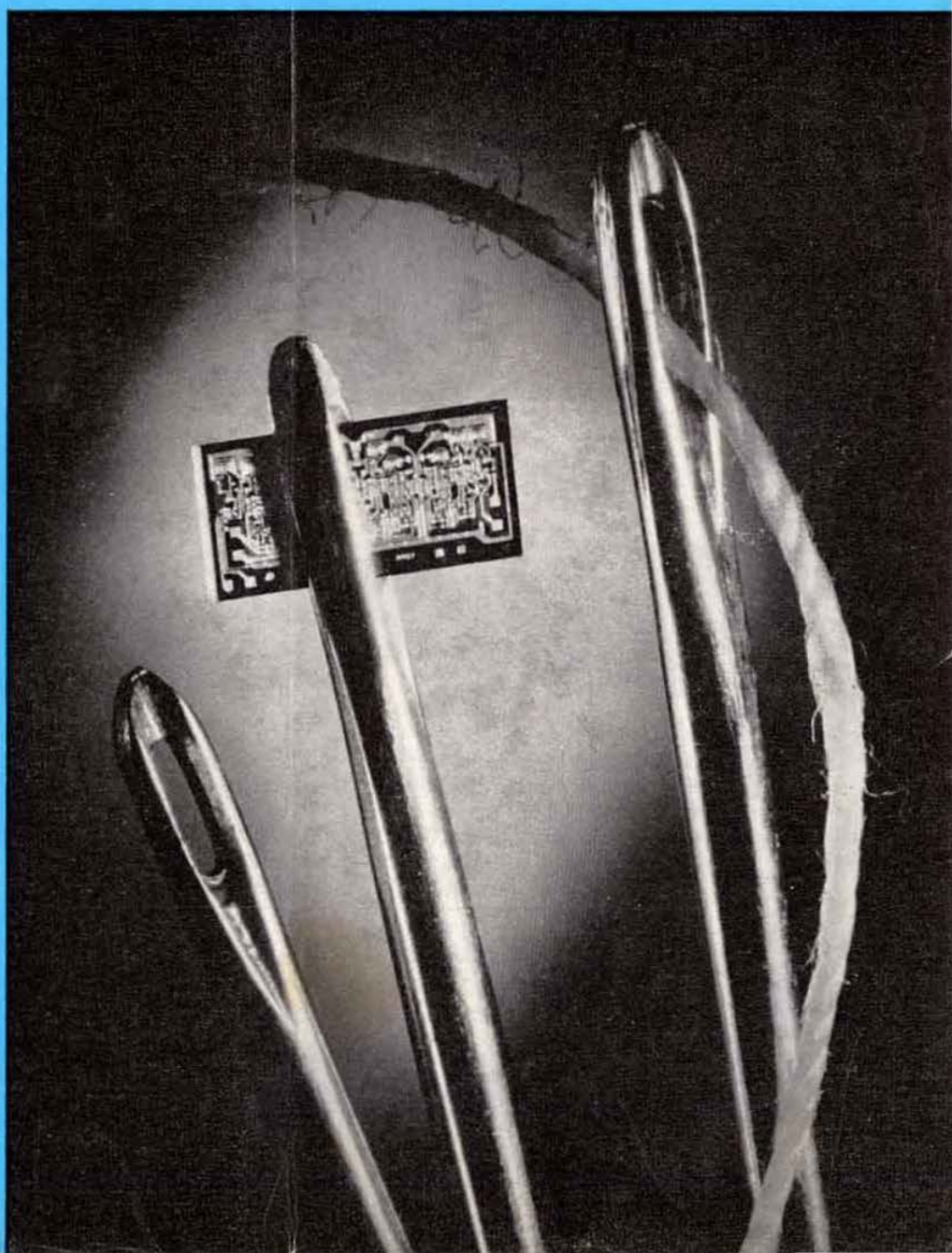
radio communication

June 1970

Journal of the Radio Society of Great Britain



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Volume 46 No 6 Price 4s

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FRONT COVER

The smallness of the silicon chip on which extremely complex circuits are made is illustrated by this photograph of an unencapsulated TTL decade counter going through the eye of a No 5 sewing needle; the circuit contains over 120 components, and the "rope" is ordinary 40 gauge sewing cotton
A Mullard photo

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**

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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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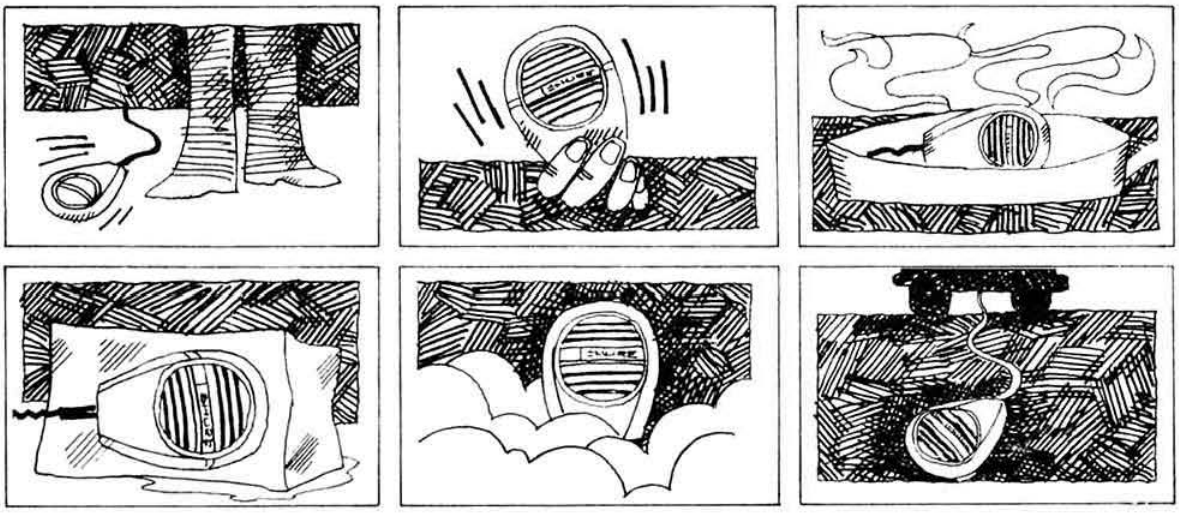

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VHF MANAGER	G. M. C. Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London, SE23.

QTC AMATEUR RADIO NEWS

Honorary treasurer

As a result of a recent illness, Mr Norman Caws, FCA, G3BVG, has found it necessary to resign as honorary treasurer of the RSGB, and this resignation has been reluctantly accepted.

The Council of RSGB has appointed Mr Arthur C. Morris, AACCA, G3SWT, to the position of the Society's honorary treasurer, under Article 28A of the Articles of Association. Further information will appear in the July issue.

Falkirk and district

A meeting, called to re-form the Falkirk and District ARC, or to promote a new club, will take place in the Royal Hotel, Bonnybridge, on Friday 12 June, starting at 7pm. The meeting will be chaired by the RSGB regional representative, Mr N. G. Cox, GM3MUY. A small charge, to cover the cost of the room and tea, will be levied. It is hoped that all who read this notice will bring it to the attention of those who have not, as it is hoped to have a high attendance.

The Axe Vale Amateur Radio Club

This club has recently been formed to cater for enthusiasts in the West Dorset/East Devon area, an area in which licensed amateurs and SWLs are somewhat limited.

Any readers in this area who may be interested in joining are asked to get in touch with the club's hon secretary: Mr J. W. Cross, "Coverdale", Woodmead Road, Lyme Regis, Dorset. Meetings are held on the first Friday of each month, at present in local hotels, but a permanent HQ is anticipated in the near future.

Equipment stolen

GI3JXS has had the following equipment stolen from his shack: KW2000B, No 1248; AC power supply PB1076; SHURE 201 mic; Q multiplier and an swr bridge.

Anyone having knowledge of any of this equipment is asked to contact Mr J. T. McMillan, 5 Edenvale Park, The Green, Dunmurry, Co Antrim; or the local police.

Scottish VHF Convention

The Scottish VHF Convention will be held at the Queen's Hotel, Dundee, on Sunday 11 October, commencing at 2pm. The main programme will be:

(1) "Latest developments at vhf", by Mr G. M. C. Stone, G3FZL, CEng, MIEE, RSGB vhf manager;

(2) "Cascodes, Q and you"—a talk and demonstration on the design of hf transistor amplifier design techniques for receivers and early stages of transmitters, by Mr M. C. Hately, GM3HAT, BSc, MIEE;

(3) "Space flight communications"—a talk on the world-wide network and telecommunication hardware, supplemented by a show of 80 special slides, by Mr A. W. Smith, GM3AEL.

It is hoped to have a short talk on vhf activity in Region 12, and a programme will be laid on for XYLs. There will be the usual additional attractions and a grand raffle. Tickets: Full Convention, including dinner, 35s; dinner only—30s; afternoon session only—7s 6d. Tickets and information from Mr G. C. Somerville, GM3KYI, 73 Balerno Street, Dundee, Angus.

Uhf tvi

With developments in colour television and single-standard receivers it has been found that the techniques used in tracing and curing breakthrough need revision. The Society will be glad to hear of tvi cases where modern television receivers were involved and to know the nature of the cure which was effected. Similarly, if you have knowledge of a particular type of television receiver which was unaffected by breakthrough problems from amateur transmissions we shall be glad to have this information. Please send your comments to the secretary of the TVI Study Group: Mrs K. Priestley, G3XIW, 43 Raymond Road, Langley, Slough, Bucks.

IARC Convention

The annual convention of the International Amateur Radio Club will take place from 16 to 18 September 1970, not October as stated in last month's issue.

Licence figures

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

Class A	13,486
Class B	2,084
Class A/M	2,558
Class B/M	266
Television	180
Model control	17,761

Reciprocal licensing

The address of the French authorities to whom licence applications should be sent is now: Direction des Services Radioelectriques, 5 rue Froidevaux, 75 Paris 14.

Argentine QSL bureau

Information has been circulated by the Federacion Argentine de Radioaficionados (FARA) that this organization is now the official LU QSL bureau. FARA is a private organization. The Radio Club Argentino, which is the IARU society in Argentine, operates the only recognized QSL bureau and its address is Carlos Calvo 1420 24, Buenos Aires.

Holiday visits

At this time of year many members must be planning their holidays, both in this country and abroad. Naturally enough you may consider "visiting the locals" in your holiday town.

May we suggest a note or telephone call in advance of your visit? This action will help to ensure you get the welcome you would hope for—and is really only courteous!

Russian and Czech languages

From time to time there arises the need for translation facilities from or into these two languages. The material is generally in the form of non-technical correspondence. If there is any member who would be prepared to offer assistance would he please write to G2BVN, the secretary of the IARU Region 1, 51 Pettits Lane, Romford, Essex.

"Living with silicon"

Mr P. G. Martin. G3PDM, author of the article "Living with silicon" in the April issue of *Radio Communication*, advises that Farnell Electronic Components should be shown in Table 8 as Plessey distributors.

Affiliated societies

Will secretaries of affiliated societies please advise G2BVN of any alteration to the information which appears in the list in the 1970 edition of the *RSGB Amateur Radio Call Book*.

RSGB Amateur Radio Call Book

Will members please note that until the 1971 edition of the *RSGB Amateur Radio Call Book* is published on 1 October 1970 no further orders can be fulfilled.

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:

Mr P. E. Mogford, 147 Falmouth Gardens, Ilford, Essex, at Barking Magistrates' Court on 17 February 1970. He was fined £25 on each of two charges, plus £10 costs and forfeiture of equipment.

Mr B. Nicholson, 131 Padnell Road, Chadwell Heath, Essex, at Barking Magistrates' Court on 17 February 1970. He was fined £20, plus £15 costs and forfeiture of equipment.

Mr J. S. Gregory, 207 Stapleford Road, Trowell, Nottingham, at Shire Hall, Nottingham, on 17 March 1970, He was fined £3 3s on each of two charges, plus £3 3s costs and forfeiture of equipment.

Mr M. P. Rogers, 55 Monswell Road, Mackworth Estate, Derby, at Weston-super-Mare Magistrates' Court on 10 April 1970. He was fined £10 on each of three charges, plus £5 costs.

Mr H. A. Kemp, Lower Cliff Farm, Strines, Stockport, at Weston-super-Mare Magistrates' Court on 10 April 1970. He was fined £10, plus £5 costs.

Mr A. Mockford, 92 East Street, Littlehampton, Sussex, at Weston-super-Mare Magistrates' Court on 10 April 1970. He was fined £10 on each of two charges, plus £5 costs.

Mr M. Evans, 9 Clifford Court, Playford Road, London N4, at North London Magistrates' Court on 4 February 1970. He was fined £10 with £15 15s costs on each of two charges (£51 10s), plus forfeiture of equipment.

Mr A. Quilliam, 6 Morley Road, Wallasey, at Wallasey Magistrates' Court on 14 January 1970. He was fined £10, plus £10 10s costs and forfeiture of equipment.

Mr H. C. H. Brigden, 2 Selsdon Road, Croydon, Surrey, at Croydon Magistrates' Court on 9 January 1970. He was fined £20 on each of two charges with £15 costs, plus £5 5s advocate fees and forfeiture of equipment.

Mr R. Hawkes, 538 Southend Road, Hornchurch, Essex, at Romford Magistrates' Court on 6 January 1970. He was fined £15, plus £5 5s costs and forfeiture of equipment.

Mr K. G. Williamson, 5 Farm Way, Hornchurch, Essex, at Romford Magistrates' Court on 6 January 1970. He was fined £15, plus £5 5s costs and forfeiture of equipment.

Mr J. Gray, 57 Caravan Site, Weldon, Northants, at Corby Magistrates' Court on 15 January 1970. He was given a conditional discharge, plus £5 5s costs.

Mr B. Hines, 91E Mandale Road, West Howe, Bournemouth, at Bournemouth Magistrates' Court on 6 March 1970. He was fined £15 on each of two charges, plus £15 costs.

Mr N. Latko, 100K Turburry Park Avenue, West Howe, Bournemouth, at Bournemouth Magistrates' Court on 6 March 1970. He was fined £15 on each of two charges, plus £15 costs.

Mr B. D. Robinson, 16 Southwood Road, Brentwood, Essex, at Brentwood Magistrates' Court on 1 April 1970. He was fined £20, plus £5 costs and forfeiture of equipment.

Mr P. H. Musgrave, 4 Apsley Villas, Kingsdown, Parade, Bristol, at Bristol Magistrates' Court on 17 March 1970. He was fined £75 on each of two charges, plus £10 costs and forfeiture of equipment.

Mr C. J. Bowskill, 53 North Side, London SW18, at South-West London Court on 24 March 1970, He was fined £25 on each of two charges, plus £10 10s costs and forfeiture of equipment.

Mr C. J. Woods, 23 Hartswood Road, London W12, at West London Court on 12 March 1970. He was fined £25, plus £10 10s costs and forfeiture of equipment.

Mr L. E. Curtis, The Caravan, Burnside House, Dalton le Dale, Co Durham, at Houghton-le-Spring Magistrates' Court on 23 April 1970. He was fined £15 on each of two charges, plus £5 costs and forfeiture of equipment.

Mr R. Butler, 1 Hill Brow, Silksworth, Co Durham, at Gillbridge Avenue Magistrates' Court on 22 April 1970. He was fined £25, plus £5 costs.

RSGB Region 4 ORM

To be held at the Regency Rooms, Wharncliffe Road, Ilkeston, Derbyshire, on **20 June 1970** commencing at 2.30pm.

The RSGB Council will be represented by the President, Dr J. A. Saxton; Mr R. F. Stevens, Mr J. R. Petty and Mr F. C. Ward.

Talk-in stations will operate on 160 and 2m, and there will be trade stands, a bring and buy stall, and extra special raffle prizes. Refreshments available all day.

Derby and District Amateur Radio Society
will be holding
A DINNER AND DANCE
in honour of visiting Council members, commencing at 8pm.

Tickets at 25s each are limited and applications with remittance should be addressed to: T. Darn, G3FGY, "Sandham Lodge," 1 Sandham Lane, Ripley, Derbyshire.

RSGB Show, 1970

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

It will take place from **19 to 22 August** at the same venue as last year: The Royal Horticultural Society's New Hall, Greycoat Street, Westminster, London SW1. For the first time the whole of the hall will be devoted to the exhibition.

Major-General J. E. Anderson, CBE, Ministry of Defence (Signals) will open the exhibition at 12 noon on 19 August.

The exhibition will be open daily from 10 am to 9 pm. Admission 4s.

A keyer for GB3VHF

by G. E. GOODWIN, G3MNQ*

ON 2 February, the electro-mechanical keying device at GB3VHF was replaced by an electronic unit which has only one moving part—the keying relay. A similar unit has been constructed for the new beacon station in Co Durham, GB3DM.

Introduction

The keyer has eight separate sections which together form the complete unit. These are the timer, pulse generator, counter chain, decoders, diode matrix, resetting circuits, relay drive and power supplies. A block diagram of the system is shown in Fig 1.

The timer controls the output of the pulse generator so that the required number of pulses are produced once a minute. These pulses are fed to the counters, the output of which, after decoding, consists of 100 separate lines. One of these lines is positive at any given time while the others remain at zero.

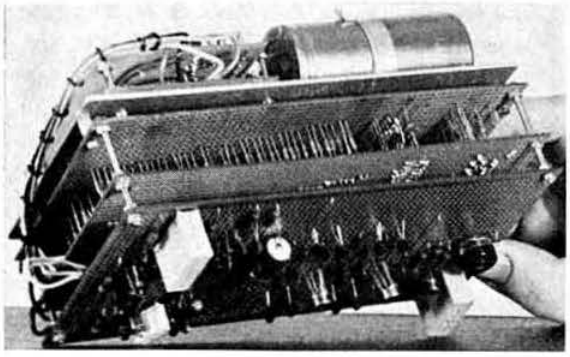
Diodes are arranged in the matrix in the form of AND gates, each gate representing one dot length in the final output signal. Where a dash is required three adjacent gates are connected, while for spaces gates are omitted. Thus, for the letter G gates 1, 2 and 3 are included, 4 is omitted, 5, 6 and 7 are included, 8 is omitted, 9 is included, and 10, 11 12 are omitted for the space between the G and B. This pattern is repeated so that GB3VHF is produced and three spaces left after the F. A signal is then generated by the matrix which triggers the reset generator, and this resets the timer and counters. This starts the timing cycle again, and after a minute the pulse generator is turned on and the code produced once more, the cycle being repeated continuously.

The composite output of the matrix is amplified and squared by a Schmitt trigger in the relay drive circuit and, after further amplification, drives the reed relay, the contacts of which key the transmitter in the fsk mode.

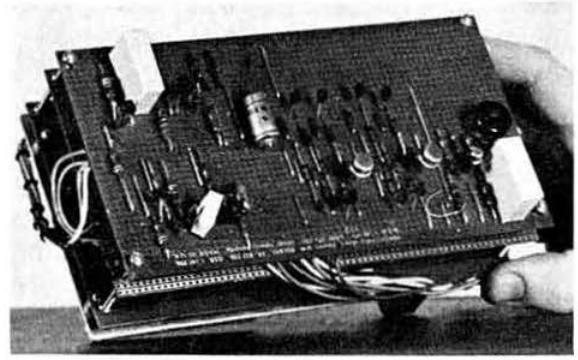
For the purpose of monitoring the operation of the keyer a signal is taken from the relay drive circuit which switches a 2kHz multivibrator, which via an emitter follower stage drives a 25Ω loudspeaker. This can be switched out when not required.

The power supplies, with the exception of the 15V rail, are stabilized to guard against mains variations. Operation continues normally between the limits of 180-260V.

The 9V supply is derived from the 15V line by means of a series stabilizer and is used for nearly all the transistor circuits, while the 3·5V line is obtained from the 9V line, this



Close-up of the keyer before fitting into its metal box. From top to bottom, first the aluminium plate carrying the main smoothing capacitor (and, not shown, the mains transformer and series stabilizing transistor) and, to its left, the PCBs containing the power supplies, audio and relay circuits. Below these are the two Veroboards with the matrix and decoder diodes and, between them, decoder emitter followers. The bottom board has the timer, reset, pulse generator and counter ICs on it



View of the bottom board showing, upper left, the timer; lower left, the reset generator; lower centre, the ic decoders with amplifiers; and extreme right, the pulse generator

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

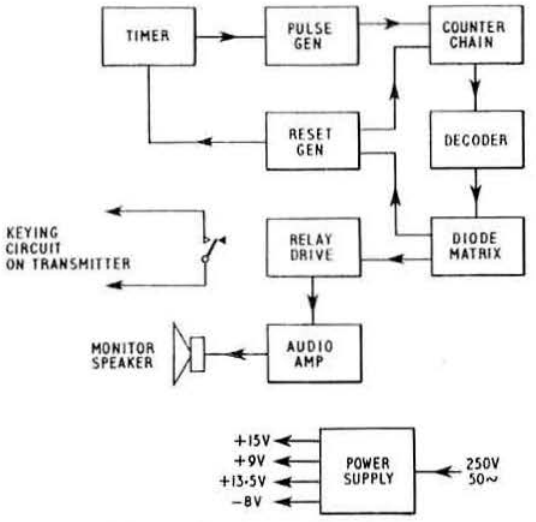


Fig 1. Block diagram of the keyer

supplying the ic counters and the remaining transistor circuits. A separate winding on the mains transformer is half-wave rectified, smoothed and stabilized to produce a —8V line for use in the decoder circuits.

Timer

This has the function of allowing the pulse generator to produce a specific number of pulses once every minute. FETs control the timing function and bipolar transistors switch the pulse generator on and off.

In Fig 2, C1 charges up via R1 taking the drain of TR1 and the gate of TR2 with it. TR1 is reverse biased by the reset voltage and the gate leakage of TR2 is extremely low, thus the time constant of C1 and R1 will be substantially correct.

TR3 and TR4 form a Schmitt trigger which is inverted across the supply lines using p-n-p transistors. While C1 is charging, TR2 source will be following it, TR3 will be forward biased and its collector will be very near to its emitter voltage. This will cut off TR4 and its collector will

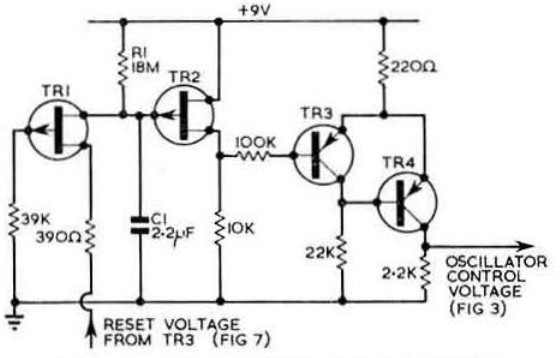


Fig 2. Timer. TR1, TR2 2N3819. TR3, TR4 ZTX501

not be drawing current, therefore the oscillator control voltage line will be at zero volts.

When the base current of TR3 approaches zero due to C1 charging, there will come a time when TR3 ceases to conduct and TR4 starts, then the oscillator control voltage will become positive. This will start the oscillator which, after the callsign has been sent via other circuits, will make the reset voltage line to TR1 zero. TR1 will then conduct heavily and C1 will be discharged, starting the timing cycle again.

Pulse generator

This uses a uni-junction transistor and bipolar amplifier as shown in Fig 3. While the timer is supplying zero volts to the OCV line the circuit is inoperative, but upon this line becoming positive C2 begins to charge via R2. When the base-emitter voltage exceeds the critical voltage C2 will discharge via the uni-junction and TR2 will produce a negative-going pulse which drives the counters.

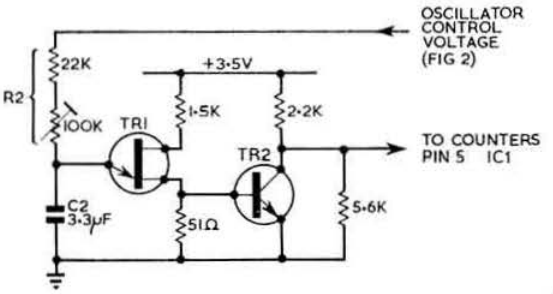


Fig 3. Pulse generator. TR1 2N2646. TR2 ZTX301

Counters

These are integrated circuits specifically designed to divide by 10 and produce a coded output according to the number of input pulses. Two such ICs are used in the keyer so that up to 100 input pulses can be accepted without ambiguity.

Fig 4 shows the circuit for these counters with the bipolar circuits required to produce a complete binary code which is then decoded into decimal code. The required code could be produced by using one bipolar stage coupled to each ic output but the signal from the ICs is only about 2V amplitude which is insufficient to operate the following circuits. Hence, two amplifiers are used to produce equal signals of 8V amplitude.

Decoders

This is a standard diode configuration which decodes the 1248 code from the counters into 10-line decimal code. Each line has an emitter follower so that impedance is low enough to drive the diode matrix. The emitters of the emitter followers are returned to the −8V line so that the output impedance is kept low at all times even when the output is at zero volts. Fig 5 shows the circuit.

At this point there are 20 lines from the decoder; 10 representing "units", ie numbers 0–9; and 10 representing "tens", ie numbers 0–90. Thus it is possible by selection of the correct lines to obtain any number between 0 and 99 This function is performed by the diode matrix.

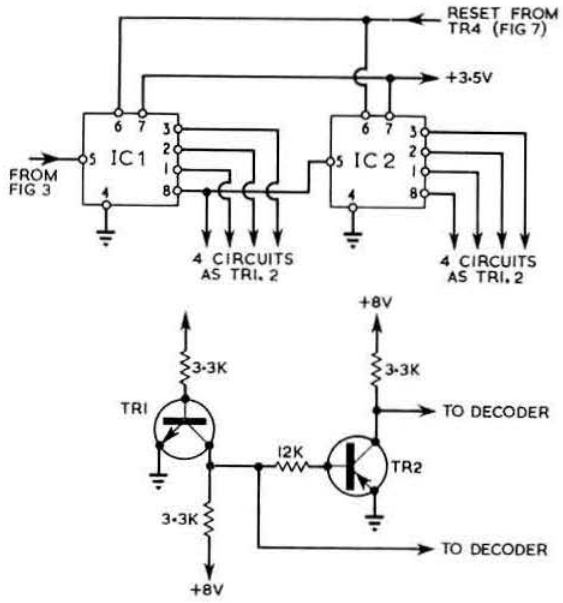


Fig 4. Counters. IC1, IC2 CuL958. TR1, TR2 ZTX301. (16 required)

Diode matrix

This consists of 38 AND gates each made up of three diodes and one resistor. One of these is shown in Fig 6.

The voltage at point X will be zero when either or both the inputs are zero, but when both inputs are positive point X will be positive also. This occurs once only during the production of each callsign, thus each AND gate supplies a unique part of the total. The third diode in each gate isolates it from the common output line. The voltage on this line rises from zero during the timing period and spaces between characters to about 2V during dots and dashes.

These 38 gates are required to make up the characters GB3VHF, and this requires 71 pulses from the generator. Pulses 72, 73 and 74 are spaces after the letter F and pulse 75 operates another AND gate which is the same as the others

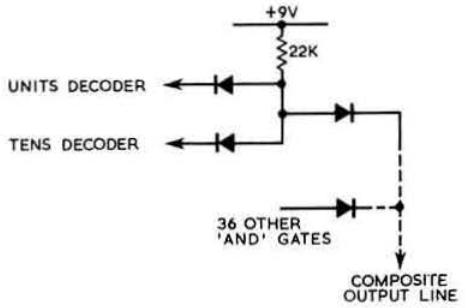


Fig 6. AND gates. (38 required.) All diodes are silicon

except that the output is not connected to the common output line. Instead, it is used to trigger a monostable used for resetting the timer and counters.

Reset

TR1 and TR2 in Fig 7 form the monostable which produces a pulse of about 20ms duration. The output of emitter follower TR3 is normally +8V which keeps TR1 in Fig 1 cut off except when a pulse is generated when the fet is made to conduct for long enough to discharge C1.

TR4 output is normally at zero volts which keeps the counters in a state ready to count pulses from the pulse generator. On reset this output goes to +3·5V and the counters are put into their zero state.

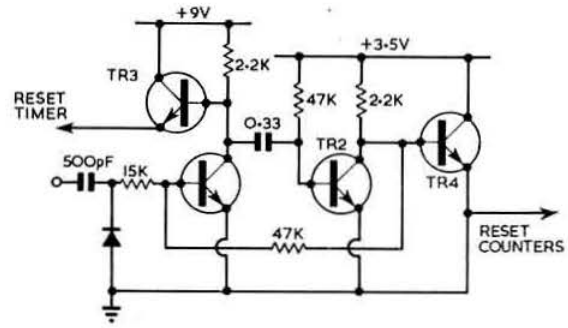


Fig 7. Reset monostable. TR1, TR2, TR3, TR4, ZTX301 (Note: A 2·2kΩ resistor should be inserted between TR4 emitter and earth. The unlisted transistor is TR1).

Relay drive

The 2V signal from the output line of the diode matrix is amplified and squared by a Schmitt trigger TR1 and TR2 in Fig 8.

