/6 **£12 10 0**
Complete chassis section only. 6¾ × 4¾in Post 3/6 **£6 15 0**
Kit of parts for 2m or 4m models (3–20a) less chassis **£9 18 0**
QQVO3–10 2m or 4m Tx. inc AE relay. Post 3/6. **£8 15 0**
less crystal PSU and mod.
As above but not aligned or tested. As June Rad. Comm. Post 3/6 **£4 18 6**
Kit of parts for 3–10. less chassis PSU mod. and crystal. Inc. AE relay. Post 3/6. **£5 3 0**

CONVERTERS

MARK 2. 2 metre. FET mixer, improved noise figure and sensitivity. GMO378–GMO378–GMO378–2N3819 or equiv. Matching 28–30MHz IF coil. Printed circuit. 8–14 vdc. Neg or Pos earth. Complete panel ready aligned. Less crystal ex stock **£7 17 6**
Crystal 38.6667 HC6U **£1 10 0**
Built into diecast box 4¾ × 6¾ × 2in finished as mark 1 model. IF28–30 only. Inc. xtal. Post 4/6 ex stock **£11 18 6**
MARK 1. 2m similar to above but with diode mixer. IF's around 25·5–27·5 26–28 or 29–31MHz. IF can be as low as 9–11MHz when xtals are available. Panel only less xtal. Working and aligned. **£5 5 0**
Complete, built into diecast box. Inc xtal. Post 4/6 **£8 17 6**
With 28–30 MHz IF. **£10 7 6**

GAREX 70CM CONVERTER

2N708–2N708–2N3478–GMO290–GMO290. Post 2/6 **£14 17 6**
Size 4½ × 3½ × 2in. diecast box FF 28–30 MHz.

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For crystals from 2–20MHz. Band edge marker, etc. Output up to 70cm. Post 2/6 **£3 10 0**
PHASE MOD. EXCITER UNIT. Fully transistor. 4½ × 2½ × 1in for 2m TX's 8MHz xtal. 24MHz output. Post 2/6. **£8 12 6**

MOBILE PSU KITS

With toroidal transformers. Circuit and instructions.

265v at 150mA bridge rec,	1	Post 4/6	**£4 0 0**
inc. chassis 6 × 4 × 2½in	2	Post 4/6	**£4 7 6**
360v at 150mA bridge rec.	3	Post 4/6	**£5 2 6**
390v at 200mA V. doubler	4	Post 6/6	**£4 12 0**
400v at 200mA plus	5		**N.F.**
250v at 150mA V. doubler		Post 6/6	**£6 18 0**

Toroidal transformers only. 1. P 2/6, 25/-; 3. P 3/6, 35/-; 4. P. 4/6, 50/-; 5. P 4/6, 58/6 Inc. circ.
800v @ 125ma v.db. 4/6 **£6 18 0**

READYBUILT MOBILE PSU

265v at 150mA chassis section. Post 3/6. **£4 5 0**
265v at 150mA built completely into diecast box. 4¾ × 6¾ × 2in baked on hammer finish. Post 4/6. **£8 17 6**
360v at 180mA chassis section. Post 4/6. **£5 10 0**
400v at 200mA plus 250 at 150mA built on to alum. chassis 8 × 5 × 2½in. Post 6/6. **£12 15 0**
Export heavy duty model built on to diecast box. Durable finish. All N or P. 12vdc. Post 6/6. **£18 10 0**

READY BUILT MODULATORS. Fully Transistor.

pp OC35 to QQVO3–10/2–6. Built on to diecast box. Grey hard finish. Inc. relay sw. l/h or speaker output. Post 4/6. **£9 18 6**
pp OC35/NKT404 to QQVO3–20a with full 15 watts output. Limiter cct and l/h winding. Grey chassis. Post 6/6. **£12 15 0**
Heavy duty export version. Post 6/6 **£18 10 0**
Neg or Pos earth. Inc. P.T.T. Microphones.

TRANSISTOR MODULATOR KITS.

310 model pp OC35/NKT404 to QQVO3–10/2–6. 1. ready built P.C. board. Relay sw. audio output. Post 4/6. **£4 18 6**
Standard model pp OC35/NKT404 to QQVO3–20a. 1. Small R.B. P.C. board. Post 6/6. **£4 15 0**
DE LUXE OC35/NKT404 to QQVO3–20a. 15 watts 2 RB P.C. boards. l/h winding. Post 6/6. **£7 17 6**
All parts except chassis supplied. Inc. P.T.T. mike heat sinks ins. and cct. 12vdc neg or pos earth.

MODULATION TRANSFORMERS.

pp EL84 or larger to QQVO3–20a 20–25W 3¾ × 3½ × 3in. Tot enc. W 3½lbs. Post 4/6. **£1 10 0**
Set of three for OC35/NKT404 to QQVO3–10. Post 4/6. **£1 0 0**
inc cct and relay for audio output.
pp OC35/NKT404 to QQVO3–20a. Post 4/6. **£1 10 0**
CAMERA BOARDS. Completely assembled video strip **£3 12 6**
2 MHz CRYSTAL MARKER UNITS complete with crystal. Post 2/6 **£4 18 6**
LEDEX SWITCHES 6–12v 6 pos 1¼in sq. fitt. Post 1/9. **18 6**
LEDEX SWITCHES 12v 6 pos 1in sq. fitt. plus two other wafers. Post 1/9. **£1 8 6**
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We herewith list a selection of quality used equipment in stock at the time of going to press.

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BAND ANALYSIS

1·8MHz: OK, GI. 3·5MHz: PA0, DK, F, GM, ON, GW. 7MHz not used. 14MHz: I, YU, ZD8, PY, UA0, 9H, W, OK, LA, VE, OH, UK3, AX, OE, CT, SP, OJ0, VO1, UP2, UA9, HK, SM. 21MHz: W, VE, YV, CR, JA, HI, 9H, AX, PZ, PY, CX, 9Y, YU, HC, VO2, ZM1, ZS, HA, 8P6, 4Z4, VO1, HB9, LZ, JX, OK, LU, SV, EL, OH, SM, ZC4, HP1, DJ, 5Z4. 28MHz: LU.

PROFESSIONAL ENGINEER'S REPORT BY

E. H. Chaudri, C.Eng., F.I.E.R.E., Chartered Engnr., G3DCS, Ipswich, Suffolk.

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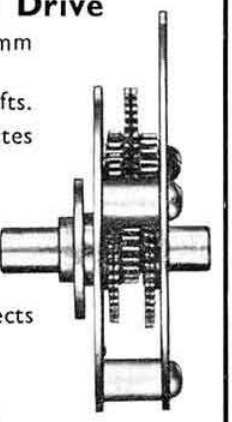

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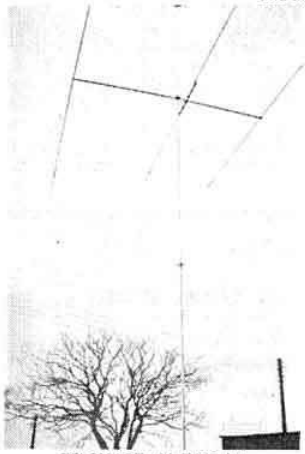

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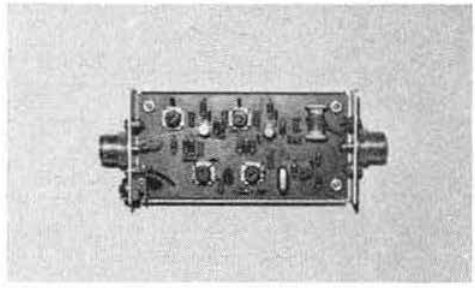

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TRANSMITTERS 6BH6-6BH6-QQVO3/10-QQVO3/20A, PA over 30 watts Input using 400v ht. 5½" × 7" × 5½" high, with aerelay, will require retuning and drilling for xtal holder supplied uses 8MHz type xtal (not supplied) less PSU and modulator, as cut from used chassis and in excellent condition needs slight attention to heater wiring, ready to fit into own case of W.H.Y. with circuit only **£5.0.0.** (less QQVO3/20A), QQVO3/20A **30/-** extra only supplied with Tx.144MHz or 70MHz.

TRANSISTOR INVERTER 12v Input, Output 400v at 150m/a + 180 v for Rx ht. silicon bridge rectification, choke smoothing 7" × 3½" × 5" high, supplied with heavy duty relay, minimum wiring required ready to mount into own case or W.H.Y. with circuit **£4.0.0.** NOTE voltages shown are mobile, static voltages will be approx. 10% lower, pos. or neg. earth.

TRANSISTOR MODULATOR kit 15 watts output to match QQVO3/20A also 15 ohm speaker winding for PA use, with 2 ready ass. P.C. boards into NKT404 driver 2 NKT404s in push pull for 12v supply, pos. or neg. earth less microphone, heat sinks, chassis and hardware, mic. imp. required 2500 ohm., with circuit **£5.0.0.** ex. stock.

THE ABOVE THREE ITEMS £13.0.0. INCLUDING QQVO3/20A.

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FOUNDED 1913
INCORPORATED 1926

PATRON H.R.H. THE PRINCE PHILIP
DUKE OF EDINBURGH, KG

APPLICATION FOR CORPORATE* OR ASSOCIATE* MEMBERSHIP

RADIO SOCIETY OF GREAT BRITAIN,
35 DOUGHTY STREET,
LONDON WC1N 2AE
Tel 01-837 8688
Giro A/C No 533 5256

* I hereby apply for election as a Corporate Member of the Society and enclose a remittance for £2/10/- being the amount of my first annual subscription.

* Being under 21 years of age and not holding a current Amateur Radio Transmitting Licence I hereby apply for election as a Non-Corporate (Associate) Member of the Society and enclose herewith a remittance of £1/5/- being the amount of my first annual subscription.

I, the undersigned, agree that in the event of my election to Membership of the Radio Society of Great Britain, I will be governed by the Memorandum and Articles of Association of the Society and the rules and regulations thereof as they now are or as they may hereafter be altered; and that I will advance the objects of the Society as far as may be in my power; providing that whenever I shall signify in writing to the Society addressed to the Secretary that I am desirous of withdrawing from the Society I shall at the end of one year thereafter after the payment of any arrears which may be due by me at that period to be free from my undertaking to contribute to the assets of the Society in accordance with Clause 8 of the Memorandum of Association of the Society.

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