Emitter follower TR3 makes the impedance low enough to drive TR4 and the audio amplifier circuits. The reed relay driven by TR4 has a diode across its coil to protect the transistor from back emf when TR4 cuts off, and the leads to the normally open contacts are screened to prevent rf, picked up on the leads connecting the keyer to the transmitter, being radiated inside the unit.

Audio amplifier

To provide an audible indication of the correct operation of the keyer, an audio stage driving a small loudspeaker is included. This produces a 2kHz tone when keying contacts close.

In Fig 9 TR1 and TR2 form a multivibrator which generates a 2kHz tone, but the base resistor of TR1, instead of being returned to the supply rail, is taken to the emitter follower TR3 in Fig 8. This point is nearly zero volts except when the code is being produced, at which time it is positive and this makes the multivibrator operate. The collector of TR2 contains two diodes in addition to the normal load resistor. These provide a dc drop of about 1·4V which when applied to the bases of TR3 and TR4 make them conduct a few milliamps thus preventing cross-over distortion. The output impedance of TR3 and TR4 is low and this point drives a 25Ω loudspeaker via an isolating capacitor, limiting resistor and switch.

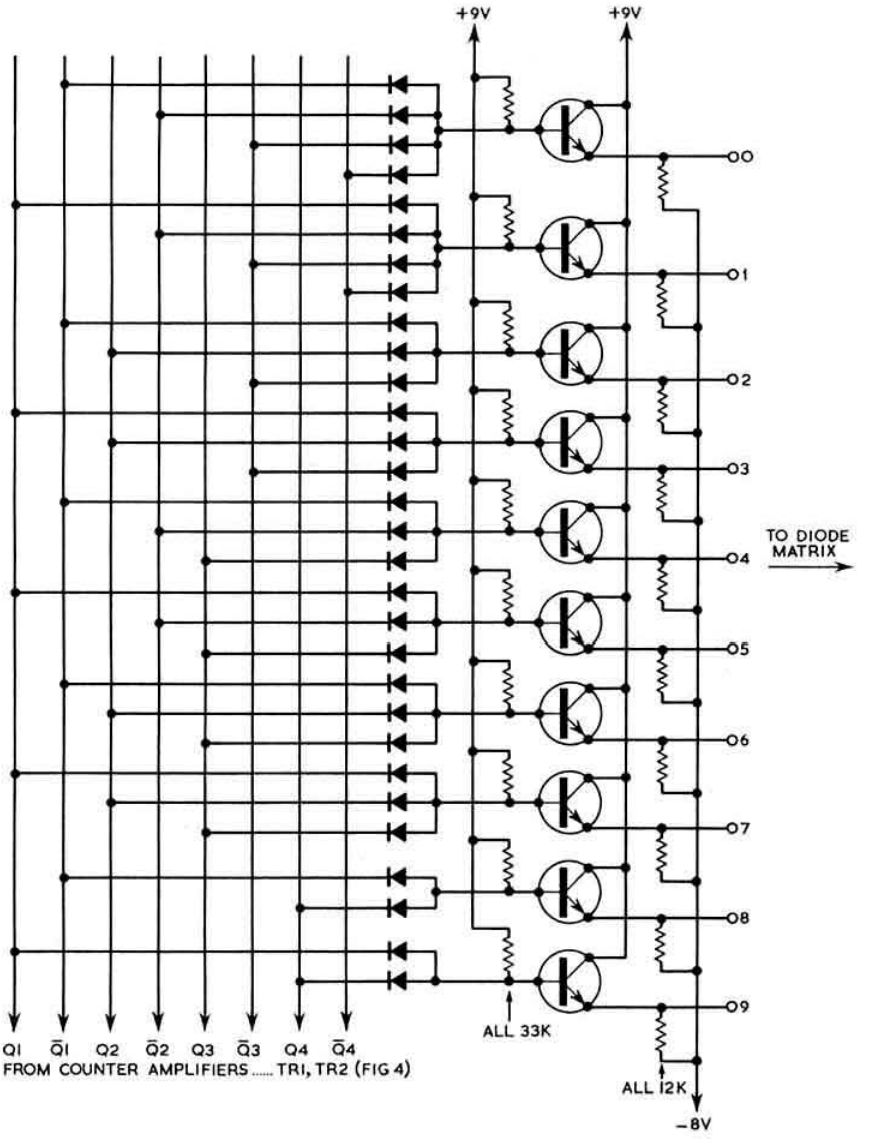


Fig 5. Decoders (two required). All diodes are silicon. All transistors are ZTX301. Interconnections between this and Fig 4 are as follows:

TR1 base to:
IC1 pin 3 or IC2 pin 3
IC1 pin 2 or IC2 pin 2
IC1 pin 1 or IC2 pin 1
IC1 pin 8 or IC2 pin 8

TR1 collector
Q1
Q2
Q3
Q4

TR2 collector
$\bar{Q}1$
$\bar{Q}2$
$\bar{Q}3$
$\bar{Q}4$

Power supplies

These provide four different voltages to suit the various components used in the keyer. The mains transformer has two separate 12V windings. One is bridge rectified and smoothed to produce a nominal 15V supply to operate the relay which is relatively insensitive to voltage changes. It also provides a suitable supply for the 9V stabilizer, see Fig 10.

The 4·7V zener diode acts as the voltage reference, TR3 is the difference amplifier, TR2 an emitter follower and TR1 the series stabilizer. The output voltage remains constant down to 180V ac input. The 9V supplies most of the transistor circuits, the total load being about 120mA. This includes 50mA for the ICs, the supply for these being provided by a zener diode which determines the voltage, and an emitter follower producing 3·5V approximately.

TR1 in Fig 10 has to dissipate about 750mW and is therefore mounted on a substantial heatsink to provide cooling. TR4 dissipates about 275mW and is a component which can do this in free air without a heatsink.

The other 12V winding on the mains transformer is half-wave rectified, smoothed and then stabilized by an 8V zener diode to provide −8V for the emitter follower in the decoders The current supplied is about 20mA.

Environmental conditions

A unit which is intended to provide continuous service must work at extremes of temperature, since in this case it has to operate in a hut where the inside temperature follows that

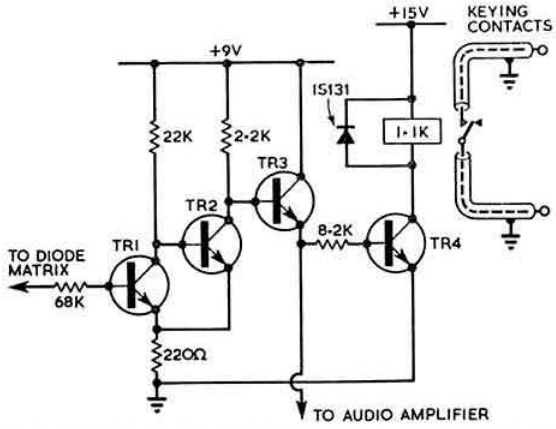


Fig 8. Relay drive. TR1, TR2, TR3, TR4 ZTX301. Reed relay 1·1kΩ coil. Single change-over contacts

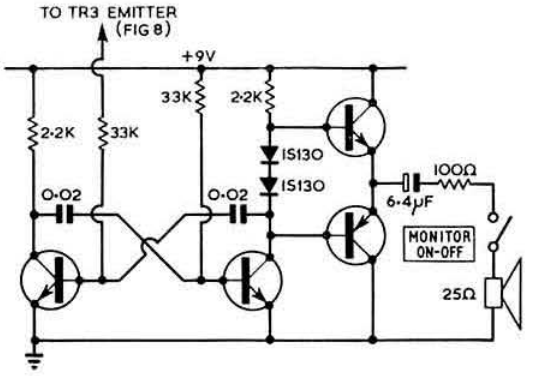


Fig 9. Audio tone generator. TR1, TR2, TR3 ZTX301. TR4 ZTX501

outside. The ICs have a working range of 0–75°C, while most of the transistors have a range of −55 to +125°C. The only limitation of these which may be exceeded is the 0°C of the ICs, when the temperature may fall to −10°C for a few hours. Summer temperatures could rise to the region of 40°C in an enclosed space. With these thoughts in mind the unit was subjected to a cycle of −10 to +50°C for several days. Satisfactory operation was obtained throughout.

Construction

The mains transformer, bridge rectifier, 3000μF smoothing capacitor and the series stabilizer are mounted on a sheet of aluminium which acts as a heat dissipating device for the components which have a temperature rise.

All the diodes in the decoders and matrix are mounted between two pieces of Veroboard and these also carry the pulse generator, timer, reset monostable and decoder emitter followers.

Specially etched circuit boards were made for the power supplies, relay drive and audio amplifier, the last two being on the same board.

A metal box, 9in by 5in by 5in contains all the boards, and controls are mounted on the front panel which also carries the loudspeaker. The general appearance of the unit can be seen in the photograph. Controls are kept to an absolute minimum, being confined to mains on/off switch, fuses and indicator, monitor on/off and insulated terminals to which the leads from the transmitter keyer are connected.

Other uses

The general principles employed in this keyer can be put to other uses and CQ generators and meteor scatter data generators have been successfully constructed. These are considerably more complicated, containing up to 500 diodes in the matrix as well as involved control circuits.

A simple callsign generator which could be used for transmitter testing would be identical with the circuits shown except that the timer is omitted and the OCV line taken direct to +9V. The pulse generator will then run without interruption and, with the required code put in the diode matrix, continuous repetition of it will result.

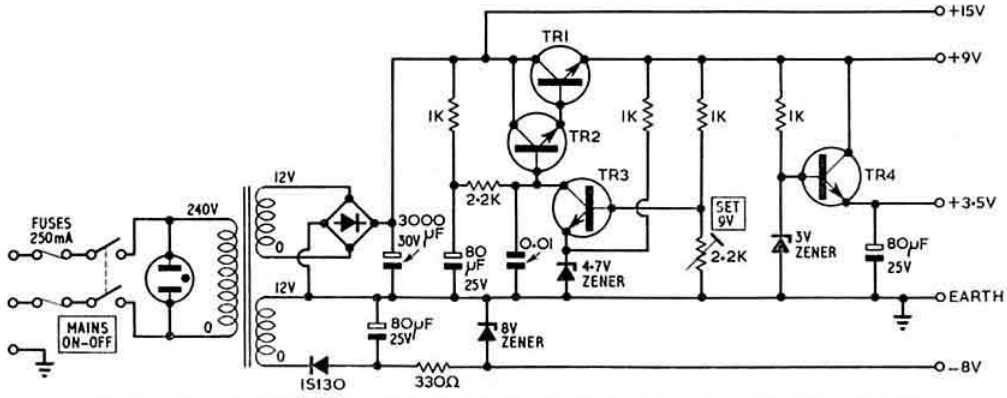


Fig 10. Power supplies. TR1 2N4921 TR2, TR3 ZTX301 TR4 BFY50. Bridge rectifier 1B05J05

Decibels down the drain

by H. S. CHADWICK, G8ON*

AS some readers will know, the writer has a "thing" about swr bridges. This relates not only to the false accuracy so often ascribed to them, but to the faith placed in their readings by our more optimistic brethren. Take the meter movement alone—and take one made by one of our leading meter manufacturers—and we find that its accuracy is ±2 per cent, meaning that there is an ambiguity of four parts in 100, or $\frac{1}{25}$th part of the scale. This alone prevents us reading to better than the nearest quarter of a unit—for all that we hear of people reading off to a second decimal point. Further, the same reputable manufacturer warns that the accuracy in the lower 10 per cent of the scale may be rather less, and there is, of course, a limit to the tiny current needed to produce any deflection whatever.

For two reasons the writer prefers a meter which has the "one-to-one" mark at the zero-current end of the scale. First, because if we are so well blessed that we are reading a very low current, the actual swr is very much less important —the "improvement" obtained by a 1 : 1 ratio as compared with a 1 : 2 ratio is not really worth bothering about; and second, with a scale reading high swr at the zero-current end, forgetting to change the "forward-reverse" switch may result in our trying to pump more and more power into a high swr line. This is more profitable to the manufacturer than to the amateur.

The errors inherent in the meter will be residual even after diodes, resistors and other bridge components have been perfectly measured and matched; after the dummy load we used to calibrate it has attained perfection; after all the plugs, cable, bridge etc have been proved to have the same characteristic impedance. But even when we have cleared up all these details—if the bridge is of faultless accuracy—the meter is still quite incapable of telling us the truth in many cases.

The bridge samples the outgoing power and compares it with the power which returns; and coaxial cable has a certain small amount of attenuation. While this may be disregarded at low frequencies or at short cable lengths, it is clear that for long lengths and high frequencies the return power has suffered two-way attenuation whereas the outgoing power has not; therefore the return power will appear as a smaller proportion than it would have been had the line been short. To be perfectly accurate, even our wonder-bridge would have had to be connected to the load by a very short length of feeder; or its reading of the swr will show false optimism. The effect becomes noticeable when long cables are in use at high frequencies.

It is clear that we can "cure" a bad swr on a line either by using a very much longer cable, or a cable with a very much higher attenuation. The unfortunate thing is, of course, that we have cured nothing. We have simply permitted our swr meter to divert from the truth; and in general we must expect that the swr it reads is not only optimistic, but also that the higher the swr it reads, the more optimistic it is. In most cases as the swr increases the loss in the cable will become even greater than that which the cable manufacturer tells us; because his attenuation, usually in dB/100ft at a certain frequency (often 100MHz), is correct only for a line which is correctly terminated, ie when the swr is already one-to-one. He is not able to tell us the loss on a mismatched line unless the nature of the mismatch can be quoted, but it is generally higher due to heating and radiation losses. So that on a long line length to mismatch the losses can be greater than the bridge would tell us.

Fortunately there is a very simple way of reducing the bridge error due to this attenuation. And it is quite easy to kill more than one bird with our stone. The author's method is to use a fairly sensitive meter for the bridge, and to use its *half*-scale deflection point instead of the fsd as the infinity

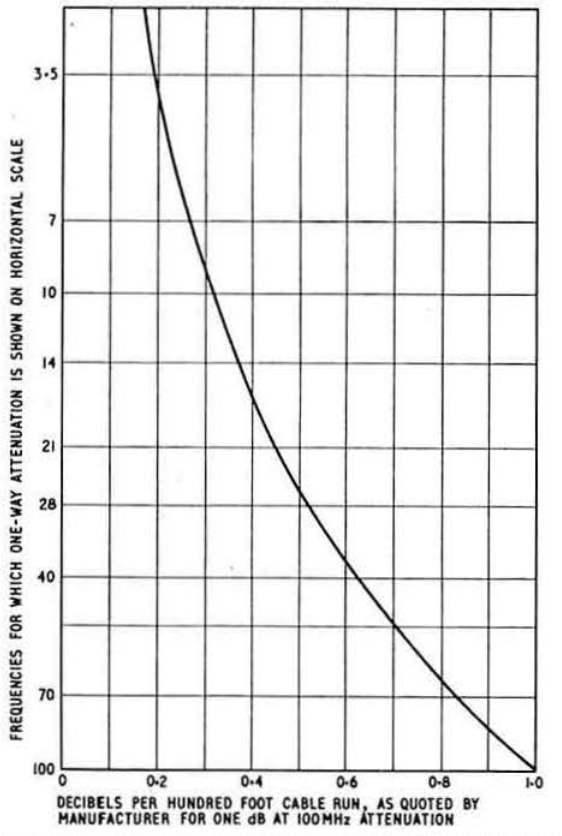


Fig 1. Rationalized graph showing relative attenuation factors at maker's specified frequency and at amateur band frequencies (see Appendix)

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mark of the swr scale. This will probably mean that a larger value of potentiometer resistance is required for the sensitivity control of the bridge. The left-hand portion of the meter scale is calibrated in the customary way as an swr meter, and for the reasons set out at the beginning we shall lose little or nothing from the cramping of the scale. There is no point in trying to read off with an accuracy which the instrument does not possess to begin with.

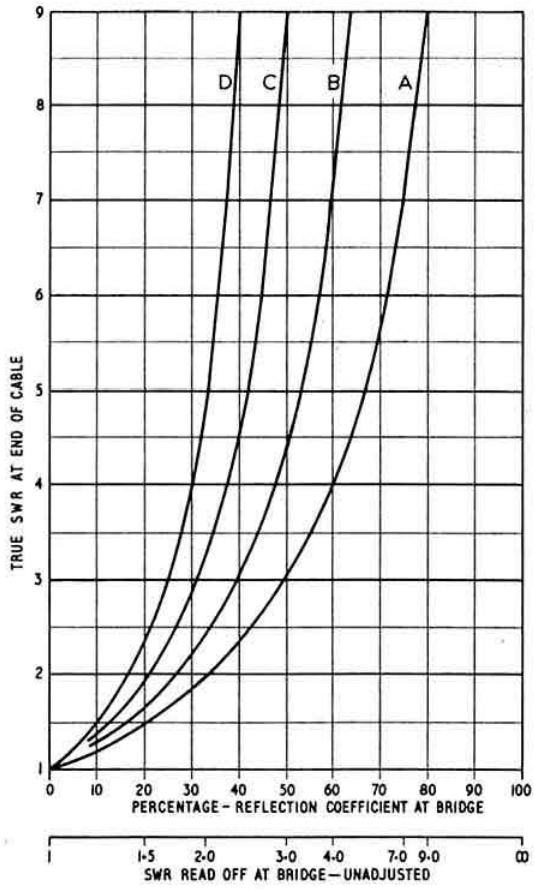

Fig 2. Comparison between "read off" values without adjustment, and true values for lines having 2dB (curve B) 4dB (curve C) and 6dB (curve D) of two-way attenuation

It will be seen that if fsd is double the current of the infinity marking, then we could adjust for a line loss of 6dB by putting out a power which produced fsd in the forward direction, and the line would reduce the return power to the point where our reverse current will make the meter read very much closer to the true swr *at the feed point of the aerial*; and the lower it reads, the more accurate the reading. The adjustment of our potentiometer has had the same effect as if we had used four times the output power when reading "forward" current—in fact we have made the bridge 6dB more sensitive in order to compensate for the loss.

We have first to work out how much attenuation we will have on our line, and perhaps to do so for several different frequencies. The formula is given in the appendix, but Fig 1 illustrates the increase of attenuation with frequency—if we double the frequency the attenuation increases by the square root of two, or 1·4; tripling the frequency, by the square root of three or 1·7; and so on. If our manufacturer gives us an attenuation figure of 1dB/100ft at 100MHz, then Fig 1 gives us directly the attenuation at any lower frequency, reading from the frequency on the vertical scale, to the curve, and down to the decibel scale below. If the given figure were 0·5dB/100ft our answer would be one half as great, and so on. But it is most important to note that this is the *forward* attenuation for 100ft, and we need the forward-and-back-again attenuation for N × 100ft, There is no need to measure our cable runs with great accuracy unless we are using vhf —even on 28MHz we are not particular to a few feet. The swr meter cannot take all this accuracy, remember!

Fig 2 shows four curves, of which A is the one with which we are operating without our adjustment. Curves B, C and D show what the swr meter would show if it were adjusted for lines of 2, 4 and 6dB, respectively, of *two-way* attenuation. It will be noted that for any given value of reverse current, the swr is much worse than we thought; for instance, if we have 6dB of line attenuation and we see an unadjusted meter reading of 2 : 1 ratio, the real ratio is about 5 : 1 And very likely it is even worse .

The decibel scale on our bridge meter can be calibrated by making each decibel point 1·12 times as great as the point preceding; ie 1dB is 1·12 times the half-scale current, 2dB is 1·12 times the "1dB" current, and so on. The swr scale, of course, is calibrated in the usual manner, as worked out in Table 13.2 of the *Radio Communication Handbook*. The accompanying text explains the procedure adequately.

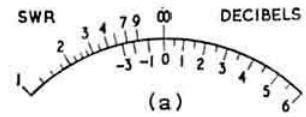

Fig 3(a). The ∞ of the outer scale is the normal forward-setting reference current, for short co-ax lengths. The scale of decibels beyond that point is to permit use of higher forward currents to adjust for decibels lost in two-way attenuation in the line. The "negative" decibels are used to measure the gain of a linear amplifier as described in the text

It will be noted in Fig 3(a) that we also have three points marked as "negative" decibels, and this is the "bird-killing" point referred to earlier. These points, numbered one to three, are respectively 0·9, 0·8 and 0·7 times the zero-decibel or half-scale deflection of the meter. By setting the forward power reading to "—3dB" with only the exciter running, one can assess the gain of the linear amplifier—a 9dB gain should move the needle from that point up to fsd. With a tone or carrier insertion it is possible to check quickly that the linear is behaving more or less correctly—but is of course no substitute for a more thorough tune-up procedure.

Our tune-up procedure sequence is now as follows:

(a) load the exciter "barefoot" into the dummy load, via the swr bridge, adjusting the transmitter for maximum output as shown on the bridge meter—after which the transmitter tuning and loading should not be reset;

(b) substitute the aerial for the dummy load and set for forward power, (i) to the half-scale point if a short coaxial line is in use, or (ii) to the point on the "decibel" scale appropriate to the two-way loss if the coaxial line is not short;

(*c*) reverse the swr bridge to read swr. If satisfactory—eg two to one or less—return bridge to "forward reading" position and reduce the deflection to "—3dB";

(*d*) switch in linear amplifier, when upward swing of the bridge meter on "forward" should be to at least +3dB (indicating a linear amplifier gain of 6dB.) Note, for each band, the best "plus dB" reading which can be attained by careful tune-up. From now on, procedure (*d*) will tell us very simply whether the linear is working approximately correctly, or whether our dc input is being converted mainly into heat and not rf energy;

(*e*) adjust bridge sensitivity as in (*b*) (ii) above, and reverse bridge for swr again. We are now reading a much more realistic ratio.

The point about the linear check is that once we have found what gain is to be expected from our linear amplifier, we can rapidly check in this way whether a valve is going down (or has gone right out!) without a lot of "de-cabineting" to find out. This is particularly so where a number of valves are operated in parallel—eg tv sweep tubes, and without this check it is quite easy to load up three to do the work of four. It can then very soon become two doing the work of three, and so on. The cost (or trouble) of the meter calibration can soon be saved by applying this check. Further, should the linear gain exceed about 9dB one should look into the possibility of self or driven oscillation in the amplifier. This sometimes manifests itself as a healthy—but often hummy—carrier which does not immediately cease with the speech, ie continues until the vox relay falls out.

If we are sure that the length of coaxial line we are setting up is to be a permanent fixture, we can go a stage further. Instead of calibrating the scale in decibels above half-scale, we could calibrate directly in terms of frequency. We calculate for each band the "two-way" loss in decibels—the appendix may be useful here—and mark off the frequency bands at the appropriate attenuation levels. An example is shown in Fig 3 (b). Here the forward setting points are shown for two different lengths of line, and in each case, for three bands. But it is a little confusing to add on a decibel scale to allow for the linear amplifier check in addition to the frequency calibration.

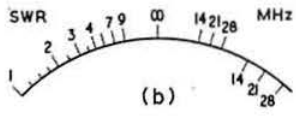

Fig 3(b). Assuming an attenuation of 0.5dB/100ft at 14MHz, this scale shows the forward current-setting points for a co-ax line 400ft long (inside curve calibration) and for a 200ft line (outside curve calibration), scaled for the three highest frequency bands

Ernest Turner Ltd has signified that it would be prepared to supply meters calibrated to suit readers' requirements. It is supposed that a 500μA movement with the scale calibration of Fig 3 (a) would be the most popular model, though the same scale on a 100μA model might suit the vhf man better.

Those who really have got a very low swr will of course see no point in the adjustments recommended. This view would be verified by the convergence of the curves in Fig 2 as they approach the origin. A fairly searching test for this condition is to set up to read swr, switch on the linear amplifier, increase the sensitivity of the bridge meter to *maximum*, and drive up the amplifier to 400W p.e.p. output. If the needle never comes off the left-hand stop, you have either a phoney bridge or "you're a candidate for heaven, my son!"— a test which is the more illuminating if carried out on a frequency in the 28MHz band.

Appendix

The general formula for the two-way attenuation of a coaxial feeder is:

$$N = 2AL\sqrt{\frac{f}{F}}$$

where N = two-way attenuation in dB,
A = loss in dB/100ft. from maker's data,
L = length of cable run in hundreds of feet,
f = frequency at which cable is to be used,
and F = frequency at which maker's data is measured.

In calibrating the meter, care must be used to ensure that current or voltage ratios are used, as distinct from power ratios.

Should the cable manufacturer supply attenuation data at a frequency lower than 100MHz, the graph of Fig 1 may still be used. Suppose that an attenuation of 0·7dB/100ft run at 50MHz were quoted. Substitute 50MHz for 100MHz at the foot of the vertical scale calibration and re-calibrate the vertical scale, the distances between 50, 40, 28, 21 etc being the same as those of the present scale. The graph will now read the attenuations appropriate to 1dB/100ft at 50MHz instead of at 100MHz. We now have to multiply every attenuation figure we read off at the different frequencies by the factor given us by the manufacturer's data, viz by 0·7, giving the attenuation of 100ft at our chosen frequency. The result will of course now need to be multiplied by two, and again by the number of hundreds of feet of cable, to give the two-way loss.

Similarly, the curve may be adapted for the vhf man. The figures of the vertical scale are multiplied by four, to read the attenuations of a cable having 1dB/100ft attenuation at 400MHz. Again, find the point on the vertical scale at which the maker's data is given, bring this point to the foot of the scale, re-marked 400MHz, and again mark off the scale to show the *quadrupled* frequencies at the same vertical distances above the maker's datum frequency. But in all cases care must be taken to multiply by the maker's attenuation (dB/100ft) by two (for the return journey) and by the number of hundred feet involved.

A quarter-wavelength vertical aerial

by J. NEIL HELSBY, G3SAA*

THE quarter-wavelength vertical aerial has several advantages. It is omnidirectional, inconspicuous, has a 50Ω characteristic impedance and should be easy to construct. Its disadvantages are that dx working is difficult if not impossible: it is more likely to cause tvi than a directional aerial; and the author could find no constructional data in any of the reference material available.

This article is therefore aimed at overcoming this last disadvantage. In the five months that it took to "design" the vertical, many mistakes were made which are related in the hope they will help others to avoid them.

Theory

The relationship between frequency and wavelength is given by the formula:

$$f\lambda = 3 \cdot 10^8 \text{ km/sec}$$

where f = frequency in Hz, and λ = wavelength in metres.

From this, a quarter wavelength is given as:

$$\frac{\lambda}{4} = \frac{246}{f} \text{ ft}$$

where $\frac{\lambda}{4}$ = quarter wavelength and f = frequency in MHz.

The mid-phone band for 20m is 14·2MHz, hence at this frequency the length of a quarter-wavelength aerial is 17ft 4in.

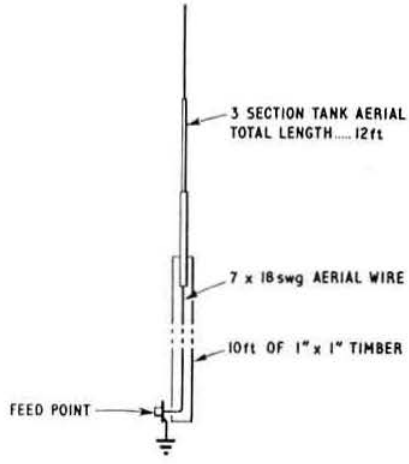

Fig 1.

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Construction

This is not critical, but Fig 1 shows how it was tackled. The aerial height requires adjustment, so the lower wire section enables the length to be readily trimmed. The three sections of the tank aerial were soldered together using a high-powered iron to ensure a permanent and good electrical contact. The aerial wire was similarly soldered to the base of the whip section. The 1in by 1in timber was a cheap bean pole. The wire was loosely stapled to the timber, the tank aerial being tied on with string. While the height is being adjusted, the whole aerial can be easily moved so as to keep the feed socket as near to the ground as possible.

The feed from the transmitter to the aerial was with a 70ft length of 50Ω coaxial cable. Shorter lengths could affect the tuning of the aerial.

First experiment

This was aimed at placing the aerial in the least conspicuous position. This, as shown in Fig 2, was against the house. Initial tuning measurements were made with a home-brew aerial noise bridge [1]. A gdo would possibly lead to the same end result. This showed an impedance at 14MHz of greater than 100Ω (maximum measurable impedance on the bridge) in the shack. Investigating at different frequencies, the 50Ω impedance point appeared to be at about 12MHz. This indicated that the aerial was too long. Eventually, about 6ft was cut off before a 50Ω impedance at 14MHz was obtained.

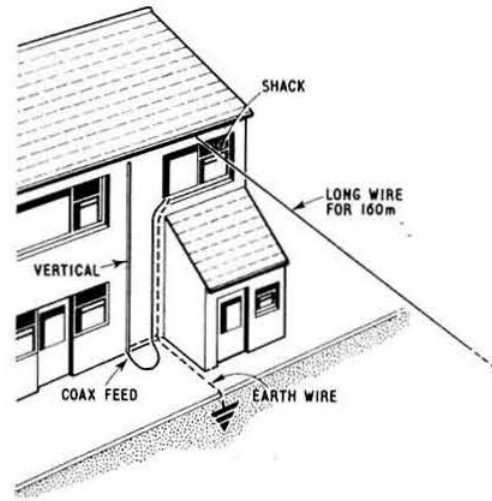

Fig 2.

Now it was known that the aerial would require shortening from the calculated length, but 6ft seemed excessive. However, loading the transmitter into the aerial gave SWRs of better than 1·25 : 1 over the band which seemed all right. Several stations were called and CQs made without success. Surely something was wrong; but was it the aerial or transmitter?

Then the author had one of those sudden inspirations that occasionally occur. What impedance was seen at the base of the aerial? This should of course be 50Ω, the coaxial cable having no effect on the aerial impedance. The aerial noise bridge showed that at the base of the vertical the impedance

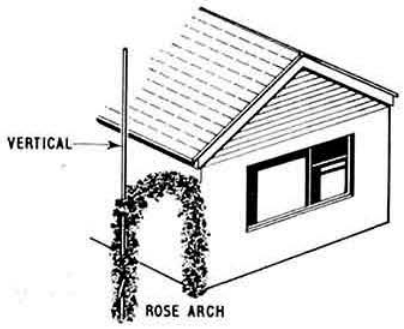

Fig 3.

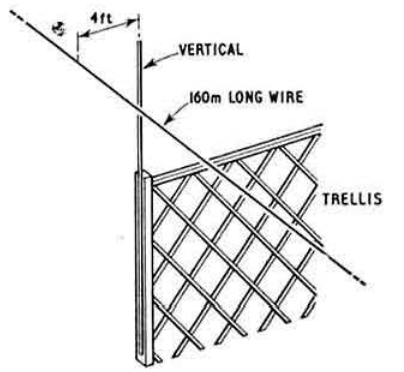

Fig 4.

was greater than 100Ω. Obviously the "earth" wire was acting as part of the aerial, the feed point being effectively offset from ground.

Second experiment

The aerial was moved to the next least conspicuous position where the base of the aerial could be at ground level. This was half-way down the garden about 4ft from a steel-framed garage as shown in Fig 3. The earth was a 2ft rod pushed into the ground. The aerial length was increased to 17ft 4in again and the aerial noise bridge indicated 50Ω impedance at both the base and shack end of the aerial with about 1ft reduction in height. Loading the transmitter into the aerial gave SWRs of 1·2 : 1.

This seemed very promising, but after two weeks of calling CQ and S9 + European stations, no contacts had been made. Eventually a local station was heard and contacted, and a very poor signal strength report indicated that things were still not correct. The close proximity of the garage could possibly have been the trouble.

Third experiment

With the aerial increased to 17ft 4in again, it was placed against a trellis fence at the bottom of the garden clear of all metal objects. The earth was a 3ft length of angle iron (not the best material) hammered 2ft (as far as it would go) into the ground. The top of the vertical is only 4ft from the long wire used for top band, Fig 4.

The aerial noise bridge indicated 50Ω at both the aerial base and shack without adjustment of aerial height. This in itself seemed encouraging.

The transmitter gave SWRs of less than 1·2 : 1. There was no reply to my first call, but a second to OH2BAX (about 1,100 miles distant) resulted in a 5–7 report. In the following three weeks, contacts were made with Finland, Sweden, Norway, Czechoslovakia, Italy, Germany, Sardinia and Vatican City. With one exception the reports have been better than 5–7; generally 5–9.

The earth system was improved by connecting to the existing long wire earth which runs under the whole length of this aerial. This forms two radials for the vertical. Final adjustment to the aerial height was made so that the transmitter required no re-adjustment between loading into the dummy load and the aerial. This entailed shortening the aerial by 2in.

The aerial was then taken down and the whip section painted. It was then permanently fixed to the 1in by 1in by screwing on the tank section and firmly stapling the wire section.

Conclusions

The $\frac{1}{4}\lambda$ vertical aerial is a reasonably workable omnidirectional device, providing its location is selected carefully. While not a dx transmitting aerial, contacts with Europe at reasonable signal strengths are possible. For the swl this system is ideal since stations in Australia, New Zealand and America are picked up at good signal strengths. The best dx so far is with KV4FZ.

Reference

[1] Kit of parts for noise bridge available from Martin Mann, G8ABR, 71 Queens Road, Tewkesbury, Glous, GL20 5EL.

The RSGB News Bulletin Service

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

SCHEDULE

Time (bst)	Frequency (MHz)	Location of station
0930	3·6	SE England
1000	3·6	Severn area
	145·1	SE England (Farnham, Surrey, beaming NW)
	145·8	Aberdeen (beaming W)
1015	145·8	Belfast
	145·8	Belfast (beaming S)
1030	3·6	N Midlands
	145·1	SE England (Farnham, Surrey, beaming SW)
	145·93	NE England (Bishop Auckland, beaming N)
	145·8	Aberdeen (beaming SW)
	145·3	Birmingham area (beaming NW)
1045	145·93	NE England (Bishop Auckland, beaming N)
1100	3·6	NW England
	145·3	Birmingham area (beaming SW)
1130	3·6	SW Scotland
	145·5	Leeds (beaming N)
1200	3·6	NE Scotland
	145·5	Leeds (beaming E)

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

TECHNICAL TOPICS

A monthly feature by PAT HAWKER, G3VA

SEVERAL of the items this month could be considered as variations on a common theme; this is that while component and device developments are unquestionably opening new paths for the amateur constructor, they still often require some care in application if their true promise is always to be achieved. And that some knowledge of what is, and is not, critical is equally important for the amateur who buys factory-built and kits.

As an apparent contradiction to these conclusions is a hint that one of the most attractive features of the integrated circuit approach is that in this case much of the responsibility for the optimization of the more difficult circuit conditions passes to the manufacturer. In the interim period, while discrete devices remain the norm, the constructor must be prepared to take some pains to ensure that devices are operated correctly; otherwise it may well be found that older methods, including the relatively uncritical thermionic valve, may produce the best results.

The double-balanced mixer

Looking through the journals, one notes the growing influence on practical designs of the 50-year-old double-balanced diode ring mixer and modulator. The availability of fast computer switching diodes, hot-carrier diodes, integrated diode arrays (eg RCA CA3019) and low-loss toroid ferrite cores for broad-band transformers have all induced a rapid increase in this classic configuration since we first drew attention to the trend in *TT* of March 1965.

For example, an advanced hf receiver (with phase-lock synthesizer) described by R. Fischer, DL6WD, in *QST* March 1970, has a front-end comprising two 3N128 mosfets in cascode followed by a four hot-carrier diode ring mixer (HP5082-2350 or the less costly non-matched 5082-2800 diodes) and 3N128 source-follower, with the entire rf assembly built into two ganged tv turret tuners. The configuration has also turned up in many direct-conversion designs, standard superhets and 144MHz converters, either with or without signal amplification in front of the mixer.

With hot-carrier diodes, a broad-band diode ring mixer can have a conversion or insertion loss of some 5 to 6dB, a typical noise figure of 6·5 to 7·5dB, local oscillator rejection (in output) of 15 to 30dB (and up to 50dB in carefully balanced units), and a dynamic range of up to about 120dB. Whereas an fet mixer can handle signals of up to, say, 100mV linearly, the hot carrier diode should be able to cope with signals of over 300mV. When preceded and followed by good linear low-noise rf/i.f. amplifiers, this approach gives probably the best dynamic range for the all-semiconductor receiver (though it still does not compare with the beam-deflection tube mixer). The rejection of fundamental input frequencies is also highly attractive for heterodyne vfo and other frequency synthesis applications.

But good double-balanced diode mixers need care in construction if optimum performance is to be achieved. Complete broad-band modules are commercially available (for example, the Comdel CM200 series mentioned in *TT* April 1968), but are costly items when compared with home construction. Several useful references on the theory and construction of diode ring mixer-modulators have appeared: for example, Chapter 5 of *Single-sideband principles and circuits* (McGraw-Hill, 1964), *73 Magazine* (March 1969) by WA1FRJ, and *ham radio* (March 1970) by WA6NCT, and the many constructional articles relating to specific equipments.

WA1FRJ indicates how the balance can be improved by the use of 1 : 1 ratio bifilar-wound input and output transformers, in addition to the usual 2 : 1 and 1 : 2 input and output matching transformers; this helps to overcome the inherent unbalance of trifilar-wound matching transformers. This additional complication is not often used in mixers but could be valuable for modulators in ssb generators. As with all balanced systems, symmetrical layout of the units is important. The oscillator and signal "ports" may be interchanged.

For good wide-band performance the coupling between the transformer windings should be as tight as possible. WA6NCT suggests that two wires should first be twisted together by means of a hand-drill and the process then repeated with the third wire to obtain a tight trifilar length of wire before starting to wind on to the toroid. Each winding can consist of between about 12 to 20 turns (according to core and frequency range) of No 32 enamelled wire. It is important to connect the wires in the correct sense, see Fig 1, and the use of wires having differently tinted enamels can help. Powdered-iron toroids are not really capable of providing broad-band operation. With ferrite toroids it is possible to make the mixer effective over the whole mf, hf and vhf range; to minimise image and other spurious responses it is usual to put one or more tuned circuits in front of the mixer, even when no rf stage is used.

To obtain optimum performance there must be sufficient local oscillator injection. Conversion loss decreases with increasing local-oscillator power up to about 1mW (0·22V across 50Ω), and typically diode quads will require around 4mW injection; some designs specify up to 1 to 3V rms across 50Ω. This, of course, is a great deal more oscillator power than required for an fet mixer (see later).

It is also important to remember that if no rf amplifier is used then the overall noise figure will include the conversion and filter losses in decibels added to the noise figure of the first i.f. stage; it is possible to build a 144MHz converter without rf stage having a noise figure of 9 to 10dB, but generally for high-performance applications some 9 to 15dB of gain in front of the mixer on both hf and vhf is probably desirable.

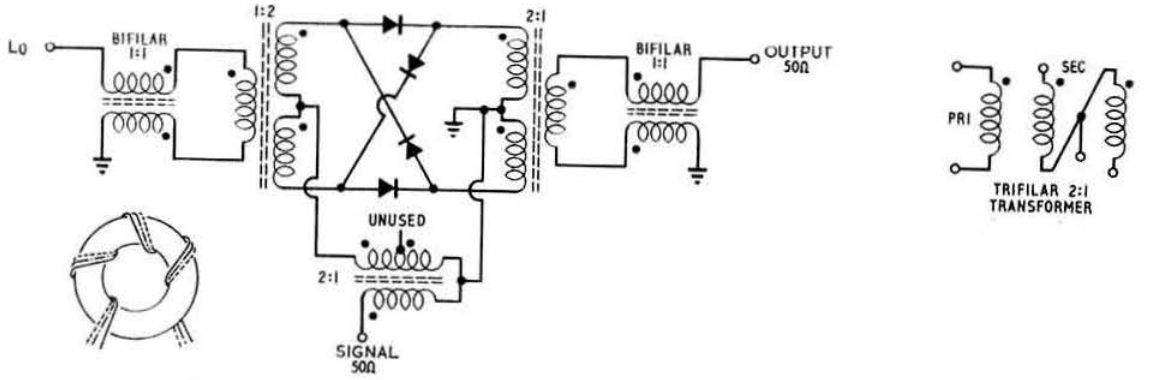

Fig 1. Double-balanced diode ring mixer showing additional bifilar-wound transformers to improve balance, and some details of the trifilar wound matching transformers. Note that in practice the three strands of wire would be twisted together before winding

In the absence of hot-carrier diodes, fast switching computer diodes can give good performance, but conventional germanium diodes are not really suitable due to the relatively poor forward to back resistance ratio. For 3·5MHz direct conversion receivers, however, there is no need to worry overmuch, and J. E. Hodgkins, G3EJF, reports (in the RSARS's journal *Mercury*, winter edition 1969-70) using both OA81s and unmarked germanium switching diodes, matching by measuring forward and reverse resistances on a testmeter—incidentally he finds the results achieved on a 35s 3·5MHz homodyne compare well with those of receivers of the BC348, R107 class.

The CA3019 integrated circuit provides six matched diodes of which four are internally connected to form a diode quad. In this unit each diode is formed from a transistor by connection of the collector and the base to provide the diode anode, with the emitter providing the diode cathode. This is only one of five methods of using transistors as diodes, but represents the most useful connection for a high-speed diode since it has lowest storage time. This suggests that in the absence of suitable diodes, discrete silicon transistors could be used in this manner.

Some time ago we presented various valve and transistor circuits providing double balanced mixers which do not require balanced signal injection or special transformers (*ART* Section 4) using a form of differential amplifier, and a somewhat similar arrangement appears to form the basis of the Plessey SL640/SL641 integrated circuits, which also eliminate the transformers and heavy carrier drive power needed for diode quads; about 11 transistors are used in these devices which are intended to replace diode rings in receiver and ssb generator applications, and will handle input signals up to about 250mV rms. When preceded by an SL610 rf amplifier, the combination should provide a high-performance front-end, as reported last month by GW3GRY.

FET mixers

Despite the attractions of the double-balanced mixer, the single fet mixer remains popular—and can give a good account of itself provided that the user is aware of certain limitations. In this connection a useful paper, "Intermodulation and cross-modulation as a function of mixer pinch-off voltage in an fet fm receiver" by R. G. Huenemann in *IEEE Transactions on Broadcast and Television Receivers* (February 1970), emphasizes that while fet mixers can provide superior cross-modulation compared with bipolar mixers, the effect of operating an fet out of the square-law region of its transfer characteristic "is disastrous".

Careful measurements made on typical American fm tuners indicate great differences in performance in different units: in one case an improvement of 50dB in cross-modulation performance was achieved simply by replacing an fet mixer with one of nominally the same type but actually having different characteristics. As originally received, this particular tuner (with two FETS in cascode followed by an fet mixer) had worse cross-modulation and intermodulation performance than a unit with single fet rf and bipolar mixer.

The reason for the poor performance turned out to be that the original 2N3823 mixer was being driven out of its square law region, as a result of the considerable spread in characteristics still found in FETS of nominally the same type. Replacing the 2N3823 with another 2N3823 known to be within specification resulted in the dramatic improvement already indicated; from being worse than the unit with bipolar mixer it was now appreciably better. It is worth noting that the original fet provided some 7dB higher conversion gain though the sensitivity was about the same—a further indication that it is important not to adjust an fet mixer for optimum gain: high local-oscillator levels can increase gain but play havoc with the dynamic range.

The author draws the conclusion that careful attention must be paid to the fet operating point and local oscillator drive level if optimum performance is to be realized. In view of the spread of fet characteristics between different samples, it would not seem to be sufficient to assume that reproduced designs will always give equally good performance to the original; that is unless care is taken in setting up the individual unit. This is particularly important to amateurs since it is often taken for granted that provided one copies a proven design exactly, similar results are bound to be achieved.

Balanced fet converter

A well-recognized method of achieving greater dynamic range with any form of vhf converter is to use a fully balanced system (remember the popular 6J6 balanced converters

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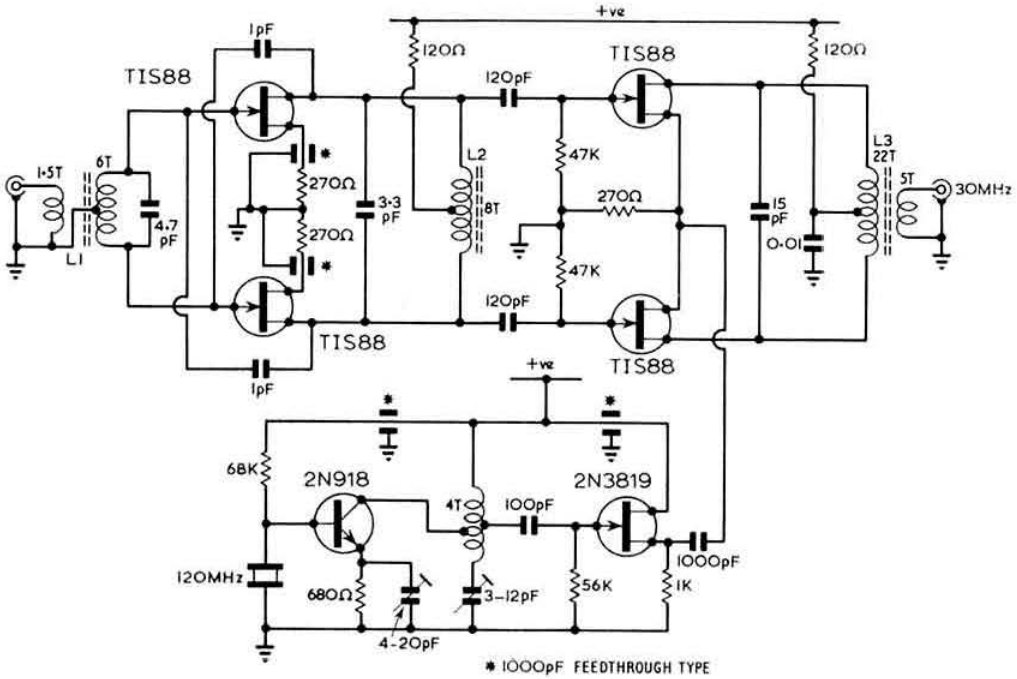


Fig 2. Italian 150MHz converter design using balanced TIS88 FETs and neutralization on rf stage. The oscillator arrangement, using 120MHz overtone crystal, is only one of many possible systems, although the use of the 2N3819 source follower looks a useful way of injecting the oscillator signal to the TIS88 mixers. Coil details relate to 8mm formers

in the early days of 144MHz?). The design of a 150MHz vhf converter (readily converted for 144MHz application) using four TIS88 devices in a push-pull rf amplifier and mixer (Fig 2) is described by G. Tommassetti in the Italian magazine *L'Antenna* (March 1970). For this unit the noise figure is given as 2·7dB and overall tuner gain as 22dB. The balanced configuration lends itself to a symmetrical layout such as that outlined in Fig 3. The oscillator in the original unit used a 120MHz overtone crystal, with a modification given for 60MHz crystals—however, other oscillator chain arrangements could be used.

Dual-gate mosfet product detector

A product detector is only another form of linear mixer; and one using the RCA 40673 dual-gate mosfet has been described recently by R. Birchel, DJ9DV, in *Funkschau* (Nr 4, 1970), see Fig 4. The diagram shows the BFY39 crystal-controlled injection oscillator, and a variable source resistor which is included to allow the working point of the mosfet to be set correctly. The i.f. signal is applied to one gate, and the oscillator frequency to the second gate.

All-transistor transmitters?

Looking back, it is noticeable how few times in the past two years or so has the subject of all-transistor hf transmitters come up, although in the pre-1968 era this formed a staple item on the *TT* menu. Is this because all the problems have been solved? Or is it because many of us have become increasingly sceptical of the value of rf power amplification with currently available transistors rather than with valves?

It is true that in commercial communications, the march of transistors into transmitters continues apace. For example, a new Marconi hf transmitter—"Aries" type H1030—has been introduced recently as a companion for the "Argo" receiver (which is a modified form of the Eddystone EC958 described in *TT* February 1969) to form a naval ssb/cw installation. In this case the power amplifier consists of a three-stage broadband linear amplifier (30dB gain) over the range 400kHz to 17MHz. The first two stages of this amplifier each comprise of two transistors in push-pull; the final stage has no less than 32 transistors in a push-pull parallel combination to provide 100W p.e.p. output into 50Ω. It is suggested (*Point-to-Point Telecommunications* April 1970) that "with the present state of the art, the method of using a large number of low cost transistors, as opposed to perhaps two or four very expensive devices, presents the most economic

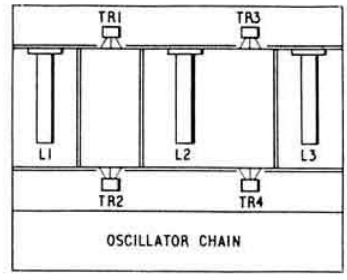


Fig 3. Possible layout of the converter shown in Fig 2

approach to the problem of achieving this order of power output with the required linearity. It has the additional advantage of incorporating ample reserve power capability and thus being more immune to damage from mismatch and overload conditions." But for the amateur constructor there are appreciable problems in operating very large numbers of devices in parallel without unequal current sharing and special filter techniques to cope with the low input impedances etc. It is so much *easier* and *less costly* to use valves at medium and high power levels. The commercial users and armed services rightly place tremendous emphasis on the improved reliability of semiconductors compared with valves—but, if we are honest, it usually does not really matter very much if with an amateur rig a valve grows old or packs up altogether. Fifty watts of transistor-produced power is not going to have any advantage over 50W of valve-power (indeed, the chances are that it will contain far more harmonic power). At present the advantages of all-transistor transmitters seem pretty well confined to low-power rigs for portable or mobile applications.

Some basically similar sentiments have been put forward by Leo Gunther, VK7RG, in *Amateur Radio* (February 1970). VK7RG is more often associated with *The Australian EEB* in which emphasis has always been put on semiconductors. His article, "Commonsense and instabilities in transistorized transmitters", is a valuable reminder of the problems still stacked against transistor power amplification; he also makes a critical analysis of designs published in various journals. He considers that, for a design to be labelled successful, it must be free of all the many forms of instability to which transistor amplifiers are prone (*TT* February 1968); the overall efficiency must be reasonable (and he shows the problems this involves in the design of tank circuits); and he stresses that we should not be caught up in the view that to be fashionable we should think in terms of transistors rather than valves. Instabilities, low efficiency tank circuits, unequal current sharing, low stage gain and harmonic generation all form part of a rather unhappy list. Although he draws attention to some useful transistor designs and techniques, much of his message is summed up in one of his section headings—"Valves are nicer". At 30W and above, "a valve is simpler to adjust, easier to drive, easier to power, more efficient, and gives far fewer troubles and harmonics." These are sentiments which need to be said, though they will rightfully be disregarded by the transistor enthusiast who wants to experiment. What is important is that amateurs generally should not be misled into thinking that they *ought* to be using hf and vhf power transistors to keep abreast of modern trends.

It is the hybrid (combination of transistors and valves) transmitter on which we should be concentrating. VK7RG usefully reminds us of a technique described by J. A. Meissner, K5CXN, in *QST* back in April 1962, which never seems to have received the attention it deserves. K5CXN described a mobile transmitter using two quick-heat valves plus an all-transistor modulator. The novelty of his scheme was that the ht for the power amplifier valve was obtained by rectifying some of the audio output of the modulator to provide a form of controlled-carrier operation, and to eliminate the need for any high-power dc-dc converter. In the original design, a low-power dc-dc converter was still included to provide power for the oscillator valve, but VK7EG points out that, today, this could easily be eliminated by using a transistor driver as in the "Mobiltrans 40". The stand-by drain on the car battery was very low, and the maximum drain of about 10A occurred only on voice peaks when running up to about 30W.

K5CXN provided full details of the home-wound modulator/power transformer, although it was the need for this special component that may have put off some people (it was eliminated in the Mobiltrans by using two audio power stages). But the basic idea seems too good to be forgotten entirely. The systems used by K5CXN and in the "Mobiltrans 40" were illustrated in *TT* January 1965.

For vhf portable and mobile operations at power levels of a few watts the position is rather different, and a good case can be made for all-transistor operation; a useful review, including a list of some American devices with prices, by Paul Franson, WA7KRE, appears in *ham radio* (January 1970). With the 2N4427 a watt output can be achieved at 175MHz at less than £1, but most of the devices have single-unit costs which make valves appear to be at give-away prices! WA7KRE admits that most of the older rf power transistors suffered from four major faults: low gain, limited power output, high cost, and susceptibility to destruction due to mismatch and detuning (parking too close to a vertical pipe or having an aerial touch a tree could blow an expensive transistor). But he considers that new rf power transistors have higher gain and higher output, and are rugged and can withstand detuning and mismatching that would destroy earlier devices. He also points out that amateurs are not concerned with broadband amplifiers and can therefore "obtain the performance specified on data sheets without any great problem," (the reluctance of transistors to give out

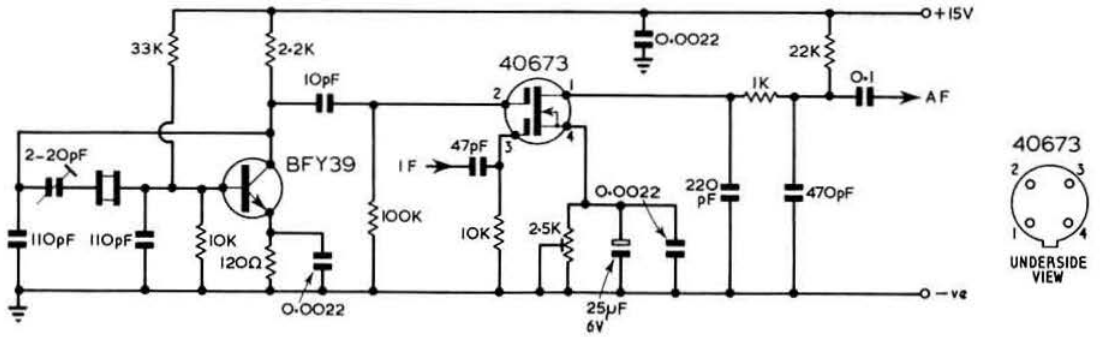


Fig 4. Dual-gate mosfet product detector

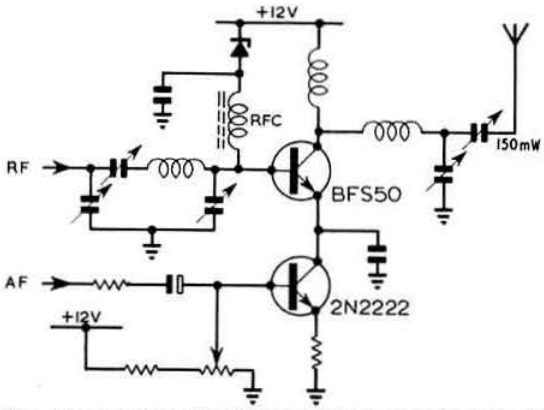


Fig 5. Basic outline of series-modulation or cascode configuration for modulation of flea-power transistor transmitter

rated powers is a major complaint among commercial designers!). For those not put off by our earlier rather pessimistic remarks, the 19-page WA7KRE article should prove a useful starting point.

One question which we have not mentioned is the problem of modulating transistors (these are far more suited to fm than either a.m. or ssb). A novel approach to this problem, eliminating the need for high-power modulator and modulation transformer, is to be found in an article by Courtney Hall WA5SNZ, in *ham radio* (February 1970) in which modulation is provided by varying the output of the power supply; he gives full details of a 15V power supply suitable for this application, although one has to sacrifice a good deal of power in the voltage regulator.

For QRP transmitters an alternative approach would be the use of series modulation, along the lines of Fig 5 which comes from *Funk Technik* (Nr 13, 1969). A basically similar arrangement was used by R.R.E. for a miniature transmitter (*ART* Section 1 and *TT* July 1966).

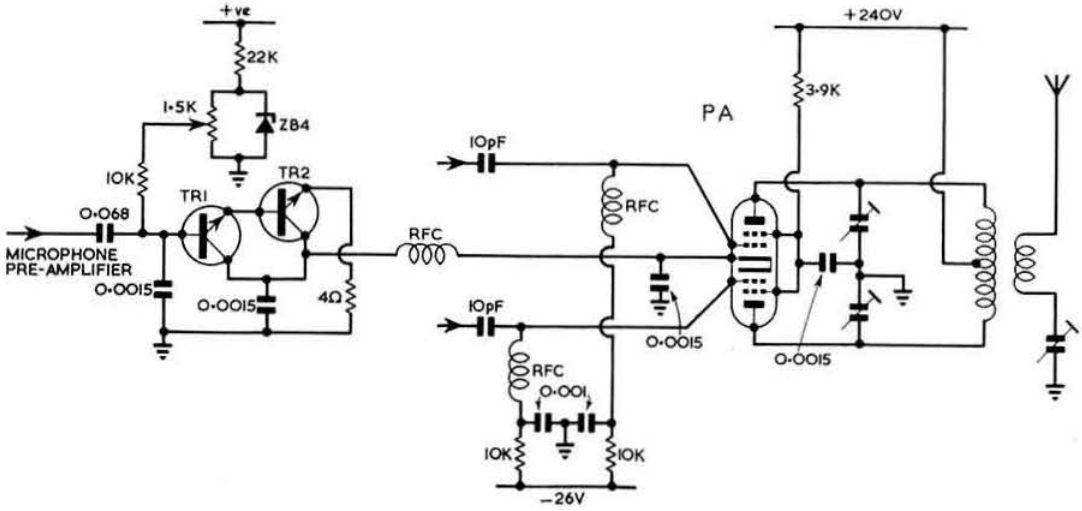


Fig 6. Cathode modulation of valve power amplifier using two transistors in Darlington compound

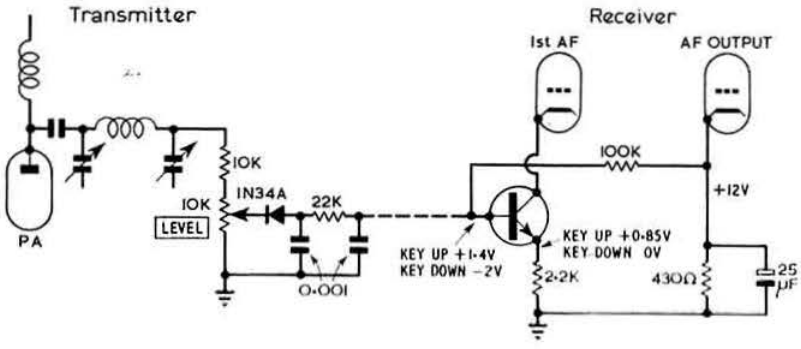


Fig 7. Phone/cw receiver muting technique suggested by W1CER

Cathode modulation with a transistor

This suggests another hybrid technique one; at thmight prove particularly useful for mobile operators convert ng ex-business radio gear. Why not use a transistor to cathode-modulate a valve?

This approach has been advocated in *Funkschau* (No 20, 1969) by H. Abel, DL2KA: Fig 6. He indicated how two transistors in Darlington compound could be used to cathode modulate a typical low-power double-tetrode (in his case a QQEO3/12) power amplifier, thus eliminating both the modulation transformer and the high-power audio modulator. DL2KA did not give any information on the transistor types although he warned that TR2 must be capable of carrying the cathode current of the power amplifier valve; silicon npn types would seem suitable.

Solid-state muting

The inclusion of a transistor in the cathode circuit of a valve amplifier can be used in another useful application: as a quick-acting muting switch. In *QST* (March 1970), Doug DeMaw, W1CER, gives details of how a transistor can be inserted in the cathode of almost any 1st af amplifier of a receiver and switched on and off by taking a small dc voltage from the transmitter output. When there is no transmitter output, TR1 is switched "on" by the standing potential derived from the cathode bias resistor of the audio output stage; during transmissions this positive voltage is over-ridden by a negative bias derived from the transmitter: see Fig 7. W1CER specifies a 2N2102 as a suitable transistor type, but also suggests that almost any npn transistor taken from a surplus computer board should prove satisfactory.

New Products

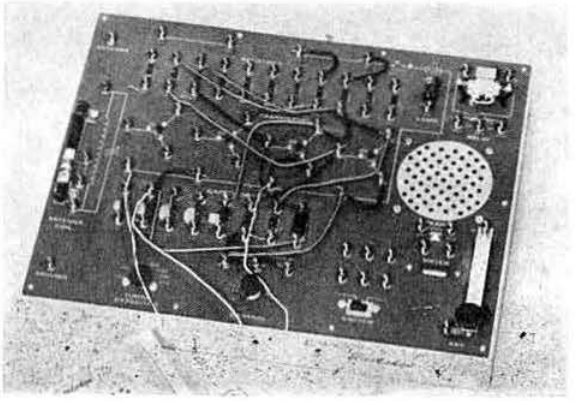
Heathkit's experimental kit for the young

A new experimentation course in basic electronics for young people has just been introduced by Heathkit. Designated the Heathkit JK-18, it features 35 exciting experiments using the "learn-by-doing" technique.

All the parts are mounted on a "breadboard", and then various circuits are constructed according to instructions by connecting them with ordinary wire, as provided in the kit. For speed and easy circuit assembly and dis-assembly, solderless spring-clip connectors are used throughout the kit.

The illustrated manual which comes with the JK-18 includes a fold-out diagram and describes the operation of the circuit in easy-to-understand language. All parts used in any given experiment are identified by both a pictorial diagram and the standard schematic representation so that the experimenter learns how to read circuit diagrams. The manual also includes a dictionary of common electronic terms and the international morse code.

Price £13 18s



The Heathkit GR-78 solid-state receiver kit

The GR-78 general coverage receiver recently announced by Heath Company provides a.m., cw and ssb coverage from 190kHz to 30MHz in six switch-selected bands. The all solid-state circuit employs field effect transistors in the rf section and four ceramic i.f. filters for excellent sensitivity and selectivity. The ceramic i.f. filters eliminate the need for alignment. Built-in bandspread tuning can be calibrated for either the shortwave broadcast or amateur radio bands, and a switchable 500kHz crystal calibrator insures accurate dial calibration.

This receiver comes complete with a rechargeable nickel-cadmium battery pack with a built-in charging circuit. Wiring options permit operation from either 120 or 240V ac, and 12V dc. It incorporates switched automatic volume control and an automatic noise limiter. Additional features include headphone jack, built-in speaker, external aerial terminals, receiver muting for use with a transmitter and a front panel relative signal strength meter.

Price £68 18s

For further information about these new products write to Daystrom Ltd, Heathkit Division, Gloucester. Tel OGL2 29451.

Put a transistor in your cathode! (2)

An outboard tuneable local oscillator for a mobile radio receiver

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

This circuit uses the same principles as that described in the previous article, and was developed as part of the same conversion project. It was desired to adapt a crystal-controlled double-superheterodyne receiver for tuneable amateur operation. The original design used a single crystal oscillator to drive both first and second mixers, and this was retained (with a new crystal) to drive the first mixer so that the 144 to 146MHz input was converted to a 29 to 31MHz first i.f. A 26·9 to 28·9MHz oscillator was then needed to convert this to the 2·1MHz second i.f. It seemed wrong to risk the frequency stability of such an oscillator by packing it into the hot confined space of the transceiver, so an outboard transistor oscillator was designed with a single coaxial connection to the second mixer cathode along which dc flowed out to power the oscillator and the required injection voltage returned.

Fig 1 shows how the second mixer stage was modified for cathode injection and power feed-out, and Fig 2 shows the vfo TR1 and cascode buffer TR2/TR3.

The oscillator is a well-known one. L1 and C2 and C4 are adjusted to obtain the desired frequency coverage. C5 and C6 should be equal and of the largest possible value consistent with oscillation. The cascode buffer was chosen because its very low internal feedback minimizes "pulling" of the oscillator when the load alters. The power feed flows through the output coil L2—do not use a ferrite toroid here, the dc will saturate it. The oscillator can operate with ht of +2 to +24V, and the last stage of construction was to adjust the ht by varying the screen resistor of the mixer stage to get maximum conversion gain. The optimum value in the author's equipment was 100kΩ providing a 2·7V supply to the oscillator.

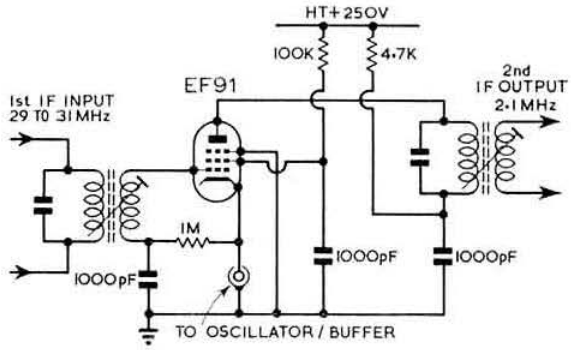


Fig 1. Modified second mixer stage

Component details

C1	10,000pF ceramic.	
C2	39pF ceramic.	
C3	30pF double-bearing airspaced variable.	
C4	30pF airspaced trimmer.	
C5, 6	150pF silvered mica.	
C7, 8, 9	1,000pF ceramic.	
C10	22pF silvered mica.	
C11	50pF airspaced trimmer.	
R1	5·6kΩ	All ¼W, 10 per cent.
R2	8·2kΩ	
R3	680Ω	
R4	6·8kΩ	
R5, 8	3·3kΩ	
R6	390Ω	
R7	1·8kΩ	
L1	7 turns 20swg spaced at 10t/in on ¾in ceramic former.	
L2	12 turns 26swg closewound on ⅝in former, tapped 3 turns from ht rail end.	
TR1, 2, 3	2N706A.	

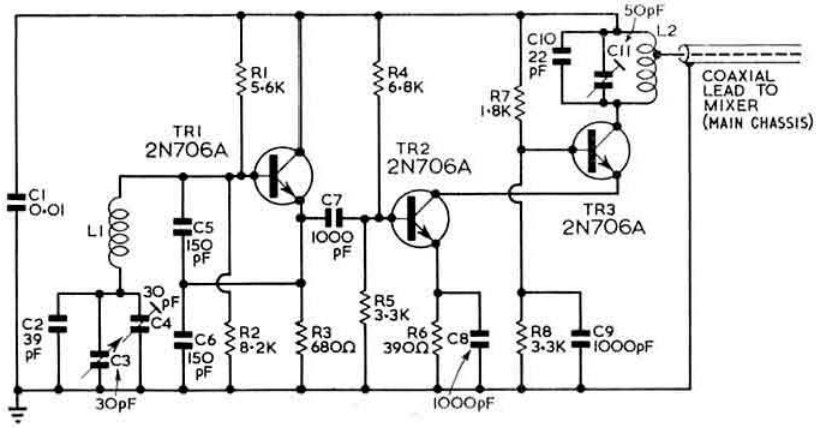


Fig 2. Oscillator and buffer

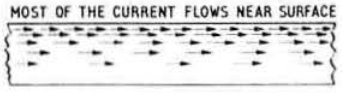
* 30 Ox Lane, Harpenden, Herts.

TVI TIPS

by B. Priestley, G3JGO

Coaxial cable and screening

It is well known that at high frequencies current tends to flow only on the surface of a conductor and this skin effect lowers the Q of coils at high frequency unless thick wire with a lot of surface is used. The same effect occurs when a sheet of metal is involved, so that if the metal is thick enough current does not penetrate to the other side, see Fig 1. This means that the electric and magnetic fields round, say, the pa tank coil can be confined as currents on the inside of a screen round the coil, but do not penetrate it to cause direct radiation.



RELATIVE CURRENT	NUMBER OF SKIN DEPTHS
100	0
37	1
14	2
5	3
0·66	5
0·005	10

Fig 1.

If, however, there is a gap in the screening, current can flow over the edge of the screen and on to the outside of the screen. Here the current can cause radiation, or it can flow on to any leads leaving the cabinet, again resulting in radiation. The obvious solution is to have no gaps, but this is not practicable. So the next question is, how big a hole is permissible? Clearly this depends on how much current exists on the inside, ie the distance from the pa tank coil, and also how much gap interrupts the current flow (see Fig 2.). Since it is difficult to predict the direction of current flow the safe rule is to avoid any holes with any length exceeding $\frac{1}{4}$in. Consider the lift-up lid on the average transceiver, with a length of maybe 60in, it is a good slot aerial resonant at about 100MHz but not that far behind at 45MHz! The solution is not to solder up the seams but to break up the gaps electrically in some way. This may mean removing paint on the bearing surfaces, adding extra screws to maintain contact, or filling up the gap with flexible braid, adhesive metal tape or knitted metal mesh. In a strong tv field strength area this is not

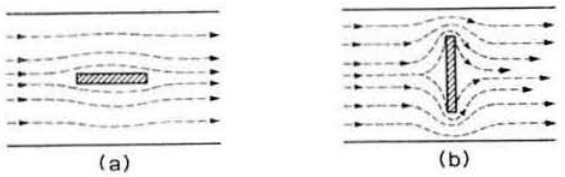


Fig 2. A slit which runs along the direction of current flow (*a*) has little effect, but one which lies across the flow concentrates the current and encourages radiation or current flow on to the outside of the shield

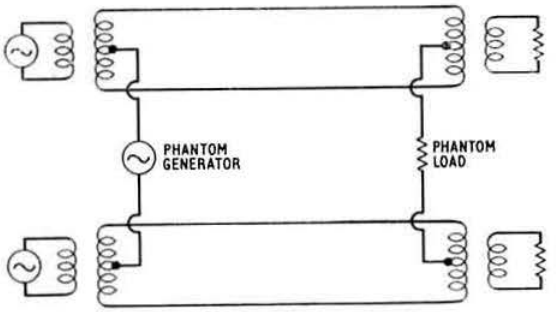


Fig 3. The phantom circuit. By using the two twin wire lines in parallel, one for each line, an extra circuit is possible

necessary, but in a fringe area it can be absolutely vital. The answer is to go over the outside of the transmitter with a search loop and tv set, exactly as when searching for radiating leads, till it is "dead". The absence of harmonic tvi when on dummy load is not a guarantee of adequate screening, since rf currents can flow on the surface of the cabinet with little radiation but can be radiated at a serious strength when an aerial is reconnected. However, if there is tvi on dummy load it is certain that connecting the aerial will not cure it.

Coaxial cable is simply twin feeder in which one wire has been smeared out to form a cylinder with the other wire as axis. Again, if the screen is thick enough there should be no current on the outside, it flows up the inner and back down the inner surface of the sheath.

In practice the outside of the coaxial cable can at the same time act as a single-wire feeder, often at some other frequency. This is a quite independent mode of operation and as it is apparently not too clear, Fig 3 shows a similar effect on a twin-wire feeder. In addition to the normal push-pull operation, the two wires are used in push-push and form half of a similar pair. Balun transformers are used to separate the two modes. This system is familiar to telephone engineers as the phantom circuit. In a coaxial system the modes do not use the same part of the sheathing so we can simply earth the outside to bypass the unwanted current, or add a choke or trap circuit which only affects it by coiling up the cable, or present it with a complete break formed by a Faraday link or ferrite transformer. All these *mode* filters have application to a tv feeder with sheathing acting as a Marconi aerial to a nearby transmitter.

When the problem is a transmitting aerial feeder which is carrying current outside and radiating, or feeding rf into the mains, the solution is to find where the rf is getting on to the outer and stop it. A balun is necessary where a dipole is fed with coaxial cable, and this can sometimes act as impedance transformer to improve the swr. A mode filter at the transmitter end may be useful in keeping down the last trace of harmonic radiation, as any harmonics on the outside will flow over the outer case of a lpf without any attenuation.

Now what about perforated metal gauze or "bikini" coaxial cable where the screening is anything but solid? Such materials can still be useful, but do not give perfect shielding so should be spaced away from intense sources of rf and perhaps backed up by a second layer or even a third, as in some signal generators. Coaxial cable should be of the best quality at least between the transmitter and lpf.

Unfolding a Hopeful Future

Sixteenth VHF/UHF Convention report

by JACK HUM, G5UM*

The President replies to the toast "The Society" proposed by Howard Steele, left

EVERY annual VHF/UHF Convention takes a look into the future. That is what conventions are for. The sixteenth, this year, did so with special comprehensiveness and thoroughness both on the political and the technical fronts. And although it is the technical aspect that interests most members in their day-to-day practice of amateur radio, the political aspects are inescapable. This one, for example:

"As radio amateurs we hold no inalienable rights to any frequency, and we must show we make good use of those we have. We enjoy much goodwill, but we must remember that frequency space is a precious commodity and there is increasing pressure upon it. The amateur movement must seize every opportunity to make maximum use of vhf up to the highest allocations available to it."

This was said by the President, Dr John Saxton, when replying to the toast "The Society" proposed by Mr Howard Steele, director of engineering at the Independent Television Authority, and guest of honour at the Convention Dinner on 25 April.

And this, again from Dr Saxton:

"Further, when the World Administrative Conference on Space Communications takes place in 1971 it will have vhf allocations very much under review."

What this means in practice was not lost on the President's listeners that evening. Namely, that a strong national society enjoying a good rapport with the licensing authority is the most valuable asset anyone could want to protect the British radio amateur and to state his case. Dr Saxton observed in his speech that the RSGB is active in developing the same good relationship with the new Ministry of Posts and Telecommunications that existed before with the GPO, and he went on to emphasise that ". . . it is of the utmost importance that British amateurs should support the Society."

More than 60 per cent of them do so already. Even so, this thought must have crossed the minds of many that evening: "What are we going to do about the other 40 per cent?" More of them in the Society will increase funds to help fight coming battles. Some of them are inactive. Others, for reasons peculiarly and myopically their own, choose not to come into the Society. Probably hundreds more have not had the advantages of membership sufficiently explained to them as to convince them that they cannot afford to stay out. And as for the younger set, faced with budgets torn in twain by the conflicting claims of cash to buy bits for the new rig and cash for the licence renewal, what better birthday present from the parents than a cheque for an RSGB "sub"?

Back to Convention; and the *Unfolding of a Hopeful Future* which was its unstated theme. When guest of honour Howard Steele proposed "The Society" he spoke in glowing terms of the unique relationship that existed between the amateur and professional communications people in this country, and especially of the admiration which the professional engineer had for the transmitting amateur's "make it work in time" approach. Although not a callsign holder himself, he employs us in considerable numbers in his division in ITA.

After touching lightheartedly on the subject of tvi (". . . no doubt the growth of uhf broadcasting will make it more difficult for the amateur to compete with the television programmes"), Mr Steele mentioned the co-operation between the Society and the Authority in looking at the possibility of putting amateur metre-wave beacons on ITA sites. And something else he mentioned was enough to make uhf enthusiasts drool with pleasurable envy; the new ultra high frequency transmitter which ITA is now putting into service is equipped with a single five-cavity klystron delivering 40kW for half a watt of drive. Another statistic was that during the past year—the year of the massive operation to commission uhf and colour for ITV—the Authority's transmitters had put more rf power on the air than in all the previous 14 years of its history.

That was in reminiscent mood. Then, looking into the future, Mr Steele reminded members that broadcasting engineers were planning to use frequencies up to 12GHz. "Only if amateurs use their allocations in these shf areas can they expect the support of the engineers." It was an encouraging sign that licence holders, far from looking upon the amateur service as nothing better than free communication, were intent upon exploring the quirks of these frequencies, ". . . and you deserve to hold on to them."

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Both Mr Steele's speech and Dr Saxton's reply promoted a great deal of discussion among members after the Convention Dinner was over. In particular, there seemed to be an earnest desire to stimulate more activity on 70cm as an ideal communication band—just that little bit more difficult than "Two" to get going on but nothing like as tough as 23 or 13cm. Many hundreds of British amateurs are already equipped to use it, and it seems to us that the primary consideration is to persuade more of them to come on to the band at set times. It has been said before, and deserves repeating, that if 200 operators around London, another 200 in the Midlands and a further 200 in the North-West spread their 70cm activity over the 25 evening operating hours of a given week then they will not notch many contacts. But concentrate it within known schedule periods and they will.

Trophy presentation

After the two vip speeches there was the pleasant ceremony of presenting the 1962 VHF Committee Trophy for the best item of equipment from the constructors' exhibition, which had been on view throughout Convention Day. It went to G8ATK for a device that was a sheer joy to look at, a dual exciter unit for 2m and 70cm, each exciter built on pc board and disposed side by side in a small case. It was being put up as a constructors' kit to encourage members of the Farnborough Radio Society to come on to vhf and uhf at a cost of only £4 10s (less valves) per constructor, and we gathered that 40 had already done so. Which means that there will be quite a deal of "Unfolding a Hopeful (and Happy) Future" in that part of Hampshire.

G8ATK of Farnham with the 1962 VHF Committee Trophy and his winning entry

Lectures

Convention's really big look into the future was provided by the first of the afternoon lectures, on Project Trident. Just about all of the 350 ticket holders (a Convention record) crowded into the big hall at the "Winning Post" to hear it. (Incidentally, the dinner attendance was also a record; 140.)

Fred Robins, G3GVM, chairman of the South Coast VHF Group, first told how the concept of a British amateur radio satellite emerged as the result of a discussion over the air, one member of the QSO being especially knowledgeable about satellite vehicles. And as such vehicles were sometimes launched with spare space that had to be filled with ballast, why not put an amateur transmitting system there instead? After G3VEL had been invited to put up a proposal, a period of intense discussion by members of the group followed, and in due time the project was laid out on paper. There seemed to be no shortage of electronic skills in the group, said 'GVM, but help on the engineering side would be more than welcome. A Project Trident Association was proposed, similar to the AMSAT unit on the other side of the Atlantic, and from AMSAT there had been co-operation and promises of help.

First lecture

Having outlined the background, Fred Robins handed over to G3VEL, Paul Dent, to go into greater detail. Paul prefaced his description of the hardware with a run-down on the ten types of earth orbit into which satellites may be launched, from the simple circular to the sun synchronous. For Project Trident a polar orbit would be preferable to enable the satellite to be readily illuminated from the UK.

Discussing—and dismissing—passive orbital devices, Paul Dent went on to describe the much more promising features of active transponders that would accept 2m transmissions and re-radiate 70cm ones, to i.f. parameters that might even allow 70cm to be tuned on top band.

Lack of space does not allow a detailed report on the G3VEL lecture or to reproduce the large number of diagrams that helped to explain the technology of space communications in non-mathematical terms so effectively. However, the following are a few "cuts" from it, and from the many questions that followed:

Ground equipment needed: An erp of 100W, which could be 6W p.e.p. into an 8-element beam, ssb recommended; or 30W to a ground plane, which had special attractions for satellite reception. For cw, only 1W into an 8-element. For receive, a 70cm converter followed by an fm tuner would demodulate the space-converted 2m signals.

Orbital period: About 96 minutes.

The life: About five years, if adequate power from solar panels was to be forthcoming.

Maximum QRB distance between stations using the satellite: About 5000km. This was unlikely to permit transatlantic communication. If this were required the satellite would need to be higher, the power levels greater, and the design parameters modified accordingly.

Design time scale: About three years.

Doppler effect: A major factor if a low altitude satellite is used, approaching and receding very rapidly with a consequent frequency change that would have operators chasing the signal over a lot of the band.

Other on-board systems: These could include telemetry and a separate communications sub-system somewhat akin to a command channel.

And finally: "This is planned to be an experiment in communications technology between low altitude terminal links, perhaps even mobile ones, and in the hope that some sort of scientific experiment can go along with it we are in touch with the universities."

After this unfolding of the future, G3VEL earned what was just about—and justifiably—an ovation.

Second lecture

The second lecture in the main hall was very relevant to what Howard Steele was to say at the Convention Dinner later that day on how to promote occupancy of our microwave allocations. The choice of speakers was appropriate: Les Sharrock, G3BNL, and Alan Wakeman, G3EEZ, whose pioneering work on 13cm and down has been regularly reported in *FMD*. They deployed their subject, "Amateur Microwave Communications", into two parts, narrow band cw/phone techniques and wide band pulse.

"One cannot stress too strongly that it requires a certain attitude of mind which prompts activity on these bands," was the G3BNL opening thought, a theme that linked with what Howard Steele was to say later that day about amateurs' ability and enthusiasm to master the quirks of the metre- and micro- wavelengths.

Both 'BNL and 'EEZ amplified the brief descriptions of their 13cm equipments which had already appeared in *FMD*.

A few "cuts", first from G3BNL: Do not multiply to 2,300MHz times 16 from 144MHz or you will impair 2m as a talk-link. Try 42·7MHz as a starting frequency to yield 2,305·8MHz. On the receive side good input matching is vital; Because rf amplifiers are "out", try a post-mixer head-amp. it can give a typical noise figure of 2dB at 28-30MHz i.f. **Aerial dish:** At least 20 wavelengths across to produce appreciable gain. Similar equipment for 9cm has given 55-mile range using a 30in dish. For feeder try ⅜in diameter Aerialite 363.

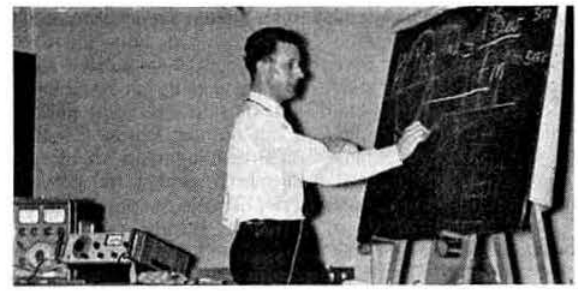
From G3EEZ: The 2,300MHz band is the lowest where pulse is permitted. To realise big power output, hit a single valve oscillator very hard in short bursts. Typically, give it 3kV but turn it on only for a microsecond at a time via a multivibrator and thyratron. At a prf of 1,000Hz the bandwidth occupied is 1MHz, giving readability comparable with cw but with simpler equipment. Telegraphy is not obligatory. There *are* means of modulating 13cm pulse. Another point: "You don't even need someone else on the band to help you align your receiver. Just bounce a signal off a nearby hill and peak up by watching the size of the reflected signal on the 'scope trace."

Third lecture

After the tea break, conventioneers trooped back into the main hall for a third lecture there, this time from G3FZL and G3OOU on narrow band fm techniques. Here was something to give new hope to those appalled by the ease with which neighbours' tv sets suck in amplitude modulated phone—try nbfm. Increasingly, scores of 2m operators are doing so even in the absence of proper demodulating circuitry and with all the disadvantages of slope detection. The 'FZL-'OOU dialogue should have encouraged many more to go about the job along the right lines.

Other lectures

Meanwhile, in the adjacent smaller lecture room the future was being well and truly unfolded by, in turn, G3JHM with his discourse on how to attempt extreme metre-wave dx via trans-equatorial scatter; and G8AOL on digital beam aerial control. Two contrasted subjects of great novelty today, pointers to what may come to be accepted techniques before the decade is out.



Geoff Stone, G3FZL, clarifies the mysteries of the modulation index during his talk in company with G3OOU on nbfm techniques

Conclusion

Finally, a last look round to tie up the ribbons of a Blue Riband record-making VHF/UHF Convention. Amid the general euphoria there was just one tinge of sadness, the absence of Fraser Shepherd, GM3EGW. "Let us stand for a few moments and remember him," said VHF Chairman Geoff Stone, G3FZL, to the guests at the dinner that evening. "He rarely, if ever, missed our annual convention."

Then it was time for the President to hand out the Constructors' Competition trophy to G8ATK, and after that the prize to the holder of the dinner menu lucky number, G3UUT, whose newly-won 4-element J-Beam will help the erp from an already well-known signal on the 70MHz band.

The G3UUT lucky number comes up to win a 4m beam for the man from York

Earlier, there had been another raffle, the customary convention one with 25 prizes worth, on average, £1 each. Good value here—and good value also on the G8AXA bring-and-buy stall, an innovation of 1969 repeated this year. Nearby were six trade exhibitors, two more than last year, and enjoying more space to move.

And as for next year, a final unfolding of a happy future. Geoff Stone announced that the 1971 Convention will be on 24 April, once again at "The Winning Post".

FOUR METRES AND DOWN

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

Midlands Convention '71

A date to set aside for 1971 is Saturday 19 June, when the always popular Midlands VHF Convention will be "adopted" by the Albright & Wilson Recreation Club at Oldbury as part of the jubilee celebrations of the club's foundation. Yes, you have heard of G3OXD/A!

With the full backing of the company, extensive facilities are to be made available for an event that should be celebrational indeed. Chairman will be G3AOS, and it is good to know that guidance is to be given by G6FK, for "Freddie King" has always made a huge success in the planning and organizing of earlier Midlands vhf events.

More nearer the time. Set aside the date now.

Another Aurora

There was animated discussion during the tea-break at the Whitton Convention about the auroral opening earlier that week, on 21/22 April. Many southerly 4m men were successful in raising GM3UAG at Banff, who represents to most people the ultimate in dx—or at any rate northerly dx—on this band.

Just as with the 8 March Aurora, operators who use the hf bands were alerted to the start of anomalous propagation by a startling absence of signals on ordinarily crowded intercontinental bands. Where "Two" was concerned many more Scottish stations were in evidence than was the case in March. Example: G3UDA of Shrewsbury worked four, heard many Scandinavians (as is usual in auroral circumstances) and reported all signals coming from a heading slightly east of north. He gives duration as 2030gmt on 21 April with GM4HR still weakly audible by 0040gmt 22 April.

It will be noted that this Aurora occurred well after the 27-day cycle which many observers predicted would produce another opening after the great one of 8 March. "Has an Aurora *ever* been repeated 27 days afterwards?" asks G3COJ, who goes on to say: "Surely Aurora is caused by a flare which lasts only a few minutes—an hour or two at most—and it seems unlikely that another flare should happen to take place 27 days later. Granted that sunspots can sometimes last for several rotations of the sun, but that is hardly the same thing."

* * *

To us in the UK an auroral opening means working European dx normally inaccessible to us. It is worth remembering that the same goes for other people in other continents where Aurora occurs. For amateurs in the northern part of the USA, the 21-22 April manifestation offered opportunities for working well into Canada both on 2m and—lucky people—on "Six". Bill Smith, K0CER, describing himself as "your ARRL counterpart", tells us that in the USA the opening began at about 1100gmt on 21 April, when W0EKB at Omaha, Nebraska, heard a VE3. The opening lasted through to 0515gmt on 22 April, when propagation in the mid-west suddenly changed to auroral Es, enabling K0CER to work VE5US and VE6MO.

Among the more startling contacts was one made by VE5US with K1JRW in Massachusetts, using 10W of sideband and a television aerial that resonated conveniently on 50MHz. The path distance was something like 1,600 miles; this also by auroral Es which, remarks Bill Smith, "has been responsible for such dx as KL7 and VE8 working into the States in years past, and more recently VE2AIO's reception of BBC television above 40MHz."

The first Supreme Award

Seven further Four Metres and Down Certificate claims dealt with at the April meeting of the VHF Committee included only the second-ever application for a "Senior Receiving". All credit goes to Colin Baker, A5032, of Brookmans Park for now being able to join the redoubtable Ron Ham, BRS15744, in the rarefied "Senior" atmosphere.

Another award ratified in April included a first-ever in the 432MHz Transmitting Section. To the 70-centimetric voice of Ripley in Derbyshire, George Elks, G8CKX, goes the first Four Metres and Down Certificate in the G8C - - class, gained through consistent use of this band from the moment he was first licensed. Not until many months had elapsed did he appear on "Two".

April's other five ratifications were all for 2m. To G8CKG goes certificate No 156; G3HCW, No 157; G8CJV gains No 150; G8CKV, No 159; and G8CEZ, No 160.

* * *

It was known while these applications were going through that the first "Supreme" was in the pipeline, and that a claim might be expected from G3MCS. It missed the April meeting because Bill Hawthorne unhappily was in hospital at the time. What cheered him no end was to receive a telephone call on his sickbed from Mrs G3MCS telling him that the last outstanding QSL cards had arrived to make possible the application for the Supreme Award.

"This news was better than if I'd won something in the Grand National," was the G3MCS comment to *Four Metres and Down*.

With Convention imminent, the VHF Committee thought that it would be appropriate to present the Supreme Award in public to Bill Hawthorne, and this was duly done at the conclusion of the afternoon's programme in the lecture hall

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

at "The Winning Post". In our picture G3MCS, at right, receives the envelope-with-certificate from VHF Manager Geoff Stone, G3FZL. At left is G3GMY, who scrutinizes all vhf certificate claims, and to *his* left, G3HBW, another member of the VHF Committee.

As time goes by, more Supreme Award claims will be made by members who have cleared the formidable hurdles of earning three Senior or two Senior plus one 23cm Ordinary. Your VHF Committee will be glad indeed to see them.

Meanwhile, all praise to G3MCS as the central figure in another piece of metre-wave history.

To TF on "Two"

A quick pre-breakfast check on 70cm on the warm and balmy morning of 6 May showed GB3GEC at 90 miles QRB pounding in at S9. And "Two"? The usual beacons—but something else: a telegraphy signal at great strength rapping out "R" continuously. Another dx record was in process of being established. It was G3CCH of Scunthorpe acknowledging to TF3EA the completion of a contact via meteor scatter, to establish the UK to Iceland "first" on 144MHz.

The meteor shower that did the trick was the Aquarids. The 6 May schedule G3CCH—to—TF3EA opened at 0400gmt. Many short weak bursts permitted partial communication. Then at 0602gmt came a long burst which contained a complete exchange of calls, reports of "26" and "rogers".

Characteristically, Johnny Stace says nothing about his own part in bringing about an achievement which came to fulfilment very largely through his own assistance and encouragement to TF3EA and subsequent months of watch-keeping at unearthly hours hoping to break down the 1,100-mile path. He praises the Icelandic operator, "in building equipment for 144MHz without having any other active local 2m stations with which to check out his converter and transmitter."

The long vigils between the two were kept even when no named meteor shower was notified, for it is a fact, as G3MNQ pointed out here a year ago, that random meteor passages capable of carrying vhf signals with them occur very frequently. The point was substantiated by G3CCH and TF3EA, who had heard pings from one another many times before the Aquarids of May.

During the Lyrids meteor shower of April, BRS15744 when monitoring Gdansk on 70.31MHz at 900 miles path-length noted the ping rate per hour conformed exactly to predictions. On the peak day of 27 April the rate rose from 34 an hour between 1830—1930gmt to no less than 132 an hour between 2130-2230gmt.

A beacon for T—E

The presence of the Rhodesian beacon only 2kHz below our 4m band is given added interest in the light of the G3JHM lecture at Convention about transequatorial dx. From ZE1AN come the following details:

Callsign	ZE2AZE.
Frequency	69·998MHz.
Type of transmission	FSK.
Words/min.	14.
Transmission letters	"QTT de ZE2AZE" (Repeated continuously).
Power input	23W.
Duration of transmissions	24h daily.
Aerial	4-element Yagi.
Direction of beam	From 1600 to 0400gmt, 350°. From 0400 to 1600gmt, 50°.
Height of mast	35ft (To be increased to 45ft if necessary).
Height above sea level (at ground)	4,369ft.
Actual site	Latitude 20° 05′S. Longitude 28° 32·5′E.

If the beacon should be heard, reports would be appreciated by HQ Secretary, RSR, Box 2377, Salisbury, and by The Secretary, Matabeleland Branch, RSR, Box 1372, Bulawayo.

And, of course, the RSGB Scientific Studies Committee will be exceptionally interested to learn of any reception from ZE2AZE in the UK.

The Rhodesian beacon is at the QTH of ZE2JF. He, along with ZE1AN and ZE1JJ, are regularly operative on the intercontinental bands and can take—or give—current information about it.

By any account, to detect ZE2AZE at 4,500 miles from the UK would be a feat of dx reception at almost the ultimate. Even so, remembering that dx is relative. . . .

How do you find GB3GEC?

. . . . to detect the West London 70cm beacon in Cheshire or Weston-super-Mare is in its own way a feat of dx reception along paths three or four times the norm. George Jessop, G6JP, tells us that "the Chester report is interesting because the height there is only 120ft asl, and the GB3GEC transmitter here is only about the same height and there is quite a lot of rough terrain in between. So how does the signal get there for 70 per cent of the time, especially as Chester is off the beam headings?"

It would help those responsible for keeping GB3GEC going on 433·45MHz to have reports that state particularly how useful this beacon is and how often it is detected over awkward paths. Comments should go to George Jessop, c/o The M-O Valve Company Ltd, Brook Green, London W6.

. . . And "Sugar Charlie"

It was sweetening news indeed to hear from G3BA that the GB3SC beacon went into on-air service at 1400 on 6 May, the legal ends having been finally tied up. Tom Douglas

gives the tech-info on it as follows: frequency 433·50MHz, fsk, with the frequency of the mark about 600Hz higher. Power: 30W of rf into the feeder delivering power simultaneously to aerials beamed north and southeast.

May "Sugar Charlie" promote more occupancy on 70cm. Beacons do, you know.

Contest news

Without question, the most significant metre-wave contest of the present month will be the "23cm and down" one on 14 June. In the early days of 1,296MHz activity it was "tests" that were organized, not contests, and interest was mild. Introducing the competitive element sharpens the edge of people's enthusiasm. This should be evident on Sunday week in the Society's first UHF/SHF contest.

An event like this challenges members' ability to build equipment that will withstand continuous operation and no doubt a tough ride to the high spots. It does something else; it draws to others' attention what can be done with our microwave allocations, and in this sense persuades them to have a go in these areas themselves. But what with? The answer lies in contestants' hands. Please, then, may fairly comprehensive equipment information be added to log entries so that it may be given publicity here?

Later in June the 70MHz Portable event should bring out the crowds to whom "Four" has a special fascination (and we can say that again in respect of the 70cm Open in July). To operators inhibited by tvi possibilities at home, the 21 June event will be just what is needed to exercise the 4m equipment away from urban areas.

* * *

As for that other portable event, the Long and the Short of it was that seldom if ever had QRM like it been heard on "Two" over the weekend of 2–3 May. There was the usual clutch of enormous signals from GW mountain tops (gratefully received by the poorly located who might otherwise never have a chance to work this prefix). And there was the usual clutch—but a very much smaller one than usual—of chaps in trouble, either with hairy *moustaches* either side of the carrier, or excessive inverter whine, or both. Overmodulating defeats the purpose of bringing back distant stations. Intelligibility suffers and the more mellifluous-sounding get the answers.

All of which was much according to form. What was *not* according to form was the great increase in ultra-QRP transistor-aided participation. The vast signal from the Dunstable Downers at G8DDC/P was achieved with 12W input. Derby's G3VKR/P with less than half a watt made a pleasant sound over a wide radius. And there were numerous others.

Friends in Europe

"In Great Britain a large number of amateurs operated on 2m, 70cm and 23cm, but unfortunately most of them did not care to submit a log. There seems to be no simple way to extract a log from an amateur unwilling to write one . . . ."

Who said this? Why, the Poles in their booklet reviewing the results of the 1968 IARU Region 1 VHF/UHF Contest.

And why were "a large number of British amateurs" on? Because it was VHF/NFD. We may also ask why so few sent in logs for the current IARU Contest of that year; and the answer is probably because people did not know.

BEACON STATIONS

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

* Not operational

This note, then, will serve as a reminder that VHF/NFD 1970 coincides with this year's IARU Contest, and that copies of the Field Day log may be submitted by way of entry for the international event. There is no need laboriously to write the lot out again; someone in the group is bound to have access to a Xerox machine capable of producing the needful extras.

British operators who *did* take the trouble to put in an entry to PZK in 1968 hit very high places: the first seven in the section for portable and mobile stations on 432MHz were British portables, out of a total of 32 entries. In the 1,296MHz portable and mobile sections 14 logs were submitted: the leading five were British. And in Section 1, 144MHz fixed stations, no fewer than 464 logs were submitted, with G2JF heading the lot. Yet in Section 2 for 2m portable stations only seven UK entries were received out of a total of 256 logs submitted at a time when hundreds of British stations were operating on the band during Field Day weekend. The remainder just could not have known, or if they did, forgot or did not bother.

Copies of the VHF/NFD log for the IARU 1970 contest should go to G3JKY to forward to the Society sponsoring it this year.

Collect an Ainsdale Parchment

Once again the annual North-western VHF Contest, organized by RSGB Region 1 members, approaches. The date: Sunday 28 June. The times: 0900–1800gmt. The bands: 4m, 2m and 70cm. Eligible entrants: any paid-up member or group of members resident in the far-flung Region 1 area (which is virtually from the Dee to the Border). But note especially that members outside the region can earn a Certificate of Merit by collecting maximum points from Region 1 operators. This should be an incentive to distant vhf men to have a go.

Members within Region 1 rate for Certificates of Merit for both fixed and portable operation on each of the three bands—and they also have the chance to wrest the G2CIP Shield from the Wirral group.

Full rules will be gladly sent to all interested who send an sae to G2CUZ, Norman Horrocks, 34 Sandbrook Road, Ainsdale, Southport, Lancs.

* * *

A rare callsign will be operative during the Ainsdale contest, EI2VBD, which thinly disguises well-known G8BRT of Sheffield, for he had it allotted to him during his last holiday in Ireland. He will be operative with 25W from County Wexford from 20 June to 3 July, and out portable on the Wicklow Mountains with 5W, frequency 145·85MHz.

Home to work on "Four"

Operators who have managed to work Dennis Haylock, G3ADZ/M, on his home to work appearances on 4m (see page 319 last time) will like to know that another regular mobile "four meteorite" is G3VPS, who may be heard commuting from Hailsham to Gatwick Airport, and also in sundry parts of Sussex. Regular operation has enabled him to chalk up his thousandth QSO on 4m mobile.

"I don't know that it proves much except that there must be life somewhere!" he remarks, *in re* grumbles of lack of occupancy of "Four". And just to prove the point he adds another statistic to the effect that during his home to work drives he has contacted 150 different stations in two countries and 18 different counties.

All this with no more than a much modified B44 plus an aerial probably better than some of those to be seen at rallies. The main element is a whip mounted in the centre of the van roof with four quarter-wave radials made from copper draught excluder on the inside of the roof. The vehicle is a glass-fibre bodied three-wheeler.

AOI helps AOX

Remember last month's request for help to G2AOX on the Project Oscar paperwork problem? Now read this (it comes from Bill Browning, G2AOX):

"Just to prove to you how *Radio Communication* is read at once, I'd like to report that by 9.30 am on the Wednesday of publication I had a phone call from G3AOI, who lives in the district, saying he was coming round to give me a hand with all the paperwork. He called within an hour."

Each was a stranger to the other until that moment.

Get it on GB2RS

"Not much vhf news on GB2RS this morning". The comment is heard some Sundays after the local 2m news reader has done his piece. The answer is in the hands of every organizer of any kind of vhf activity: send the info along to reach RSGB headquarters not later than first post on Thursday morning and it can then go out over GB2RS on the following Sunday.

(However, if this information has already been published in the Club News section of *Radio Communication*, please do not send it for inclusion in GB2RS broadcasts. This will avoid unnecessary duplication of time and effort by headquarters staff. *Editor*)

New news on "two"

Helped by the punch of 150W from a good site, the latest GB2RS news bulletin, on the air these last couple of months from the QTH of G8ANQ at Bishop Auckland, has been laying down a good signal northwards to the border (1030bst Sundays) and southwards well into Yorkshire (1045bst).

Reports at a distance would be welcomed by Bill Burton. The frequency is 145·95MHz.

Tech corner

From G3OSU (Dr A. C. Carr of Bath)

I was very happy to see another detailed semiconductor circuit in *Four Metres and Down*—the G2AIW transmitter for 2m. Could elucidation be given on one or two points in the circuitry as shown?

Referring to Fig 3 on p32, January issue, in the oscillator section there are two BA111 diodes, two 18pF capacitors and three 220k resistors. Evidently the oscillator is being modulated by the af, but:

(i) On positive half cycles of af input *both* diodes are reverse biased. Assuming that these diodes might be of the varicap type, it seems that the feedback loop capacitance and the emitter-to-ground capacitance are simultaneously decreased. One would expect either of these to produce fm, so why use both?

(ii) Why the symmetrical design in this area?

(iii) What are the 18pF capacitors for?

Note. The above comments were forwarded to G3LIM, who evolved the circuit shown, and who now replies as follows:

From G3LIM (Bill Lambeth, of Twickenham)

(1) The oscillator circuit was a voltage-tuned transistorized adaptation of a design found on p102 of the first edition (1965) of *The Radio Amateur's VHF Manual*. No attempts were made to optimize the design and one thinks on reflection that greater linearity of deviation would result from the combination of only one varactor and a fixed capacitor in place of the other; the deviation sensitivity would be reduced, however. Peak af voltage should be less than reverse bias so that the diodes do not conduct.

(2) Design symmetry I find pleasing; often it is co-incident with a design advantage.

(3) The 18pF capacitors were added to reduce oscillator feedback; without them the arrangement squegged.

From G3COJ (Brian Bower, of High Wycombe)

I built a 70cm converter similar to the one shown on p99 of the February issue. I found severe i.f. breakthrough (8–10MHz) which was coming through the converter. It was greatly reduced in the particular model I built by adding disc ceramic capacitors of a value of 4,700pF across the feedthrough at the cold end of L1, and a 0·1μF across the feedthrough at the cold end of L4.

From G3XAD (Alan Southwell, of Burnley)

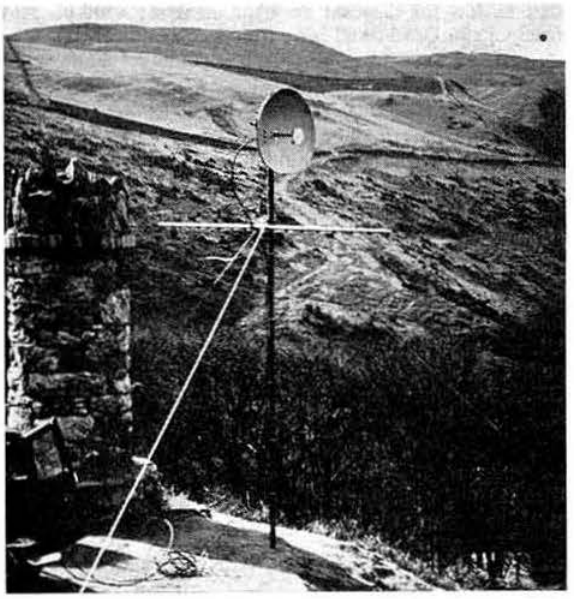
Some technical details are given below of the equipment used at the landward end of the recent contacts on 23cm between GD3TPF/P and GW3XAD/P (believed "first", as stated in May *Radio Communication*).

The gear at the 'XAD end used a DET24 tripler to 23cm which I built into the circuit in the *RSGB Handbook* designed for the 2C39. The only difference I have noted in the basic circuit is that a little more capacitance is required to tune the anode with the DET24. Something around $\frac{1}{2}$W of output is realized for 15W input and about 8W of drive from the QQVO3/20A in the 70cm transmitter.

The receiver uses the K6AXN lines and a transistor oscillator chain which goes as far as 640MHz where there are three BF180 amplifiers in cascade in order to get sufficient drive for the diode multiplier.

This just gives adequate current through the 1N21C mixer. The i.f. amplifier has a BF180 in grounded base mode. The i.f. strip was an EC10. The aerial system used comprised a 3ft dish with a 3-element Yagi as feed.

This equipment at GW3XAD/P worked GD3TPF/P on 23cm at a range of 66 miles. Later it was transferred to a site 1,150ft asl near Blackburn and worked the Isle of Man station at RST559 over a path length of 94 miles.



Looking out across the Irish Sea to the Isle of Man is the 23cm dish of GW3XAD/P in readiness for the believed-first GW to GD contact on this band. At the other end was GD3TPF/P

From G8VN (Harold Turner, Leicester)
Referring to p252, last paragraph but one, G8AOL's comments on scaling down 70cm arrays for 23cm, I was interested to read his suggestion that it would be possible to produce negative forward gain by direct scaling down of all dimensions. I wonder if G8AOL would like to explain how this is possible? It is certainly *not* because scaled down dimensions produce a disproportionately high capacitance on the end of adjacent directors as he suggests. If the dimensions are *all* scaled down the capacitance is the same!

$$\text{Capacitance between parallel elements in presence of ground} = \alpha \frac{A}{\log \frac{2D}{1.61d} + B}$$

where A is constant, B is a function proportional to height above ground, D spacing, and d diameter of element.

If all dimensions of a Yagi are scaled down precisely from one frequency to another the performance of the two Yagis will be the same to a second order accuracy. The difficulty arises in obtaining *precisely* the dimensions at the higher frequency because the dimensions are becoming smaller and smaller, and the aerial has to be constructed to a much higher order of accuracy. If *any* departure from the scaled down dimensions is made the performance of the higher frequency aerial will be different.

Incidentally, aerials for 10cm and 3cm have to be built to a *very* high degree of accuracy to obtain a specified performance. I learnt this the hard way on radar aerials.

Note. The above was forwarded to G8AOL, who now replies as follows:

From G8AOL (B. Godwin, of Bexleyheath, Kent)
While I agree in principle with G8VN's comments that scaling down *all* dimensions should work, my observations were specifically in respect of the Multibeam, and based on the results that G8ARM experienced in scaling down, and was suggested as a possible answer to why it had not worked, not as a general comment.

Results obtained at 23cm gave complete attenuation in the forward direction, with side lobes about 30° either side of where the main lobe should have been, and most of the signal directed out at the back. It was the shape of the polar diagram that gave the impression that direct scaling had produced too long a director element.

The capacitance across the ends of adjacent dipoles referred to in my original contribution related to the ends of the four directors where they are brought together at the boom and supported in an insulator. The impression was that the coupling coefficient had risen when scaling down, possibly due to some complex fringing effects as the ends of the dipoles are brought closer together, resulting in two one-wavelength dipoles rather than four half-wave dipoles.

It seems that the important point here is that the impedance between the ends of the dipoles remains constant with frequency. This would not be the case if the capacitance remained constant. The capacitance at the end of the dipole is reduced in proportion to the square of the element diameter; hence reducing the diameter by a factor of three results in one-ninth of the capacitance, while reducing the spacing by three will increase it, resulting in a total reduction in capacitance of one-third at three times the frequency.

With the dipoles supported at the high impedance point, any small variations here could—and obviously did—have serious effects on the end loading and velocity factor. When scaling the physical dimensions of this type of director-support, the reduction in dielectric constant with increasing frequency for the majority of insulators must be taken into account (admittedly this would have the opposite effect to that put forward). The main difficulty is to produce a sufficiently strong mechanical support for the directors when scaling down.

Regarding the accuracy required, the same tolerance in dimensions is permissible whether the wavelength be 1m or 1cm. It is only that the units become rather unmanageable at 1cm. It was for this reason that a wideband design was chosen so that small variations would not be quite so serious.

In conclusion, I would say that scaling down the Multibeam type of aerial is not as simple as scaling down the Parabeam, which we have used for a couple of years on 23cm with reasonable results. It presents a much simpler mechanical problem when attempting scaling down.

Here and there

Running 400mW on 145·35MHz, G8DAD will be operating from his home QTH at Lichfield later this month on his return there from boarding school in Gloucestershire. Look out for him.

* * *

G3HWR urges that *any* info on early activity on 23cm and down way back in the pioneering days will be welcome, not just believed-record claims. Yes, anything, including equipment details. He is QTHR.

* * *

"The amateur movement is strongly supported. It crystallized in this country into the Radio Society of Great Britain. The amateurs are still going strong. You will recognize their

transmissions because they always call each other 'old man'. They are usually very young men. They have the greatest fun and increase knowledge by giving mass observation"—the late P. P. Eckersley in his autobiography *The Power Behind the Microphone*.

* * *

"W3GKP transmits for moonbounce on 2,304·0MHz on request, and tests with W4HHK (1kW). If you want a sked advise preferences in frequency, emission or polarization to William L. Smith, 1525 Spencerville Road, Spencerville, Maryland 20868"—W3GKP.

* * *

Since metamorphosing from G8AWJ to G3ZCE, Stuart Lindsay has found himself endorsing recent comments here about the use of cw to get those dx contacts under normal 2m conditions. Especially has he marvelled at the G3TIR to GI5ALP schedule on the low end of "Two", and he is looking forward to his return home to Bognor Regis at the end of summer term at Manchester University so that he may resume telegraphy operation himself. Meanwhile he invites "anyone anywhere who would like to arrange a sked on the key after 19 June" (end of term) to write to him care of the Department of Physics, Shuster Laboratory, University of Manchester, Manchester 13.

* * *

G3DXI has sent us a list of 12MHz and 16MHz crystals that multiply into 2m and 70cm, HC6U and FT243, all at 12s 6d each. List is too long to print here. For a copy send an sae to G5UM.

* * *

And apropos microwaves, G3LBA told us at Convention that he has for disposal an 8ft aluminium dish of 36in focal length. Details and price from him again QTHR.

* * *

"Would like more details of equipment for 1,296MHz and up, especially 13cm, instead of the sketchy details usually given. Our bands don't just end at 70cm! A series of detailed and informative articles would be welcomed by many, as voiced from time to time in 'Four Metres and Down'. How about chasing up some of the tech types a bit?"—G3PNI.

* * *

If you are considering riding in on the new wave of interest in rtty, adhere to the acknowledged frequencies: 145·3 for UK north and international contacts; 144·6MHz, UK south. Picking on random frequencies for rtty nets will only lead to chaos. Most Thursdays 2000–2030bst, Ealing's G3YKB operates rtty. He quotes 15 other London area stations on 144·6MHz.

* * *

Do you have a spare HC6U between 5·25 and 5·3MHz? If so G3AAJ will make you an offer. Write Ron Broadbent at 94 Herongate Road, London E12.

ON THE HOUR
ON THE KEY
ON "TWO"

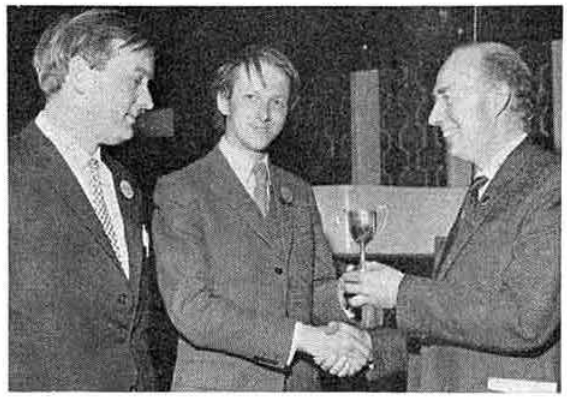
If you are looking for more telegraphy contacts on 2m try the G3JKY suggestion to put out a CQ on the hour between 144·0 and 144·15. Others may be waiting for your call.

REPORT ON

THE NORTHERN RADIO SOCIETIES ASSOCIATION'S CONVENTION

The NRSA held its annual convention in the Cumberland and Kendal Suites at Belle Vue Gardens, Manchester, on 26 April 1970. The object of the convention is to place amateur radio on show to the public and this involves club participation.

The clubs who arranged and organized stands this year were the Wirral Amateur RS, Bury & Rossendale RS, East Lancashire RS, Eccles RS, Liverpool and District RS, Manchester & District RS, Stockport RS, Certificate Hunters' Club, and South Manchester Radio Club (incorporating North-West VHF Group). In addition, displays were put on by RAEN in conjunction with the Scouts. An additional stand was the RSGB bookstall which was virtually sold out by the end of the day.



Mr B. Armstrong, G3EDD, (r), presenting the G8AYD Trophy to Mr P. G. Torry, G3SMT, chairman of South Manchester Radio Club. On left is G3SMM, NRSA chairman

Members of South Manchester Radio Club, winners of the G8AYD Trophy, gather round their exhibit, Left to right: G3HZM, G3UTL, Swl Cannell, G8BOT, G3MXV, G3SMM, G3WFT, G3VIW and G3YKJ

There was no formal opening ceremony this year, although the association's chairman, Mr W. M. Furness, G3SMM, made a short speech in which particular reference was made to the fact that the Stockport Radio Society was to celebrate its golden jubilee in June 1970 and that one of its founder members, G2ARX, was present at the convention. Reference was also made by the chairman to the fact that the Region 1 representative, G2AMV, was now the longest serving regional representative of the RSGB.

The chairman then introduced Mr Brian Armstrong, G3EDD, executive vice-President of the RSGB, who had kindly agreed to judge the club stands and to name the winner of the G8AYD Trophy. This is awarded to the club or society which, in the eyes of the judge, has arranged the most informative display. Mr Armstrong commented on the various stands and named South Manchester Radio Club as the winner. South Manchester was the joint winner last year with Manchester & District RS.

The South Manchester display consisted of solid state equipment ranging from one-transistor items mounted on cardboard or hardboard to a sophisticated ssb transceiver along with various items of test equipment. In the course of his address Mr Armstrong stressed the need for full use to be made of available amateur bands, with special reference to the vhf and uhf bands, and pointed out that the lack of use of these bands could lead to them being lost to the amateur.

An additional feature at the convention consisted of the adjacent suite being set out as a cinema with two separate film programmes. This was extremely well patronized throughout the day and gave people an opportunity of seeing certain technical and general interest films—as well as giving them an opportunity to rest their feet!

One of the highlights of the convention was the arrival of Granada TV's outside broadcast unit with a volunteer crew who demonstrated colour television on a closed-circuit network.

The callsign, as in previous years, was GB2BVC, and talk-in stations were operated on Top Band (Stockport Radio Club), on 2m (North West VHF Group) and on 4m (RAEN). The main station (using Sommerkamp equipment feeding a TA33 Jr Beam) was operated mainly on 20 with many contacts, predominantly with Continental stations, though one GDX QSO was a VK9 on 15m.

It is estimated that between 3,000 and 3,500 people passed through the convention during the day, and as a whole it was generally considered a success.

Trade stands were put on by Lowe Electronics, Stephens James, Weller Electric, Garex, Radiotronics, BEQ Amateur Supplies, Dynatech Limited and the Amateur Radio Shop, who between them provided a very varied and attractive diet for the large crowd.

The thanks of the committee are due to everybody concerned in the organizing and running of the convention; with special reference to the ladies who looked after the reception area; to Granada Television, and to Belle Vue Limited for the facilities and services provided.

A booking for 25 April 1971 has been made for next year's event.

G3SMM

MORE NEW PRODUCTS

A large range of mobile aerials is offered by Antenna Specialists UK Ltd, of 66 Bolsover Street, London W1. Of particular interest to members of RSGB will be the ASP 629, a $\frac{1}{2}$-wave aerial offering a 2·5dB gain relative to a $\frac{1}{4}$-wave ground plane. The stainless steel whip has its own matching transformer enabling accurate matching to be carried out. A mounting hole of 0·75in is required, and fitting needs no access from the interior of the vehicle.

The ASP 629 is one of a range of aerials suitable for use on the 144 and 432MHz bands. Retail sales of these aerials to amateurs are being handled by KW Electronics Ltd, of 1 Heath St, Dartford, Kent.

THE MONTH ON THE AIR

A monthly feature by JOHN ALLAWAY, G3FKM*

READERS who are interested in the 10m band will be pleased to know that *QUAX*—a newsletter formerly published by SM4DXL and devoted to amateur radio on that band—is about to appear again. It is to be produced by G3DME, Alan Taylor, who may be reached at "Altadena", South View Road, Crowborough, Sussex, and the subscription rate is 11s per annum. A *QUAX* net takes place on 28,150kHz at 1000 on Sundays, and other nets at 0900, 1600 and 1700 on the same frequency.

Mention of 10m in an earlier *MOTA* has drawn forth comment from G8KB, who feels that the band would well reward careful study by those interested in vhf, as trophospheric, auroral and meteor scatter effects are to be observed from time to time. The use of the vast open space available during the times when there seems to be no long-distance propagation for local QSOs is suggested as a move towards better understanding of its behaviour as well as removing some of the congestion from the lf bands.

W. G. Meredith, formerly 5A1TA, is now resident at the address shown in *QTH Corner*. He has informed G3FKM that he is still behind with his QSL chores, but promises that all cards received will be answered. 5A5TH, who is a Libyan, is active once more, but it seems doubtful whether amateur radio will be permitted to non-Libyan nationals again.

Please note that G3NMR is *not* acting as QSL manager for the present holder of the callsign EL7B. He was acting in this capacity only for the previous holder of the call who was active in 1964-5. G3UML also asks your scribe to point out that he does *not* look after similar duties for VP1PV although that station appears to be telling people that he does!

The information given in March *QTH Corner* that WA4WTG is acting as QSL manager for CR4BC has been found to be incorrect and apologies are extended to WA4WTG for inconvenience caused. Unfortunately it is not always possible to check sources of information as closely as desirable, and while every attempt is made to avoid errors no guarantee can be given that all QTHs given are correct.

Readers will be sorry to learn that ON4CC, and ON4ZO and wife have been seriously injured in car accidents (ON4ZO's son being killed). Our sympathy is extended to them with wishes for speedy recovery.

News from overseas

Ron Kreger, VE3DLC, has supplied a list of stations for whom he is currently acting as QSL manager. These are: ET3DS, HI8XJA, HI8XPM, HS3DR, OX5AY, VP1FW, VP1TM, VP2DAN, VP2DAO, VP2GBH, VP2GBG, VP2GN, VP2KF, VP8JI, YV5ACL, 5H3MA, 5Z4KL, 6Y5CB, 6Y5GB, 6Y5GM, 6Y5RM, 7X0AH, 8P6AH, 8P6AZ, 8P6BM, 8P6BN, 8P6BX, 8P6CD, 8P6CL, 8P6CP, 8R1S, 8R1U, 8R1Z, 9Q5EP and 9Y4GB. Enquiries should be accompanied by an sae and irc and sent to 30 Zenith Drive, Scarborough, Ont, Canada.

Ron Smith, G3SVW, is now on Stonington Is (Graham Land) and will be there for two years. He has a KW2000B transceiver and says that he will be active mainly on 14,020 kHz cw with some ssb on 14,180kHz. Power is only available during the hours of darkness so VP8LK's activities will depend on those of the generators. Voltage fluctuations cause some T7 and T8 signals to be radiated but a dc power supply is expected next December and this should solve the power problems. Contacts with the UK are particularly desired and QSLs should be sent via G3NOM.

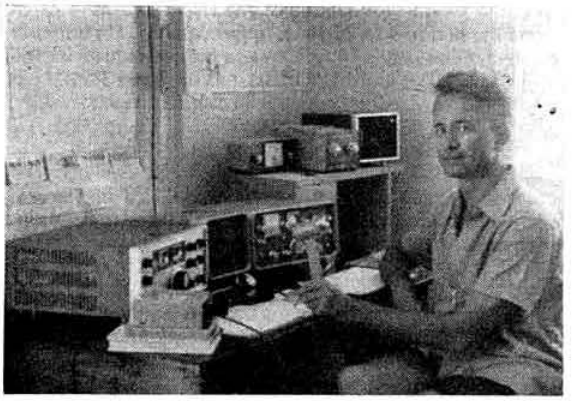
9H1CB (G3RFH) writes to say that he will be in Malta for another year and that he is to be found on all bands 3·5 to 28MHz on cw and ssb. He uses an FT150 and expects to have a tri-band quad up by July. All contacts before 1 May will be QSLd via the bureau whether cards have been received or not, but after that date applications should be sent via G3LQP. 9H1AZ will be returning to the UK in July and Ken points out that there are no three-letter callsigns in Malta—except for 9H1SWA which was a special call for a one day event, 9H1USA being a pirate. 9H1BP says that so many stations appear to need cards from Malta nowadays that the boys at the RAF Luqa Radio Club, 9H1BA, are going back through their logs to ensure that they have not let anyone down.

G3HSR, Jim Smith, is now in Singapore and on the air as 9V1PR. His wife is also licensed and holds the call 9V1PS.

Recent changes in the organization of the Cyprus Amateur Radio Society have resulted in the election of Mr Mike Hadjimichael as its first Cypriot president. ZC4MT reports that although there is no regular amateur radio activity in the country at present, special stations have been licensed—in the last two years 5B4FD and 5B4ES have been operated legally—and the current activity of "5B4NZ", who has been noted on 1801kHz, is deprecated as it can only do harm to the cause for early restoration of licences. It is hoped that 5B4FD/P will be on during NFD operating from the ancient city of Salamis.

According to Ian Hacking, G3VDO/MM, it is expected that Japan will be issuing reciprocal licences to foreign amateurs by next year. Until now no foreign operators have been allowed, even from the EXPO 70 station JA3XPO.

* 10 Knightlow Road, Birmingham 17.



David Appleton, VR10, always on the lookout for signals from the UK, will be on the air from Tarawa in the Gilbert Is for the remainder of 1970

DX news

ST2SA is said to be found regularly on 14,021kHz at 1430 on Sundays, and on the same frequency on other days (except Friday) at 1900 with 21,031kHz a possible alternative at this time. 700 QSL cards have been supplied by WA5REU and those desiring a direct QSL are asked to send their card with six IRCs to the address in *QTH Corner*. K6KA is trying to raise funds to provide Sid with a transmitter with a vfo.

Strange prefixes were much in evidence during the WPX Contest. Some of those noted were HU2CEN (YS2CEN), OG and OI (who were Finnish stations), XQ3ZN (CE3ZN), and XX0TT who is said to have been in Angola. TA2SC was using the callsign TC2SC. WS2JRA was a special callsign being used by the South Jersey Radio Association between 4 and 12 April, and WE4SUN was the solar eclipse study group station of the Georgia Southern College RC.

9N1RA is leaving Nepal at the end of May, ZM3PO/C should have left Chatham Is on 10 May, and C21JW will most likely have departed from Nauru by the time this is read. 6O1KM is said to be on his way to Tristan da Cunha where he will be using the call ZD9KWM. 5Z4KL is interested in operating from the Comoro Is (FH8) during August, and FP8CY is believed to be due there in the autumn but may be unable to be active until early in 1971.

Activity from Portuguese Timor seems to be on the increase. In addition to CR8AI, CR8AG, Adriano, is often to be found between 14,220 and 14,240kHz at around midday. Torres, CR8AJ, is crystal controlled on 14,013kHz and usually on the air between 1300 and 1700.

BV2A has been reported on 28MHz ssb. UA0XF is said to be in Tuva—Zone 23 for the WAZ chasers. 3X1SJ is supposed to be the callsign of ON5SJ who is in Guinea for a 60-day stay, all band ssb operation is forecast.

TT5JR has been heard on the air giving his location as Fianga, Tchad. He is said to be DJ1EJ. Another new African callsign is W9EVT/ZD5 who has been on 28MHz ssb quite frequently. He asks for QSLs via PO Box 7557, Johannesburg.

VP2AASL has been reported on 14MHz. He is W2BKU and says that in future all provisional Antigua callsigns for visitors will have a four-letter suffix–VP2AA plus two other letters.

KH6BZF has all the KH6EDY logs from 1 January 1961 to 31 December 1969. *West Coast DX Bulletin* reports that some of the 1969 logs may be invalid because they were not properly signed. Applicants for KH6EDY cards should send two IRCs for surface reply or four IRCs for air reply with their sae. It is hoped that some of the present personnel will become licensed soon.

TI2J has taken over the task of sending out QSLs for the recent TI9 expedition, and those already sent to TI2CMF will be forwarded to him. DL7FT has no knowledge of YM1AL, who was reported recently to be instructing those he worked to QSL via Frank.

The South African government is planning to build a weather station on Bouvet Is (3Y0) and the work should start this autumn. *West Coast DX Bulletin* reports that ZS1ANT has applied for the position as radio operator there and has been accepted. All men and materials will be landed by a specially modified ship and helicopters, due to the almost impossible landing conditions from the sea.

It now seems clear that the call TY6ATE has been issued twice—first to 3V8AL (see May *MOTA*), and then to Ted Schultz who operated from 23 December 1968 to 6 May 1969 when he returned to the USA. QSOs after this date were probably with a pirate.

G3TIK will be operating from Kourou (French Guyana) during June and July. Equipment to be used is an HW32 and ground-plane aerial. Callsign is not yet known, but possible frequencies to be used are 14,090kHz cw, and 14,125 and 14,250kHz ssb. It is hoped to have a special QSL card as the site of the station will be that used for the ELDO Europa vehicle launches. QSL to G3TIK, 98 Austen Paths, Stevenage, Herts.

UK1LAA/100 appears to have been a special callsign issued for four days only to commemorate the 100th anniversary of the birth of Lenin.

Arthur, ON4CC, (seated) one of the pioneers of the ssb mode and winner of three successive ARRL DX contests in the late 'forties, pictured at the operating position during a recent visit to the specially built radio room belonging to Ted, G2HKU, in Minster, Kent

Ron, F5QQ, also known as one of the operators of the very successful 3V8AA expedition, has been active as GD5ARJ from the Isle of Man for some time. He hopes to accompany the forthcoming expedition to Clipperton Is before taking up his next assignment

Dxpeditions

The trip to **Albania** by DL7FT has been postponed due to lack of funds and is now likely to take place in September. According to the *DXers Magazine* two well-known USA dxers have stated that they are prepared to finance the expedition if they could see some kind of legal document from Albania giving permission to operate. Other sources suggest that a group of Scandinavian amateurs—possibly including some of those recently involved in the Market Reef expedition—are attempting to put ZA on the air this summer.

At the time of writing, K2IXP was en route to **Sikkim.** He was hoping to operate from AC3PT during his stay, and also intended to apply for permission to visit the **Laccadive Is.** If he succeeded he hoped to go there about 10 June, but in view of the fact that even Indian nationals are refused licences it seems rather unlikely that he will be lucky. A visit to the **Andaman Is** is being contemplated by HS1ABO and VU2BT who may go there in June, July or September.

KA9RC reports an expedition to **Minami Torishima** (formerly Marcus Is). This will be a 24 hours a day operation on 10, 15 and 20 metres cw and ssb, and will take place from 2 to 8 July. The callsign is likely to be KA1B.

More activity from **Market Reef** is promised by a group of 10 operators using the callsign OJ0DX during the period 6 to 14 June. Two stations will be on the air simultaneously and all bands 80 to 10 metres will be used.

CE3ZN's previously mentioned intention of visiting **San Felix Is** (CE0X) may become fact during the second week in August.

Kenneth Cantrell, K1OTA, is planning a visit to the Mediterranean area in the summer. He will be in **Monaco** from 23 to 27 July, in **Andorra** from 30 July to 4 August, **Luxembourg** from 6 to 9 August, **Malta** from 13 to 16 August, and **Tunisia** from 21 to 23 August. His equipment will consist of a Drake TR3/RV3 and frequencies he intends to use are given as 7,030, 7,255, 14,030, 14,280, 21,030, 21,300, 28,030 and 28,600kHz. Financial help would be very welcome and should be sent to 36 Pembroke St, Quincy, Mass, 02169, USA.

VE3EWY will visit Dominica, St Lucia and St Vincent during the period 9 to 25 June, approximately. He hopes to be active on all bands 10 to 80m and his cw frequencies will be 28 025, 21,025, and 14,025kHz, and on 7 and 3·5MHz as near to the band edges as possible. Ssb frequencies will be 7,095, 14,195, 21,245, and 28,600kHz. Equipment will consist of a Galaxy 5 and 14AVQ aerial.

Gus, W4BPD, has now received word that his FR7 and FH8 licences are in order and should be on his way before this reaches readers. He has given a list of transmitting frequencies which he will use, they are as follows: 3,500/5, 7,000/5, 14,000/5, 21,000/5 and 28,000/5kHz (cw), and 3790/3800, 7,060/7,070, 14,100/105, 21,245/250 and 28,490/500kHz on ssb. Listening frequencies as announced. *More than two QSOs per band per mode will result in delayed QSL cards for the offending station.* All QSLs go via W2MZV.

New Russian prefixes

Official Bulletin No 267 received from ARRL HQ announces that the Radio Sports Federation of the USSR has now furnished a breakdown of the new UK series of callsigns in use by Soviet club stations. A UK1, 3, 4, 9 or 0 followed by any letter, a UK2F, a UK2A, E, H, I, J, L, P, U, W, X, Y all indicate Russian SFSR. UK2A, C, I, L, O, S, W, indicates White Russia (UC2). UK2B and UK2P are UP2 (Lithuania). UK2Q and UK2G are Latvia (UQ2). UK2R and UK2T are Estonia (UR2). UK5O is Moldavia (UO5). UK5 followed by any letter other than O is Ukraine (UB5). UK6F, O and V are Georgia (UF6). UK6G is Armenia (UG6). UK6D, C and K are Azerbaijan (UD6). UK7 is Kazakh (UL7). UK8H is Turkoman (UH8). UK8J and UK8R are Tadzhik (UJ8). UK8M and UK8N are Kirghiz (UM8). UK8A, C, D, F, G, I, L, O, T, U and Z are Uzbek (UI8). All vhf stations in the USSR have the new prefix UR.

Top Band news

9H1BP has written to say that it appears that 1·8MHz operating permission is being withdrawn from those Maltese amateurs who already have it, and no new stations are being licensed for the band. G3VPS reports that during his recent visit to 9H1BL they worked 124 stations on 160m, including contacts with G, GC, GM, GW, OK, DL, OE and 9H1. Most OK signals were up to two "S" points louder than the average G station, and no GIs were heard in spite of skeds having been arranged. Peter wishes to thank G3WPO, who appears to have done a very fine job at this end by acting as a most efficient MC, and all those who burnt the midnight oil to work 9H1BL.

Compliments are also being received about the efficient way in which the recent GM3SVK/P expedition was carried out.

Awards

The WK Clubs Award

Issued by International CHC-FHC Chapter 16.

Custodian: Flt Lt Roy Handley, G3GJQ, RAF Cosford, Wolverhampton, Staffs.

There are six awards—for obtaining sufficient points by working club stations (*a*) anywhere, (*b*) in different countries, (*c*) in different ITU zones, (*d*) with different prefixes, (*e*) in all six continents, and (*f*) CHC/FHC club stations. Full details

of minimum requirements and points values (together with details of the **Pioneer Airways Award** etc) are obtainable from G3GJQ in exchange for an sae. Thus awards are available to listeners and cost 5s, 10 IRCs or $1.

The WF-CHC Award
French CHC Chapter 68, J. M. Cibot, 8 Rue de la Nouette, Rambouillet 78, France.

For contacts with members of Chapter 68 since 1 January 1969. Class C requires 15, Class B 30, (with a minimum of four QSOs with members outside France), and Class A 50 points (with at least five QSOs with members outside France and three with honorary members). Points values of QSOs are as follows: with Chapter 68 members, one point; with members outside France, three points; with honorary members, five points; with three non-CHC members of the chapter, one point; and three listener reports from swl members count one point. Membership lists are available from G3GJQ. This award costs three IRCs for Classes A and B and 10 IRCs for C.

The Pedagogue's Diploma
For confirmed contacts with English university towns. G stations need 25 for Class 1, 20 for Class 2, or 15 for Class 3; others 20, 15 and 10, respectively. Towns are: Bath, Birmingham, Bradford, Brighton, Bristol, Cambridge, Canterbury, Colchester, Durham, Exeter, Guildford, Hull, Lancaster, Leeds, Liverpool, London, Loughborough, Manchester, Newcastle-under-Lyme, Newcastle upon Tyne, Norwich, Nottingham, Oxford, Reading, Salford, Sheffield, Southampton, Uxbridge, Warwick and York. This certificate is issued by the Garendon School Radio Society, Loughborough, Leics, in connection with the centenary of the first Education Act of 1870. They also issue the **Carillon Award** for working 10 stations in Leicestershire (including three in Loughborough) five and one, respectively, for non-G stations). Either certificate costs 5s or seven IRCs, and applications should be sent to G3TKK, 36 Spinney Hill Drive, Loughborough, Leics. Listeners may apply.

This magnificent trophy, donated by the Brazilian Ministry of Communications to the national society whose amateurs perform best in the World Telecommunication Day Contest, will be competed for yearly unless it is won by the same society for three consecutive years

The Mayflower '70 Certificate
Issued by Plymouth ARC
Custodian: G3KFN, 74 Tavistock Road, Stoke, Plymouth.

Awarded for one QSO with GB2USA or three members of PARC or any three Plymouth stations during the period March 1970 to November 1971. Log extracts should be sent with 2s or two IRCs to G3KFN. Listeners may also apply.

The Massachusetts Amateur Radio Week Certificate
A certificate signed by the Governor of the Commonwealth of Massachusetts will be issued to all amateurs who submit claims to have worked two Massachusetts stations during the period 0001 14 June to 2400 20 June. Applicants should give QSO details and enclose a large sae and one irc and submit to Bill Holliday, WA1EZA, 22 Trudy Terrace, Canton, Mass, 02021, USA, before 31 July 1970.

* * *

Requests are frequently received for up to date information on various certificates and awards, and suggestions have been made that the Society should publish its own directory. However, this task has already been undertaken by K6BX, who issues his *Directory of Certificates and Awards* every three months. This book is kept up to date and contains details of many hundreds of the world's awards. It may be obtained from G2BVN (R. F. Stevens, 51 Pettits Lane, Romford, RM1 4HJ, Essex), price 21s 3d.

In future the manager of the **CQ Magazine SSB DX Awards** will be WA6GLD (Jerry Hagen, 5031 Arroway Avenue, Covina, Cal 91723, USA). Cards for the 100, 200 and 300 SSB Awards may still be sent to G3FKM for checking.

Please note also a change of address for the manager of the **Robinson Crusoe Award**—this is now BRS27806, 12 Ella St, Newland Av, Hull.

Contests

Results of the **1969 Giant RTTY Flash Contest** have been received and show that top score was made by VK2FZ (2,609 points). The only UK entrant was G3WQT (168 points). The listener section was won by Alexander Morton from Scotland.

Results have been received of the **WAB HF Phone Contest.** Highest score was achieved by **G3OWH** (37,975 points) which was a multi-operator entry. World winner (single op) was **5N2AAF** (22,080 points). Top UK and world second entry came from **G6LD** (18,540) who was closely followed by DL2RR (18,300). Other UK scores include G3SWX (16,520), G3VLL (13,975), G2ZR (2,460) and G8KU (1,200).

The 1970 Venezuelan Independence Contest

0000 4 July to 2400 5 July

All bands 3·5 to 28MHz a.m. and ssb.

Stations in Europe work YV and other American stations and give RS plus a three-figure serial number starting at 001. QSOs with YV count two points except on 40m where they count one point. Other QSOs count one point. Multipliers are ARRL countries and YV and USA call areas. Score is sum of individual band totals arrived at by multiplying QSO points by band multiplier, and separate logs should be used for each band. A certificate will be awarded to each participant who works at least five YVs and stations in five other American countries, and also to listeners who have 50 contacts confirmed, if eight IRCs are sent to RCV, Concurso Independencia de Venezuela, PO Box 2285, Caracas, Venezuela. Logs should be postmarked no later than 15 September. The certificate awarded in previous years has been most attractive but a number of applicants have complained of non arrival or very slow delivery.

Worked all Massachusetts Cities and Towns Contest

0000 14 June to 2400 20 June

All bands and modes.

Final score is the total number of different Massachusetts cities and towns worked multiplied by the number of different counties worked (maximum 14). A minimum of 10 points is required to be eligible for an award, and entries must be sent to arrive no later than 31 July to Warren Baker, W1DFR, 66 Rexford St, Mattapan, Mass, 02126, USA.

The Eighth Illinois QSO Party.

1600 1 August to 2200 2 August

All bands and modes.

Stations may be worked on each band/mode for credit. Total score is number of Illinois counties worked multiplied by the total QSO points (one per QSO). Each group of eight contacts with the same county counts as an extra multiplier. QRGs to be used will be around 3,560, 3,735, 7,060, 14,060, 14,275, 21,060, 21,360, 28,050 and 28,660kHz. Send logs before 1 September to K9CJU, 3620 N. Oleander Av, Chicago, 111, 60634, USA.

1970 Countries Table

	1·8 MHz	3·5 MHz	7 MHz	14 MHz	21 MHz	28 MHz	Total
G3VPS	9	12	10	60	18	10	119
G3JVJ	4	66	18	37	23	26	174
G8VG	3	21	26	28	42	42	162
A6265	3	75	64	172	140	116	570
A6248	4	59	57	157	107	87	471
BRS25429	3	96	74	119	111	104	507
A6304	10	32	43	148	127	77	437
ORS31427	—	9	11	179	109	108	416
BRS27880	3	51	31	99	56	49	289
A6278	3	44	36	76	24	29	212
A5489	—	70	17	89	60	122	358
BRS30694	6	24	29	70	61	44	234
A6242	2	19	7	38	26	29	121
A6023	5	32	31	59	21	15	163
A6148	5	78	11	37	28	68	236
A6098	4	21	12	26	37	25	125

(This month's table is in order of 7 plus 14MHz scores)

QTH Corner

AX9AC	PO Box 204, Port Moresby, Papua.
CR8AJ	Horacio Torres, PO Box 59, Dili, Portuguese Timor, (via Darwin, Australia.)
EL2AT	via W4NJF, 1416 Rutland Drive, Virginia Beach, Va, 23454, USA.
EP2TW	via GI3XHV.
GB3WCS	via G3YHN, C. J. Pedley, 57 Temple Rd, Willenhall, Staffs. WV13 1ET
HC8FN	via WA2WUV, Virgil Bowers, Box 296, Massapequa, NY, 11758,USA.
HR1SWG	c/o USA Embassy, Tegucigalpa, Honduras.
HS1ABC	via K5QHS, 4423 'A" Street, Little Rock, Ark, USA.
HS1ABU	via W5ZG, 4715 Crockett Boulevard, Galveston, Texas, USA.
HS1ACF	via WA4UOE, 340 SW 64th Way, West Hollywood, Florida, 33023, USA.
HS2ACA	via DK1RR, Gerd Berg, Schulstr 8, 5901 Wilnsdorf-Rudersdorf Germany.
HS3ACP	via W9VNE, 1206 Woodlawn, South Bend, Ind, USA.
HS3ACV	via W8BVJ, 693 Warner Road, Hubbard, Ohio, 44425, USA.
HT4IN	W4QPX, G. L. Baker, RFD 1-Box 185, Dalhart, Texas, 79022, USA.
KC6WS	Box 185, Yap, Western Caroline Is, 96942.
KJ6BZ	Box 42, 24 ADS, APO San Francisco, Calif, 96305, USA.
KJ6CF	PO Box 114, APO San Francisco, Calif, 96305, USA.
KS6DH	G. Johnson, Dept of Education, Pago Pago, US Samoa, 96920.
KS6DJ	PO Box 263, Pago Pago, US Samoa, 96920.
ST2SA	Dr S. A. Ibrahim, Box 125, Medani Hospital, Sudan.
VP2VAA	via VE3GMY, E. P. Beatson, 56 Kilworth St, Komoka, Ont, Canada.
VP8LK	via G3NOM, R. Gerrard, 32 Parland Av, New Mills, Stockport, Cheshire.
WE4SUN	via W4DQD, PO Box 2067, Georgia Southern Branch, Statesboro, Ga, 30458, USA.
WS2JRA	via K2AA, S Jersey Radio Assn, Seymour Avenue, Cecil, NJ, USA.
YB1AAK	via K9EYZ, Edwin Heitzer, RFD, Middleton, Wis, 53562, USA.
ZL1BJT	PO Box 144, Manama, Bahrain, Arabian Gulf.
3X1SJ	via W4SPX, 1722 Dorris Drive, Orlando, Fla, 32807, USA.
ex-5A1TA	W. G. Meredith, 29 Moor Croft, New Brighton Village, Mold, Flints.
5N2AAF	via W7VRO, Dick Moen, PO Box 981, Bellingham, Wash, 98225, USA.
9H1CB	via G3LQP, 56 Combe Rd, Tilehurst, Reading, Berks.
ex-9M2BC	now G3PMT, 8 Waldegrave Rd, Dagenham, Essex.
9Q5GI	via G3TWS, 32 Bibury Rd, Benhall, Cheltenham, Glos, GL51 6BA.
9V1PR	Jim Smith, 4-J Rosyth Rd, Singapore 19.

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

Band reports

Quite a good month with a great deal of interesting signals to be heard on the hf bands, including some expeditionary activities. The YV0 trip seems to have been somewhat disappointing and was apparently of only 36h duration. Eighty metres still produces some very fine signals from dx locations, and the usual crop of deliberate interference. A new "ploy" by one would-be EI dxer on the band is to make a practice of calling "CQ DX" for long periods within splattering distance of the established dx "net".

Very many thanks to all who have sent in information during the past month and have heeded the request for logs to be set out in chronological order. Special thanks are due to the following—and especially to G3AAE who has discovered that his first report to *MOTA* was sent off 30 years ago!: G2HKT, G3AAE, G3AX, G3HB, G3HCT, G3III, G3JVJ, G3KGM, G3UML, G3VPS, G3WCY, G3WNT, G3YHD, G3ZIL, GM4QK, G5JL, G8VG, BRS2098, BRS17567, BRS27880, BRS30231, BRS30694, A5489, A6023, A6098, A6248, A6265, A6904 and A6947. Calls listed in italics were on cw, the rest on ssb.

1·8MHz. 2350 *9H1BL* (QSOd by G3VFA, Partridge Electronics RC using Joystick VFA aerial.)

3·5MHz. 0000 CT2AK, EA8HA, EP2FB, PY7BFN, 9H1CB. **0200** *EL2CB*, VP2VI. **0500** FP8AP, KZ5BA, OA8V, VE7ZM, VP9GE, WS2JRA/2, XE1KS. **0600** HC2GG/1, KG4AS, PZ1AH, ZM3AAY. **1900** AP2MR. **2000** JW1DX, VU2BEO. **2100** 4S7PB, 5Z4KL. **2200** CR6IV, EP2DX, OY1X, TA2E, TF5TF, VP2VI, 6W8DY, 9H1BE, 9J2DT. **2300** *AX6HD*, *CR6AI*, UI8LM, VU2BEO, ZD9BN.

Propagation Predictions

The months of June, July and August, are the most unfavourable months for dx conditions, because the F2 MUFs are considerably lower than in the winter months.

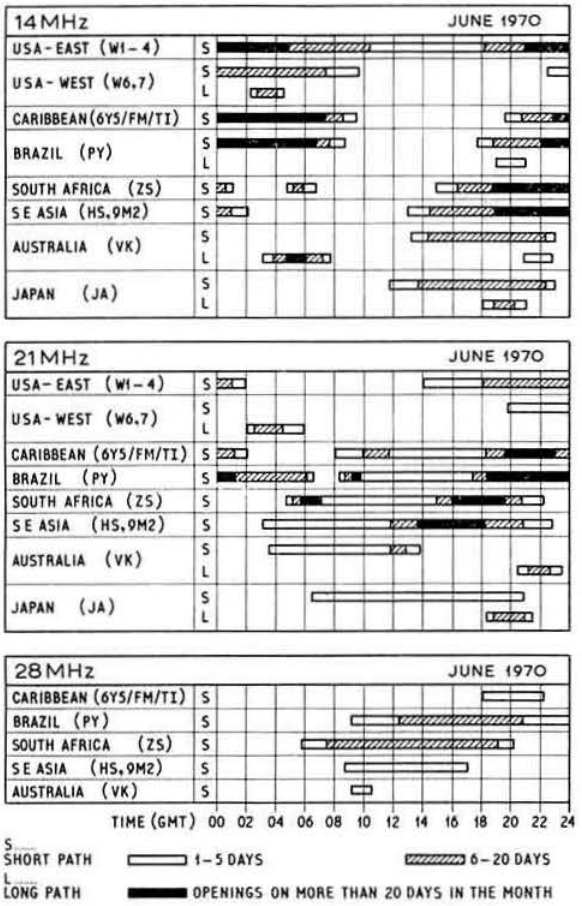
On **28MHz**, even Africa and South America will not be heard with certainty, mainly on days with above average F2 MUFs. Contacts with North America and Japan will be impossible.

On **21MHz** the unfavourable conditions will also be noticeable; North America, Australia and Japan will only be heard on days with above-average F2 MUFs. Contact with the west coast of North America will be possible in the early hours of the morning, and with Japan and Australia in the latter part of the evening via the indirect path. Stations in southern Europe will find better conditions than those farther north. Some compensation for poor dx conditions will be provided by the sporadic E short-skip conditions during the summer months for distances of about 500 to 2,000km. These short skip contacts are possible because of the existence of a sporadic E layer at frequent intervals.

14MHz will offer excellent dx conditions during summer months. This band will be open for traffic to North and South America during the latter half of the night. The most favourable conditions for traffic to South Africa will be between 1900 and 2300gmt. As it is now winter in the southern hemisphere, atmospheric disturbances will be relatively low, and traffic with South Africa should be good during the night on 14MHz.

On **7** and **3·5MHz** the chances of dx during the night will be relatively low, as the nights are short and atmospheric disturbances will be strong. The dead zone will not appear on 3·5MHz, even shortly before sunrise.

The provisional sunspot number for April 1970 from the Swiss Federal Observatory was 109, with a period of high solar activity occurring during the first half of the month. The predicted smoothed sunspot numbers continue to decline slowly towards the minimum expected in 1974–5, and figures for August, September and October 1970 are 89, 87 and 85, respectively.



7MHz. **0500** EA6BN, HC2GG/1, HK6BRK, PYs. **0600** HR2GK, TG9GF, 5J3WO (HK3WO). **0700** HC4BS, W6RR, *XE1RRK*. **0800** *VR2FO*. **1000** K4II. **2000** VU2BEO. **2200** CR6GA. **2300** VP2VI, *5T5BG*. **2400** JW7UH.

14MHz. **0500** KC4USA, 5VZDB. **0600** AX0LD, FO8BS, HB9VP/KH6. **0700** *G3JFF/MM* (off VK5), VR5LT. **0800** EA9EA, KJ6BZ, YK1AA. **0900** HU2CEN, TT8RG, VR1O, VR4EZ, ZM1AAT/K, ZM3PO/C. **1100** UA9VH/JT1, TC2SC. **1300** KC4USQ. **1500** JY1, KX6BQ, VQ9CD, 9N1MM. **1800** HS4ADB. **1900** TR8DJ, VU2VAE (QSL to K2UOP), ZD7SD. **2000** JAs, VKs, VK9GN, VP8LK, ZV7AWD (Fernando de Noronha). **2100** KL7BZO, VP8KD. **2200** CP1CT, CX7BF (op VP8KO on 21 April), YV0AI, 6Y5SR. **2300** 9L1RP, 9N1MM. **2400** XQ3ZN, ZD7SD.

21MHz. JAs all day. **0700** CE0AE. **0800** *TU2CX*. **0900** *FL8RR*, KS6DH. **1000** TT5JR, *ZM1AAT/K*. **1100** HM1FM, *KS6CQ*, *KX6HG*, *KW6EG*, VE8RG, VK9MS, VP2ME (says *does not* QSL), VR4EE. **1200** *FK8AH*, KR6HR, *PJ2HT*. **1400** *EA6AU*, *VP1VR*. **1500** AX9XI. **1600** *DX1HMI*, HC8GS, KL7DTH/KG6, *SU1IM*, VQ8CZ, ZD9s BM and BN (pile-up handled admirably by G3LQP/9V1PA with breakers "blacklisted" and announced). **1700** KH6COB. **1800** *G6ZY/CN/M*, CR6GA, HS3ACP, KL7BZO, 6X8XX, 9H1CB. **1900** KC4AAD, *XW8CZ*, YV0AI, 7Q7AA, 9K2BG. **2000** CR4BC (Box 36, St Vincent, Cape Verde), KM6DQ, *VP8HJ* (Dave active again with SB 101). **2200** VR4EE. **2300** W5,6,7, FM7WF.

28MHz. **0900** AX9DM, many JAs. **1000** AX6LG, MP4MBB, 9N1RA. **1100** AP2MR, HS4ABM, KG6AQY, ZM1AJU, 5Z4LS. **1200** FB8XX, KH6GLU (long path), VU2OLK. **1300** TJ1AU, TU2CS, W9EVT/ZD5, 7P8AB, 9L1RP. **1400** TN8BK. **1500** DU1FH, ZE2JA (member of OT Club—active over 40 years). **1600** CE3OE, JY1, VQ8CW, VQ9RK, *VP8HJ*, YB1AN. **1700** 8QAYL. **1800** VP5NB, YB0AB (Box 2127 Djakata), 4S7PB. **1900** CE8BJ, *VS9MZ*. **2000** VP8KL, W6s, etc.

Many thanks to all correspondents, and especially to the following for items obtained from their publications: **DX News Sheet** (*Geoff Watts*), the **DX'ers Magazine** (*W4BPD*), the **Florida DX Report** (*W4FRO*), the **DXer** (*K6YGS*), **NARS Newsletter** (*5N2AAF*), **Long Skip** (*VE3DID*), **On the Air** (*ON4AD*), the **West Coast DX Bulletin** (*WA6AUD*), the **Ex-G Radio Club Bulletin** (*W3HQO*) and **DX'press** (*PA0TO*). Please send all items for **July** issue **to reach G3FKM no later than 8 June,** For **August** issue by **13 July,** and **September** issue by **10 August.**

SOCIETY AFFAIRS

A brief report of the Council meeting held at Society HQ on 11 April 1970, commencing at 10am.

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

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

Apologies for absence were received from Messrs N. Caws, A. F. Hunter, H. E. McNally and C. H. Parsons.

Correspondence
The general manager reported receipt of a letter from the Malta Amateur Radio Society, thanking RSGB for the donation towards its new headquarters.

A letter had been received from Mr T. Darn (Region 4 RR) inviting the President and a Council member to the Region 4 ORM at Ilkeston, Derbyshire, on Saturday 20 June, After discussion, it was agreed that Dr J. A. Saxton and Mr R. F. Stevens should attend the meeting to represent Council, in addition to Zone Managers J. R. Petty and F. C. Ward.

Membership and affiliation
It was resolved:

(i) to elect 107 corporate members and 38 associate members;
(ii) to grant corporate membership to seven associates;
(iii) to grant corporate membership to 31 applicants contained in subscription applications received from various overseas organizations;
(iv) to waive the subscription of four members due to blindness or other disability;
(v) to grant affiliation to the Westmorland Radio Society (G3YWR).

Zone G meeting
Mr A. F. Hunter had submitted a written report on the meeting, but in his absence it was decided to receive the report at the next meeting of Council.

Honorary treasurer
The President reported that he had received a letter from Mr N. Caws tendering his resignation as honorary treasurer of the Society. Mr J. W. Swinnerton said that Mr Caws had found it necessary to do this due to further health difficulties. Council decided reluctantly to accept Mr Caws' resignation.

VHF NFD 1970
A letter had been received from Mr A. Wakeman, G3EEZ, criticizing Council's decision to eliminate bands above 23cm from VHF NFD. After considerable discussion Council confirmed its original decision, and Mr Stone agreed to meet Mr Wakeman to explain the reasons to him. A similar letter from Dr D. Evans and colleagues would be published in the May issue of *Radio Communication* with a reply from the VHF Contests Committee.

Minutes of committee meetings
Council approved the minutes of the VHF Contests Committee (24.3.70), Finance and Staff Committee (23.3.70), Technical Committee (3.3.70), Education Committee (7.2.70), and the Membership and Representation Committee (16.3.70).

Other business
Mr B. Armstrong raised the subject of a letter which he had received from Mr J. B. Hodgson, G3YKB, inquiring why rtty was not available to reciprocal licensees. Mr E. W. Yeomanson remarked that he has also received a note from Mr Hodgson on this matter, and had replied giving details of the past rulings of the Ministry of Posts and Telecommunications. It was agreed that no further action was necessary.

Mr R. F. Stevens reported that Marconi Instruments Ltd had donated a counter-timer to the Society for use in connection with Australis Oscar measurements, and he had written to the managing director of the company expressing the Society's gratitude.

Council was in session for 2¼ hours

YOUR OPINION

The Editor
Radio Communication

Sir—I have just read your comment in the May *Radio Communication* as to the financial state of affairs of the Society, which I had not realized was so bad.

I do not know if I am a minority, but I would not complain about a 50 per cent increase in membership fees; even a 100 per cent rise would be worth it for the service, which is unique, that the Society provides. Since the price of other magazines has risen to 3s and 4s I think it only fair that subscriptions should be increased, although I am by no means rich!

So, I wish the Society best 73 and let you know that this member won't grumble.

Yours faithfully,
L. W. Jones, G8CXS

The Editor
Radio Communication

Sir—I read with interest your editorial in the April issue of *Radio Communication* and also Mr Jackson's contribution relating to "pollution" of the amateur bands. It seems to me that before we can, with any conscience at any rate, advance our case for the retention of our frequency allocations at the ITU Conference in 1971, a sustained effort must be made to demonstrate that amateurs are a responsible group who are making a real and useful contribution to the science of radio communication.

While I agree with the sentiments expressed by Mr Jackson relative to interference created by other users in our bands, it is pertinent to point out that some of the grotesque manifestations heard nowadays, which their amateur originators have the temerity to call signals, particularly on the lower frequency bands, do us no credit whatsoever. I trust that the warning given in your editorial will be heeded by all concerned and perhaps, dare I hope, that there will be a conscious effort to raise our standards both from a technical and an operating standpoint.

May I suggest that when in contact with a station which has an imperfect or defective signal, the operator should be given a factual report. It would also seem that in many of these cases technical ability is virtually non-existent, and it may be that the rae should be

considerably stiffened and ought to include a practical test of the candidates' ability to handle transmitting and measuring equipment. Perhaps it is now time for the licensing authority to introduce compulsory requirements relative to the standard of test and measuring equipment to be maintained at every amateur station. It seems quite incredible to me that many ssb stations do not even possess an oscilloscope!

Finally, the RSGB needs to introduce a monitoring service which can winkle out persistent "polluters" and point out to them the error of their ways.

If we are to retain our frequencies and, perhaps what is more important, the respect of the other users of the rf spectrum, there is no time to be lost in raising our standards before it is too late.

Yours faithfully,
E. W. Jones, GW3HAW

The Editor
Radio Communication

Sir—"Current Comment". Amateurs interested in conservation of amateur radio will have considered the articles in the April and May issues as very much inter-related.

"The price of security is eternal vigilance", and we ought not to ask "What will it cost us to have fully efficient national (and international) societies to guard our interests?" but "What will be the cost of NOT having these?"

Seen in this light, a doubling of the present subscription ought to be acceptable to members. Let us make 1970 Conservation Year for Amateur Radio, too!

Yours faithfully
E. Arnold Matthews, G3FZW

The Editor
Radio Communication

Sir—The following may be of interest to RSGB members and others who read our journal, and on which George, G6JP, could furnish further details:

Berylluim oxide is used in E3280/4CX-250 devices and the dust is TOXIC. It occurs to me that there must be many amateurs using these valves who are inquisitive enough to get a hacksaw and cut open this type of valve and have a closer look at the internal construction, after it has become o/c of course.

Yours faithfully
R. Broadbent, G3AAJ

The Editor
Radio Communication

Sir—We note that in the "Your Opinion" section in the May issue of *Radio Communication* there is a letter from G3BID mentioning the shortage of 72 Ω heavy duty twin cable. We would like to advise you that we have in stock Belden (USA) type 8210 cable which is a heavy duty cable rated 1kW having 7 by 21awg conductors making each conductor 13awg which is equivalent to our 15swg size.

Yours faithfully,
H. E. Perkins, G3NMH
Western Electronics

The Editor
Radio Communication

Sir—When in Japan recently, I met JA3AA, Isaji Shima, who asks Top Band dx merchants to listen out for his cw signal on 1,910kHz around 2100gmt. "And the best of British luck." I thought to myself, but when I learnt that he has a rhombic of 200m side, 30m high, backed up with a Yaesu Musen FL-400 and FL-2000, I figured he should make it. So anyone wanting a rare one should get their headphones polished, crystals ringing and the wax blown out of their ears!

Me, with my sordid commercial mind clicking away like a desk calculator, naturally wanted to know the details of how he got his gear on to Top Band. I am pursuing this matter with JA1KP, who is on the design staff of Yaesu Musen, and I will divulge the dope in due course, suitably adjusted for the UK regulations.

Yours faithfully,
Bill ("The Bandit") Lowe

The Editor
Radio Communication

Sir—I was in charge of the RNXS radiotelephone control unit during the radio exercise between 1000A and 1230A on Sunday 12 April 1970, when a certain amount of controversy arose with a radio amateur who could not accept that our callsigns were not "pirates" and refused to shift his frequency (from that being operated on the exercise) when I asked for his assistance in the matter. I feel, therefore, that it would be helpful to all concerned if radio amateurs could have the position explained to them.

The Royal Naval Auxiliary Service and the Admiralty Ferry Crew Association are part of the RN Reserve, and in order to carry out their duties certain training programmes are in force which include communications etc. As a result, units around the coast of the UK have official RNXS callsigns, which vary between commands. The first part of the callsign consists of three letters and refers to the command in which the unit is situated, the latter part consists of a single or two figure number which identifies the actual unit.

When these callsigns are in use (usually in the hf, 2 and 3MHz bands), it would be very much appreciated if radio amateurs could assist by refraining from blocking the exercise frequency when requested.

I hope this letter may help all concerned in clearing up any misunderstandings in the future.

Yours faithfully,
J. P. Wells, RNXS/AFCA

The Editor
Radio Communication

Sir—I was very interested in the letter by G3WPL when my wife was reading "Your Opinion" out of the March issue to me. As you may gather I am blind, and I am very keen to have one or two instruments with which I can take radio or electronic measurements. But there is not much available, although I have often spoken to others who soon say, "Oh, that should be easy," or, "Someone will do it for you"; but the question is, Who?

I understand that there are 70 to 80 blind radio amateurs in Great Britain, but not enough for a commercial firm to be interested. I have already written to three companies to see if they can supply a grid dip meter and do two simple modifications—by putting an audio oscillator to indicate the dip on the meter and to put dots or tiny rivets on a dial on the outside of the panel.

The first said (a couple of years ago) that they could not help but suggested I asked the RAIBC, but as you may know they are not in a position to do that type of work. The second also said they could not help me but were willing to supply the meter at cost to the Radio Society for the Blind if I wrote there—there is no such society. And the third did not make a GDO but suggested I write to the first company.

As you can see, I am back in square one, so can you mention this in the magazine to see if we can awaken some interest.

Yours faithfully,
Alan R. Reynolds

The Editor
Radio Communication

Sir—Is there any way in which the RSGB can arrange to provide some licensed amateurs with a receiver for top band, because it appears that a few do not possess such a luxury.

While listening to the RSGB slow morse transmissions and attempting to improve my cw, on quite a few occasions up comes some idiot slap bang on frequency calling CQ and completely blotting out the signal. I realize that no frequency is exclusive to any one person or for one purpose but surely these people could listen and if they hear a slow morse transmission QSY and allow people like myself to listen. That is, of course, if they have not forgotten their cw and are unable to read even these slow transmissions.

Please do not think that I am complaining about all amateurs; it is only a small minority who do not seem to care. But perhaps if you could print my request they might be persuaded to have a little consideration for others who are, after all, only trying to join them in possessing a G callsign. If it were not for the fact that I know many licensed amateurs in this area who are most helpful and courteous I would probably feel like abandoning my hopes for a licence, but of course that is the last thing I wish to do as this is a wonderful hobby.

I hope this has not bored you too much, but I felt I had to let off steam to someone and my xyl said it ought to be you rather than her.

Yours faithfully,
Jim Harding, BRS30328

THE RSGB SHOW, 1970

All the usual Exhibition attractions will be present and correct, but in particular we should like to draw members' attention to the display of Home Constructed Equipment. The Society invites items for display, subject to the following conditions:

i All items submitted for exhibition will be subject to acceptance by the Exhibition Committee.

ii Entries will be accepted (*a*) as items which have been the subject of published articles in the *RSGB Bulletin* or *Radio Communication* during the period January 1968 to date. It should be made clear that only the member writing the original article will be allowed to enter; (*b*) from members who are prepared, if required, to write a constructional article for publication in *Radio Communication* featuring their entry, this article to be paid for at the normal rates.

iii Entrants will be required to certify that their entries were constructed entirely by themselves from commonly available materials and components.

iv RSGB members only will be eligible.

v The Horace Freeman Trophy will be awarded for the most original piece of equipment on show.

vi Additional prizes may be awarded at the discretion of the judging committee.

The John Rouse Memorial Trophy will be awarded for the best piece of equipment submitted by a member aged 16 years and under; the rules in (ii) above will not apply in respect of entries for this trophy.

Members wishing to exhibit should write to the organizer of the Home Constructed Equipment Exhibit, M. Elliot, G3VWS, 23 Filbert Crescent, Gossops Green, Crawley, Sussex.

OBITUARIES

S. E. Blomfield, G3PCI (ex VS2AL)

It is with sorrow that we record the death of (Jim) Siegfried Essex Blomfield of Everton, Lymington, Hants, on 15 April 1970 after a short illness, aged 65.

He was the hon secretary of the Lymington and District ARS for a number of years, a member of the Royal Signals Amateur Radio Society, and for many years a member of the RSGB. He was first licensed in 1936 as VS2AL at Bahau-Negri Sembilan, Malaya, where he was a rubber planter until 1951.

During the 1939-45 war he was captured and interned as a PoW by the Japanese in Changi, Singapore. One of his most treasured post-war possessions was an AVO Model 7 VOA meter, presented to him in 1946 from the RSGB Prisoner of War Fund.

He was a most modest person and a fine gentleman who derived pleasure from helping others in all spheres. He will be sadly missed by all his overseas amateur radio friends of the dx bands, and his fellow hams on the lf "nets".

Among the many friends and relations who attended his funeral were G2DC, G3JAF, G5IK, G3HCL, G3ODJ, G3XPN, G3AS, G3EUZ, G3TJY and F. C. Webb, swl.

Our sympathy and condolences go to his widow, Enid, and his daughter, Juliet.

J.E.J., F.C.W.

James Shepherd Nicholson, VU2JP/GM3FJP

The death took place recently in Edinburgh of Mr J. S. ("Nick") Nicholson, VU2JP/GM3FJP. Like so many young people, he became an ardent swl, and when he left Scotland to become a tea planter in India in 1928 he soon became licensed as VU2JP.

He found in amateur radio not only a link with his homeland but a channel of worldwide friendship. Nick's heart was always in dx —particularly cw dx. From 1934 onwards the list of awards he won during the following 20 years or so is long and honourable. To mention only his major achievements—in 1935 and 1936 he won the BERU Junior Challenge Trophy, and came second in 1934 and 1937. In 1949 and 1950 he won first place for all-band cw in VU2 in the CQ DX Contest. He gained BERTA in 1952 and the Empire DX Award in 1955.

At the end of 1956 Nick returned to Edinburgh and was allocated the callsign GM3FJP. He did much to encourage the younger generation of listeners, particularly the boys at his old school, Daniel Stewart's College, but he still found time to win, in 1958, the first place for Scotland on all-band cw in the CQ DX Contest. He also held office as President of the Lothians Radio Society in 1960-1.

His death was sudden and unexpected. At his funeral service, conducted by the Rev Walter M. Ferrier, GM3BDA, and the Rev R. A. Baigrie, there were many Edinburgh amateurs present to pay their last tribute to their friend and colleague. Nick is survived by his widow and two sons.

W.M.F.

Alan R. C. Johnston, G2TX

May one who came to know him early in life, record a loss to amateur radio in the recent death of Alan R. C. Johnston, G2TX, of Emsworth, Hants.

He had the master touch of being able to inspire others with his enthusiasm and was completely free of the regrettable aloofness which some cultivate. Yet he was capable of blunt comment where it was merited—his pungent, though far from ungrateful comments over the years during QSO on 80m, which band he mainly worked, are recalled.

Alan commanded affection no less than respect.

He was first licensed in May 1914 under the call of JXX. Such licence provided for a maximum power of 20W in conjunction with wavelengths not exceeding 100m. It was not until June 1924 that he received his G2TX licence.

His memory lives vigorously in his many friends who survive him, and our sympathies go out to his family.

W.E.D.P.

Thomas Taylor, G3SAV

It is with great regret we record the death at the early age of 29 of Thomas Taylor, G3SAV.

After an illness lasting several months. Tom passed away in the Southampton General Hospital on 29 April.

Up to the time of his illness he was an active member of the Southampton RSGB Group and will be greatly missed by all.

E.J.W.

Mrs Stella Nash

Our condolences to R. G. (Bob) Nash, of 9 Holybrook Road, Reading, on the death of his wife, Stella, on 2 May.

She will be remembered by many amateurs who called at No 9 during the mobile season, and by overseas amateurs who were regular visitors. Bob was hon secretary of Reading Amateur Radio Club for many years, and between normal meetings "Tuesday night at No 9" was a frequent event for the locals who will be saddened by Stella's passing.

RADIO AMATEUR EMERGENCY NETWORK

by **S. W. LAW, G3PAZ***

We welcome the group newsletters which are received from time to time. Whatever their shape, size or frequency there is always some item of interest, and all give some indication of time and energy devoted to our particular branch of endeavour.

One of the regulars is the West Sussex news-sheet; a monthly effort which is never dull. Incidentally, its "Blue" series of exercises seem to have been a great success and we can assure our readers that there is no basis for the canard which hints that the title has any connection with cheese—Danish or otherwise! A piece of cake they may have been, but it is our user service, the boys in blue, who have been involved in this first-class liaison work, to the great benefit of all concerned. Already the need has been found for more channels to supplement the present 70·375 and 145·8MHz at present in use. A new 2m channel of 145·08 is to be used for administration, to which will later be added another on 4m.

Yet another indication of the good relations existing in Sussex is that an article on RAEN has appeared in the local police news-sheet. This should serve as a spur to groups who find some apparent apathy in their areas from the user services. Good relations are only established by continual effort and a determination to provide a viable service which can be demonstrated without fail.

We also note that East Sussex Group has changed its controller, who is now Frank More, G3JFM.

Lecture material

Applications are still being received for lectures on RAEN, and one of the needs most felt by those who give these is for visual material in the form of photos or slide transparencies of group activities, equipment, or best of all, but understandably difficult, actual incidents. It would be much appreciated by the RAEN Committee if controllers could spare copies of such material. Reasonable out-of-pocket expenses can be met from the chairman's fund. Do not forget reports of incident call-outs for inclusion in the incident book in the committee archives.

Looking back

We tend to forget those who have gone before. There is no doubt that RAEN was really consolidated by the East Coast disaster of 1953, but some of the details have become hazy in our minds. A recent very informative news-sheet from the Norfolk groups harks back to 1953 when casualities in the county were 85 dead and some 6,000 made homeless. At that time the amateurs in the area spontaneously tackled the enormous problem of communications with a good heart and great effect. Today a trained and co-ordinated body of some 100 members covers Norfolk and NE Suffolk with first-class police liaison and good contact with the British Red Cross Society.

Like another of the counties with an eastern coastline, Essex, the Norfolk groups find 160m a useful traffic channel, though 2m is employed for much of the work in central areas.

Incidentally, any amateur visiting Lowestoft will find a warm welcome at the old CD HQ, Normanston Drive, (NGR TM 540937), any evening where Controller G3YDZ and the members of NE Suffolk are to be found.

Odd spot

On 31 December 1963 there were 1,600 registered RAEN members in the UK. Have you lost your card? Have a look round for it and our registrations secretary will be only too happy to stamp it up to date.

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

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

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

RAEN Group of the Month

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

Essex RAEN

Essex RAEN is an old and well-established group dating back to the 'fifties. Readers of *World at their fingertips* will no doubt remember the photograph of the control room set up in the Chelmsford headquarters of the Essex Police. The group is now run by a committee of ten, including Inspector Hutchins of the Essex Constabulary. Committee chairman is J. A. Rollason, G3WCO, 19 Braemar Avenue, Chelmsford—telephone Chelmsford 52891.

Control rooms have been established in Essex police headquarters, Chelmsford, (callsign G3PHQ) and in the British Red Cross branch (callsign G3WYP). Call-outs are arranged on the first and third Sundays of each month. Activity is solely on 2 and 4m, channels being 70·375MHz, 70·5MHz and 144·75MHz. Aerial polarization, vertical for 4m and horizontal for 2m.

Essex RAEN's principal duty is to handle casualty lists from the scene of the incident, hospitals etc, and to pass these to Essex police headquarters.

The activities of this well-established group have been very successfully guided by the committee for the past 18 months and they are to be congratulated on their initiative in preserving both a well run group and police liaison.

Remember, be prepared—"It can happen to you".

Radio Amateur Old Timers' Association

The twelfth reunion and AGM of the Radio Amateur Old Timers' Association was held at the Horse Shoe Hotel, London W1, on 1 May 1970. Some 50 members attended, under the chairmanship of Kenneth Alford, G2DX, the president of the association; and Eric Russell, G5WP, acted as master of ceremonies.

After a toast to "Silent Keys" had been proposed by the president, a few short anecdotes on pre-war operating experiences by G2NH, G5WP and G6LL ended the formal speeches.

The AGM which followed was similarly very brief, leaving much more time than usual for rag-chewing among the members, a policy which seemed to meet with general approval.

Old-timer RSGB members are reminded that RAOTA exists to maintain and foster a spirit of friendship among amateur transmitters of long standing, and to be mindful of any who may be in special need. A benevolent fund exists to meet these needs, and any such cases brought to the notice of the association will receive prompt and considerate action.

RAOTA membership is open to any currently licensed amateur who held either a radiating or artificial aerial licence prior to September 1939. Under the present constitution it is not essential that the licence shall have been held without a break.

On election a member pays a membership subscription of 21s, which includes the cost of a membership badge. At the present time there is no annual subscription. Membership is limited to 300, and the present membership is approximately 50 short of this figure. Any member will be pleased to supply further details, or membership applications can be sent direct to the hon secretary, Miss May Gadsden, 79 New River Crescent, London N 13.

E.A.D.

CONTEST NEWS

Rules for the RSGB 7MHz DX Contests 1970

Radio amateurs throughout the world are invited to take part in the ninth RSGB 7MHz Contests for single-operator stations.

Transmitting contests

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

2. When. CW Contest: From 1800gmt on Saturday 24 October to 1800gmt on Sunday 25 October 1970.
Phone Contest: From 1800 gmt on Saturday 7 November to 1800gmt on Sunday 8 November 1970.

3. Eligible entrants. Licensed amateurs in all parts of the world. British Isles entrants must be members of the RSGB.

4. Contacts. CW Contest: cw (A1) only.
Phone Contest: a.m. or ssb.
Serial numbers must start at 001 for each contest.

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

Each contact between a British Isles station and an overseas station will score as follows:

Location of overseas station	Points
Continent of Europe	5
Continent of North America	15
Continent of South America	25
Continent of Asia	25
Continent of Africa	25
Continent of Oceania	50

Bonus points. British Isles stations may claim a bonus of 20 points for the first contact with each new country. For the purpose of scoring, the "RSGB Countries List" will apply, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries.

Overseas stations may claim a bonus of 50 points for the first contact with each British Isles country-numeral prefix, ie G2, G3, G4, G5, G6, G8, GC2, GC3, GC4, GC5, GC6, GC8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GM2, GM3, GM4, GM5, GM6, GM8, GW2, GW3, GW4, GW5, GW6, GW8. Contacts with GB stations will not score bonus points.

6. Entries must be addressed to: The HF Contests Committee, c/o R. S. Biggs, G2FLG, 29 Lord Avenue, Clayhall, Ilford, Essex, England.

7. Trophy. The Thomas (G6QB) Memorial Trophy will be awarded to the leading British Isles entrant in the CW Contest.

Copies of the General Rules for RSGB HF Contests, as well as contest log sheets, and cover sheets, may be obtained from: The General Manager, Radio Society of Great Britain, 35 Doughty Street, London, WC1N 2AE.

Receiving contests

The attention of entrants is drawn to Rule 6.

1. When. CW Contest: 1800gmt on Saturday 24 October to 1800gmt on Sunday 25 October 1970.
Phone Contest: 1800gmt on Saturday 7 November to 1800gmt on Sunday 8 November 1970.

2. Eligible entrants. All short-wave listeners throughout the world. British Isles entrants must be members of the RSGB. Only the entrant may operate his station during the contest. Holders of amateur transmitting licences for bands below 30MHz are not eligible to take part.

3. Entries must be clearly typed or written on one side only of foolscap or international A4 size paper which must be ruled in columns headed (in this order): (i) Date/time gmt; (ii) Callsign of station heard; (iii) Report and serial number sent by station heard; (iv) Callsign of station being worked; (v) Bonus points; (vi) Total points claimed.

Logs must be posted by 23 November 1970 and must be addressed to: The HF Contests Committee, c/o R. S. Biggs, G2FLG, 29 Lord Avenue, Clayhall, Ilford, Essex, England.

All entries must contain the following declaration:
I declare that this receiving station was operated strictly in accordance with the rules and the spirit of the contest and I agree that the decision of the Council of the RSGB shall be final in all cases of dispute. I do not hold a transmitting licence for the bands below 30MHz.
Date..... Signed.....

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

For British Isles entrants, each complete log entry of a contact between a British Isles station and a station in the following continents will score as indicated:

Location	Points
Continent of Europe	5
Continent of North America	15
Continent of South America	25
Continent of Africa	25
Continent of Asia	25
Continent of Oceania	50

For overseas entrants, each completed log entry of a contact between a British Isles station and any other station in the contest will score as indicated:

Location of listener	Points
Continent of Europe	5
Continent of North America	15
Continents of South America, Africa, and Asia	25
Continent of Oceania	50

5. Bonus points. British Isles entrants may claim a bonus of 20 points for the first station logged in each new country (see transmitting section).

Overseas entrants may claim a bonus of 50 points for the first station logged in each British Isles country-numeral prefix (see transmitting section).

6 (i) The HF Contests Committee reserves the right to disqualify any entrant whose log is consistently inaccurate.

(ii) The practice of logging a series of contacts made by one station is deprecated. Consecutive log entries must not include the same callsign in either the 'station heard', or the 'station being worked' columns.

7. Awards. A certificate of merit will be awarded to the leading entrant in each of the British Isles countries, and to the three leading overseas entrants.

Rules for Summer Top Band Contest

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

2. When. 2100gmt on Saturday 4 July to 0200gmt on Sunday 5 July.

3. Eligible entrants. The contest is open to licensed amateurs in all parts of the world. Multiple-operator entries will be accepted. There will be two sections for:
(a) British Isles stations;
(b) Overseas stations.

4. Contacts. CW (A1) only in the 1·8-2·0MHz band. County code letters, as published on page 48 of the January 1970 edition of *Radio Communication*, must be sent after the report-serial number group by all UK stations, eg for a contact from Sussex 599001SX.

5. Scoring.

(a) UK section—Three points for each completed contact plus a bonus of five points for each new county within the British Isles, and a bonus of five points for each new country outside the British Isles.

(b) Overseas section—Overseas stations may only claim points for contacts with British Isles stations, and will score three points for each contact plus a bonus of five points for each new British Isles county worked.

6. Logs. Column (5) must be headed "County code letters received". The county code letters as sent must be entered at the top of each log sheet. Entries must be addressed to: RSGB HF Contests Committee, c/o R. J. Hughes, G3GVV, 10 Farm Lane, Tonbridge, Kent, and **not** to RSGB headquarters.

Rules for IARU Region 1 VHF/UHF and UHF/SHF Listener Contests 1970

1. Eligible entrants. All listeners within IARU Region 1 may take part. Licensed amateurs are not eligible to enter.

2. Date and duration of contests.
- **(a)** 1800gmt on 5 September to 1800gmt on 6 September.
- **(b)** 1800gmt on 3 October to 1800gmt on 4 October.

3. Contest sections. **(a)** There will be three sections: 2m, 70cm and 24cm.
- **(b)** There will be sections for each uhf/shf band.

4. Any station may be logged once on each band. CQ or test calls will not count for points and should not be logged.

5. Logsheets. The logsheet must show the following:
- **(a)** Date.
- **(b)** Time (gmt) of start of QSO logged.
- **(c)** Callsign of station heard.
- **(d)** Report, serial number and QRA Locator given by station heard.
- **(e)** Callsign of station contacted by station heard.
- **(f)** Report and serial number given by listener to station heard.
- **(g)** Claimed score.

6. The callsign under **(e)** on the logsheet may appear only once in every 20 QSOs logged.

7. Scoring. Points will be scored at one point per kilometre between the listener and the station heard.

8. Entries. Cover sheets must be set out as shown in the example below. Two copies of the cover sheet and logsheets must be sent to: The Secretary, VHF Contests Committee, 60 Merlin Grove, Beckenham, Kent, BR3 3HU. Submission of a log implies acceptance of the rules.

9. Closing date. Entries must be postmarked not later than 21 September. Late entries will not be accepted.

10. The judging of the entries will be the responsibility of the organizing Society whose decision shall be final.

11. Disqualification. Entrants deliberately contravening any of these rules will be disqualified. Minor errors will result in loss of points. Errors in callsigns or serial numbers will result in loss of points as follows: One error, 25 per cent; two errors, 50 per cent; three or more errors, 100 per cent.

12. Awards. The winner of each section will receive a certificate.

SAMPLE CONTEST COVER SHEET

Contest..... Date..... Claimed score....

Section..... Listening station registration No.....

Name .....

Home address.....

Location of station .....

Latitude..... Longitude..... QRA Locator....

Height above sea level in metres.....

Receiver.....

Aerial(s) .....

Declaration

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

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

September 1970 IARU Region 1 VHF/UHF Contest

The rules for this contest, which were published in the May issue, should have included sections for fixed and portable/mobile stations on 1,296MHz in Rule 2.

432MHz Cumulative Activity Contest 1970

This contest, re-introduced in response to popular demand, did in fact prove popular. Entries from 23 stations indicate that interest in the band is not really as little as might be assumed if one were to judge from activity on non-contest evenings. As always, the entrants by no means constituted the total number of stations active, and it is hoped that future events on 432MHz will be as well, or better, supported.

The winner, as is becoming habitual for this band, was John Warrington, G8AKE, of Melton Mowbray. His geographical location, being workable dx to many other stations, no doubt contributed to the win, helped by good equipment and much experience. In addition, John's regular contacts with ON4HN, by far the best distances recorded by anyone, resulted in the substantial margin of 75 points between the winner and G8AYN, the runner-up. Subject to Council approval, certificates will be awarded to both these stations.

Mention must be made of the dismal showing of the Class A licensees. Out of only four entries, the best they could manage was a 10th place. What about it next time, chaps . . . or have you all got too old to compete with these G8 – – – characters on their home ground?

Comments from entrants were unusually uniform, being enthusiastic for the return of the Cumulative, and unanimously uncomplimentary about the conditions. Propagation could not be described as better than average on any of the five evenings, and poor on most occasions. One comment which deserves further consideration was that a repeat contest might be staged in the summer, when the warmer weather may lead to better conditions and more activity, especially from the portable stations. The staggering of the sessions through the week was generally popular, although one or two entrants requested a move to Saturday evenings.

Posn	Callsign	Score	County	Best dx (km)	Power
1	G8AKE	203	LR	360	150
2	G8AYN	128	SY	167	15
3	G8AWO	112	HF	100+	120
4	G8AGY/P	104	BE	176	25
5	G8BGQ	100	HF	120	30
6	G8AVX	99	WK	—	60
7	G8AUE	93	DY	—	50
8	G8BIL	89	WK	—	32
9	G8CZQ	79	MX	102	25
10	G3XEB	76	HF	118	26
11	G5UM	72	LR	98	12
12	G8CTT	70	KT	—	30
13	G8AOD	66	SX	45	12
	G8ATK	66	SY	—	10
15	G8BQH	58	BS	125	50
16	G8AHF	43	HE	—	30
	G8APZ	43	MX	105	20
18	G8BWO	42	SD	104	11
19	G2WS	21	ST	54	62
20	G3RZG	18	DT	—	15
21	G8CHW	16	LE	70	2
22	G8BKR	15	GR	48	25
23	G8ADP/A	14	GR	94	12

A check log from G8AKT is acknowledged.

DF Qualifying Event—Stratford

Date: 19 July 1970.
Map: OS Sheet 144 (Cheltenham and Evesham).
Assembly: 1300bst for start at 1320bst.
Location: NGR 096213 Notgrove Long Barrow four miles west of Bourton on the Water on B4068. Frequencies and callsigns will be announced at the start.

Intending competitors are asked to notify Mr I. A. Cobbold, G3RPJ, at 5 Avenue Road, Stratford-on-Avon, of the numbers in their parties requiring tea, not later than 12 July.

80m Low Power Contest 1970

Only eight entries were received for this year's contest, against 14 each in 1968 and 1969, although a number of past entrants did appear in the competitors' logs. It has been suggested that the low activity was the result of a clash of dates with a WAB contest.

The leading station was operated by E. Chicken, G3BIK, of Northumberland, and subject to Council approval he will receive the 1930 Committee Cup. Close behind in second place was H. J. Crane, G2AVC, of Middlesex, and he was followed by K. H. Coates, G3IGU, of Doncaster.

The equipment at G3BIK consisted of a transistorized transmitter using three 2N706s, a CR100, and a 430ft end-fed aerial at 30ft. G2AVC used an EF50 oscillator/807 pa transmitter, an Eddystone 640, and a half-wave dipole. The only other transistorized rig was that belonging to G3JKY which also used 2N706s. The simplest transmitter was undoubtedly G3TR's single EF91 Colpitts oscillator.

A few comments were received—most enjoyed the contest, but bemoaned the low activity.

A check log from G5OJ is gratefully acknowledged.

Posn	Callsign	Points	Power	Contacts
1	G3BIK	3,000	0·5W	30
2	G2AVC	2,950	0·5W	31
3	G3IGU	2,800	0·5W	28
4	G3TR	2,700	0·4W	28
	G3JKY	2,700	0·5W	28
6	G3NEO	2,200	0·5W	22
7	G3LIQ	1,350	0·8W	28
8	G3ALG	950	0·5 and 1W	10

Contests calendar

6-7 June—HF NFD
14 June—Microwave Contest (1,296MHz and up)
14 June—DF Qualifying Event, Salisbury
21 June—70MHz Portable
28 June—DF Qualifying Event, High Wycombe
4-5 July—Summer 1·8MHz
4-5 July*—144MHz Open
11-12 July—High Power HF Field Day
19 July—DF Qualifying Event, Stratford
26 July—432MHz Open
9 August—DF Qualifying Event, Chelmsford
10 August—144MHz SSB
15-16 August—70MHz CW
5-6 September*—VHF NFD and IARU Region 1 VHF Contest
13 September—80m Field Day
20 September—DF National Final, Slade
3-4 October*—IARU Region 1 UHF/SHF Contest
10-11 October—28MHz Phone
24-25 October—7MHz CW
24-25 October—CQ WW DX Contest
7-8 November—7MHz Phone
7-8 November*—144MHz CW
14-15 November—Second 1·8MHz
27-28 November—CQ WW DX Contest
6 December—144MHz Fixed Station

*To coincide with IARU Contests

SPECIAL EVENT STATIONS

Vauxhall Motors Sports Spectacular, 13 June

The Shefford club is organizing an exhibition station which will operate from 1.30pm to 6pm with the callsign GB3VM. Bands: 80, 40 and 20m, ssb and a.m; 160 and 2m, a.m. All contacts welcome.

Lichfield Scouts' "Scoutabout '70", 13 June

Lichfield amateurs will be operating at Beacon Park, Lichfield, on 160-10m ssb, using callsign GB3LDS. Special QSL cards will be issued, and contacts with Scout stations welcomed. Requests for schedules, with sae, please, to E. A. Matthews, G3FZW, 1 Shortbutts Lane, Lichfield, Staffs.

Garendon High School, GB3GHS, 22-27 June

Garendon School Radio Society, Loughborough, Leicestershire, hopes to have this station on the air on 1·6 to 10m to commemorate the centenary of the 1870 Education Act.

George Watson's College, 26 June-6 July

GB3GWC will be in operation on all bands 80 to 2m in connection with George Watson's College centenary year celebrations. It is hoped that exiled Watsonians will try to contact their old school.

Fermanagh Festival, 19-28 June

GB3FRE will be located in the Town Hall, Enniskillen, and will operate on 160 to 10m, ssb and cw, during this festival. Although some operation (cw) during daytime envisaged, operation will be mainly from 7pm to 11.30pm. Special QSL cards will confirm all contacts. County Fermanagh is still regarded as a "rare" county.

Willenhall, Staffs, 3-5 July

Exhibition station GB3WCS will be in operation at the Willenhall Comprehensive School's annual garden fete. Bands 160m–40m, a.m. and ssb; 20m–10m, ssb; 2m, a.m. All contacts confirmed by special QSL cards; incoming cards through the bureau to G3YHN, please. Requests for schedules and other information, with sae, please, to C. J. Pedley, G3YHN, 57 Temple Road, Willenhall, Staffs WV13 1ET.

Llanfair Caereinion, 4 July

Stowbridge and District ARS, in collaboration with the Welshpool and Llanfair Railway, will operate GW6OI/P at the Llanfair Caereinion terminal station between 1200 and 1800bst, mainly on 80m but possibly on other bands. QSLs to all contacts.

Worthing, Sussex, 4 July

Exhibition station at Worthing High School for Boys' annual fete. Operation on 10m and 15m, ssb; and 80m–2m a.m. Special QSL cards. Looking out for school stations and amateurs still at school. Requests for schedules, with sae, please, to C. Garcia, 68 Grand Avenue, Worthing, Sussex.

Festival of Nottingham, 11-28 July

Amateur Radio Club of Nottingham will operate GB3FON at Wollaton Park, Nottingham. Operation on all hf bands 160 to 10m (spot frequencies: 1·920, 3·760, 7·060, 14·260, 21·360, 28·660MHz). Special QSL card.

MOBILE RALLY NEWS

Elvaston Castle Mobile Rally, 14 June

At Elvaston Castle, five miles south-east of Derby on the B5010 between the A6(T) and the A6005.

Talk-in stations will be on the air from 10.30am using callsigns G3EEO/A and G3ZBI/A on 160m and 2m, respectively. Events will include a judo display, a prize draw and a balloon race. Plenty of parking space and over 250 acres of grounds for walks and picnics.

Pembroke & District ARC "Bucket and Spade" Party, 14 June

At the Regency Hall, Saundersfoot, where ZD9BE will show films of his activities on Tristan da Cunha. Talk-in stations will operate on 1,875kHz and 144·35MHz.

Advise Mr J. Hogg, GW8DMD, 2 Pembroke Road, Pembroke Dock, Pembs, if attending, so that catering arrangements can be made. Lunch can be booked with GW3TUD, Coles Cafe, Saundersfoot.

Cardiff RSGB Group Mobile Picnic, 14 June

At Porthkerry Park, near Barry, Glam. Opens 11am. Talk-in stations on 1,980kHz and 144·35MHz.

A df hunt for competitors on foot will commence at 3pm, for which only simple equipment required as the frequency will be in the 160m band. Porthkerry Park has a pebble beach.

University College, Swansea, Mobile Rally, 21 June

On the university campus at Singleton Park off the A4067. Talk-in stations on Top Band and 2m. Opening 1pm.

All the usual events, including a mobile/pedestrian df hunt, and many local amenities for all the family.

Further information from Philip Regan, Union House, University College, Swansea, SA2 8PP.

Anglian Mobile Radio Rally, 20-21 June

At the Suffolk Show Ground, Ipswich—Bucklesham Road entrance. Hf and vhf stations on the air—callsign GB3AMR. Talk-in on 160·2 and 80.

Saturday 20 June—lectures at 2.30pm, 3.30pm and 5pm; followed by social evening. Facilities on Saturday night for caravans.

Sunday 21 June—the rally itself, commencing at 10am. Trade stands, bring and buy, grand draw, fun fair, fashion parade, police displays, hi fi, electronic organs, and many other attractions for all the family.

Further information from D. W. N. Thomas, G8BVE, 9 Burlington Road, Ipswich 55200.

Longleat Safari Mobile Rally, 28 June

At Longleat Park, near Warminster, Wilts. Entrances off A362 Frome to Warminster road. Talk-in stations from 10am: 1,920kHz, G3TAD/P; 70·425MHz; G3JMY/P; 144·25MHz, G6YB/P.

Many attractions, including display by 37th Wessex Welsh Signals Regiment, in beautiful setting.

South Shields Mobile Rally, 5 July

At Bents Park Recreation Ground, Coast Road, South Shields. Talk-in stations from 11am on 160m and 145·8MHz. All the usual trade stands and competitions.

Further information from D. Forster, G3KZZ, 41 Marlborough Street, South Shields.

Cornish Radio Amateur Club Mobile Rally, 5 July

At St Ives County Secondary School, St Ives, Cornwall. Talk-in stations from 10am on 1,873kHz, 70·375MHz and 144·19MHz. Station on 80m for general contacts. All the usual attractions.

Mobile rallies calendar

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

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

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

CANCELLED—ARMS's Rally at Alconbury.

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

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

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

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

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

9 August—Woburn Abbey Mobile Rally.

9 August—Stratford-upon-Avon Mobile Picnic.

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

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

23 August—Swindon and District ARC Annual Mobile Rally, No 15 MU RAF Wroughton aerodrome, near Swindon. Talk-in stations: G8AUG on 2m; G3WEF on 160m; from 10.30am.

20 September—Peterborough Mobile Rally. Walton Senior School, Mountsteven Ave (off Lincoln Road), 2 to 5pm. Contact D. Byrne, G3KPO, QTHR.

Mid-September— RSGB Scottish Mobile Rally Region 14.

Looking ahead

20 June—Region 4 ORM.
25-26 July—British Amateur Television Club Convention, Cambridge.
19-22 August—RSGB Exhibition, New Horticultural Hall, London.
11 October—RSGB Scottish VHF Convention, Dundee.

13th JAMBOREE-ON-THE-AIR

The 13th Jamboree-on-the-Air will be held from 0001gmt 17 October to 2359gmt 18 October 1970, during which period stations may operate at any time.

It is suggested that the following official world Scout frequencies be used for calling only and after contact stations should QSY:

Phone 3,740, 7,090, 14,290 21,360 28,990kHz
CW 3,590, 7,030, 14,090, 21,140, 28,190kHz

HB9S, the new station of the Boy Scouts World Bureau, will operate two complete stations throughout the event, operation being mainly on phone (ssb).

All stations taking part must strictly adhere to their local regulations at all times.

The Swedish Scout Union has produced a very modern and striking participation certificate. The leaflet *Getting the most out of the Jamboree-on-the-Air* is available on request from Boy Scouts World Bureau, 1211 Geneva 4, Casa postale 78.

For up to the minute information from national organizers listen to various Scout radio networks. Meetings are as follows:

UK — Every Saturday at 0800gmt on 3,740kHz
Europe — Every Saturday at 0930gmt on 14,290kHz
World — Every Saturday at 1800gmt on 21,360kHz

CLUB NEWS

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

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

REGION 1 — RR B. O'Brien, G2AMV

Special regional events:
28 June; Region 1 VHF Contest.
13 September; Region 1 Field Day.

Details of the two contests will be circularized in due course to local representatives and ASRs.

30 August; Preston Mobile Rally.

Official regional meeting at Southport. (Date to be finalized, probably 20 or 27 September).

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

Ainsdale—10, 24 June, 8 July, 8pm, The 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 Lancashire ARC)—4 June (Construction competition and any questions), 2 July (Open night), 7.30 pm, Edinburgh House, Shearbank Road, Blackburn. Details from *G4JS*.

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

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

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

Chester (C & DARS)—2 June (Net night on 160 and 2m), 9 June, (Visit to BBC tv transmitter at Moel-y-park), 16 June ("Short wave listeners", by G3OWY), 23 June ("On to square two" by G3ATZ), 30 June (Junk sale). 8pm, YMCA, Chester. Further details from *G8AYW*.

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

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

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

Liverpool (L & DARS)—Tuesdays, 8pm, Conservative Association Rooms, Church Road, Wavertree. 2 June (Nfd plans), 9 June (Review of nfd), 16 June (Plans for Liverpool Show participation), 23 June (Plans for Region 1 VHF Field Day), 30 June (Working night for Liverpool Show station. The show takes place on 16, 17, 18 July and the club will be operating on 20, 15, 10, 4 and 2m. Contacts count as 2 points towards the Worked Liverpool Award). Please note new secretary: *K. Wood, G3WCS*, 90 Childwall Valley Road, Liverpool 16.

Liverpool (NLRC)—5, 19 June, 3 July, 8pm, Labour Party HQ, 13 Crosby Road South, Liverpool 22. Secretary: *Peter Jeffs*, 38 College Road North, Liverpool 23. Telephone 051-924 3020.

Manchester (M & DARS)—Wednesdays, 7.30pm, 203 Droylesden Road, Newton Heath, Manchester 10. Future plans include the holding of Morse classes and a junk sale probably on 3 June. A club project has been announced and is in its first stages. It is to be a transistorised df receiver. Future attractions will include a talk on "Chassis bashing", by Tom Cook, and "Computers", by Don Shaw. Annual subscriptions are to be cut by half for senior citizens.

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

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

Preston (PARS)—11, 25 June, 9 July, 7.30pm, (Private Room), "Windsor Castle", St Paul's Square. Secretary: *George Windsor*, 26 St Gregory's Road, Preston.

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

Southport (SRS)—Wednesday, 8pm, Sundays, 2.30pm, at the Esplanade. Secretary: *A White*, 91 Portland Street, Southport.

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

Stockport (SRS)—Second and fourth Wednesdays at the Blossoms Hotel, Wellington Road South, Stockport. Further details from the secretary: *Peter Taylor, G8BCG*, QTHR.

Thornton Cleveleys (TCARS)—10, 24 June, 8 July, 8pm, St John Ambulance Brigade Hall, Fleetwood Road North, Thornton, near Blackpool.

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

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

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

Wirral (Wirral DX Association)—Last Thursday in the month. 25 June (At G3AKW for a "Sheepskin night" when members will bring along their awards and certificates). During June the club plans an expedition to Hilbre Island. During July and August, instead of the usual formal meetings, members will be at the Red Cat Hotel, Greasby, and will welcome visitors.

REGION 2 — RR K. Sketheway, BRS20185

Barnsley (B & DARC)—11 June (Visit to Radio Sheffield), 12 June ("Control circuitry", by P. Carrbutt, G3AFV), 26 June (Ladies night), 7.30pm, King George Hotel, Peel street, Barnsley. *G3LRP*.

Bradford (BRS)—16 June (Nfd post mortem), 7.30pm, 10 Southbrook Terrace, Greta Horton Road, Bradford.

Halifax (NHARS)—3 June ("RAEN", by G3MBQ), 17 June (Sale of surplus equipment), 1 July ("Dxpeditioning", by G3UBI), 7.45pm, Peat Pitts Inn, Ogden, Near Halifax.

The most recent event was the AGM when it was a case of nearly all return to office. The secretary and chairman were returned for another session. It was also voted to make the change of meeting place as a regular so now it is permanent to meet at the Peat Pitts Inn, Ogden, Halifax.

Hull (H & DARS)—5 June (Swl night and nfd arrangements), 12 June ("Life as a radio operator in the MN", by G3AGX), 19 June (Practical night), 26 June ("Making the most of your tv viewing", by G3SSA and G3PQY), 3 July (Swl night), 7.45pm, 592 Hessle Road, Hull.

Scarborough (SARS)—Thursdays, 7,30pm, c/o RAF Association, Fulbeck House, 3 Westover Road, Scarborough.

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

Spen Valley (SVARS)—4 June ("What's new", by S. Marsden of West Riding Electronics Ltd), 11 June (Visit to Army Apprentice School, Harrogate), 18 June (Open meeting), 26 June ("Transistors at rf", by A. Yarker, G3TAY), 2 July (AGM), 7.30 pm, The Grammar School, High Street, Heckmondwike.

Sunderland (SARS)—First and third Thursday of each month, 7pm, Sunderland Technical College. *G3XID.*

REGION 3 — RR R.W. Fisher, G3PWJ

Mobile Rally—Upton Mobile Rally organized by Worcester and District Amateur Radio Club, with many competitions and games for the children, 12 July, Hill County Secondary School, Upton upon Severn. *G3VJN.*

Birmingham (MARS)—9 June, 7.45pm, Midland Institute, Margaret Street, Birmingham 3.

Bromsgrove (B & DARC)—Second Friday of each month, the *Royal Oak*, Barley Mow Lane, Catshill, Bromsgrove.

Coventry (CARS)—5 June (Preparation for nfd), 12 June (Night on the air), 18 June (Vhf, treasure trail, a sort of df competition), 26 June (Night on the air), City of Coventry Scout County HQ, 121 St Nicholas Street, Radford Road, Coventry.

Dudley (DARC)—2, 16 and 30 June, 8pm, Central Library, St James Road, Dudley. Club Station, Old Windmill, Vale Street, Upper Gornal, Dudley, Worcs. *G3PWJ.*

Hereford (HARS)—Every Friday, Civil Defence HQ, Goal Street, Hereford. *G3WRA.*

Leamington (MWAE & RS)—8 June (Open meeting), 15 June (Radio model control), 22 June (Test equipment exhibition), 29 June (Open meeting), 8pm, 28 Hamilton Terrace, Leamington Spa. *G8ARZ.*

Lichfield (LARS)—First and third Friday of each month, the Swan Hotel, Lichfield, *G3NAS.*

Nuneaton (NARC)—Thursday evenings, fortnightly, 8pm, the Grange, Caldecote, Nuneaton. *G2HAO.*

Solihull (SARS)—13 June (Exhibition station Solihull carnival; G3GEI/P on 160m and GB3SOL on the hf bands), 16 June ("Transistors I have known", by B. Bond, G3XGP), 7.30pm, the Manor House, High Street, Solihull. *G3YOY.*

Stourbridge (STARS)—2 June (Club station on the air and natternite), Scout HQ, South Road, 16 June (Informal), 8 pm, Shrubber Cottage. *G8CVK.*

Stratford (SoA & DRC)—26 June (AGM), 7.30pm, Halls Croft, Old Town, Stratford. *G3RPJ.*

Sutton Coldfield (SCRS)—8, 22 June (Natternite), 8pm, Sutton Town Football Club Coles Lane, Sutton Coldfield. *G3XXJ.*

Wolverhamton (WARS)—1 June (Hi-fi evening), 8pm, Neachells Cottage, Stockwell Road, Tettenhall. *G3UBX.*

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

REGION 4 — RR T. Darn, G3FGY

REGION 4 ORM

This will be held at the "Regency Rooms", Wharncliffe Road, Ilkeston, on Saturday 20 June at 2.30pm. It is hoped that there will be a good attendance of Region 4 members. The President of the RSGB, Dr J. A. Saxton, along with Council members R. F. Stevens, G2BVN, J. R. Petty, G4JW, and F. C. Ward, G2CVV, will be in attendance.

Ilkeston is a busy market town just off the M1 motorway. There is a cafe on the premises and also a bar. If there is sufficient room available, trade stands will be asked to come along. The meeting will be followed by a dinner and dance in the evening, organized by the Derby and District Amateur Radio Society in honour of the visiting Council members. Tickets are limited at 25s each and can be obtained from the Region 4 RR, G3FGY.

Chesterfield (CADRS)—Meetings are held on the second and fourth Wednesdays in the month, 7.30pm, at the Hunloke Adult Education Centre, off Derby Road, Chesterfield.

Derby (DADARS)—Wednesdays, 7.30pm. 6-7 June (Nfd at Blagreaves Lane, Littleover), 10 June (Tape recorded lecture), 13 June (Exhibition station at St Nicholas' School, Allestree), 17 June (Third df practice run, the clubroom will be open for those not taking part), 21 June (70MHz /P Contest, see club notice board), 24 June (Discussion on 13th Mobile Radio Rally). All meetings take place at the Society's Clubroom, 119 Green Lane, Derby. *G2CVV.*

Derby (NHCAARG)—5 June (Preparation for NFD weekend), 12 June (Final arrangements for the 1st Mobile Rally at Elvaston Castle on 14 June), 19 and 26 June (Open evenings to clear work on nfd and mobile rally). All meetings on Fridays at Room 7, Nunsfield House, Boulton Lane, Alvaston, Derby. *G3LCV.*

Grimsby (GARS)—11 June (Df event to start at Weelsby Woods at 7pm), 25 June (Tape lecture). All meetings continue to be held at the clubroom of the North Lincs Photographic Society, rear of 50 Welholme Road, Grimsby.

Heanor (SEDARS)—Every Tuesday during June, 7.30pm, at the South East Derbyshire College of Further Education, Ilkeston Road, Heanor. Visitors are always welcome.

Lincoln (SLWC)—Tuesdays, 7.30pm, 2 June (Nfd preparations), 9 June (Visit to Lincoln power station), 16 June (Treasure hunt), 23, 30 June (Open nights). All meetings at No 2 Guardroom, Sabraon Barracks, Breedon Drive, off Burton Road, Lincoln.

Nottingham (ARCON)—4 June (Bring and buy sale. Junk and equipment invited), 11 June ("Transistor transmitters", by G. A. Garrard of Texas Instruments, visitors are welcome), 18 June (Final arrangements for GB3FON,) 25 June (Open night). After the AGM in April there has been a re-shuffle on the committee. Mike Harris, *G3VUI*, is the new secretary and his address is 20 Durham Cresent, Bulwell, Nottingham, NG6 9AH.

REGION 5 — RR S. J. Granfield, G5BQ

Bedford (B & DARC)—4 June (Tape recording for the radio amateur-hints and kinks on reception and re-transmission, including licence regulations G3UQR), 6-7 June (Nfd—QTH Cranfield, Beds), 11 June (Thoughts on nfd—"We didn't take enough beer..." etc. To be followed by an informal session). 18 June (Junk sale—auctioneer extraordinary, G3XKB). Meetings at the *Dolphin*, Broadway, Bedford.

Bishop's Stortford (BS & DARC)—15 June (Talk and demonstration of mobile equipment by Derek Purchase, G3LXP), 8pm, The British Legion Club, Windhill, Bishop's Stortford, Herts.

Cambridge (C & DARC)—Club meets on Fridays, 7.30pm, Club Headquarters, Corporation Yard, Victoria Road, Cambridge.

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

Shefford (S & DARS)—4 June (Nfd—final plans. Club treasurer's half-yearly report, G3TVG), 11 June (Nfd post mortem), 18 June (Signalling systems—British Railways), 2 July (Vhf/uhf field day planning, G8AKT). Church Hall, Shefford, Bedfordshire.

REGION 6 — RR L. W. Lewis, G8ML

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

Gloucester (GRS)—Second Thursday, 2.30pm, RAFA Club, 6 Spa Road, Gloucester. No more meetings until September.

South Bucks VHF Club—2 June (Bring and buy—surplus equipment sale), 7 July (Talk on vhf gear construction), 8pm, Bassetbury Manor, High Wycombe.

REGION 7 — RR P. A. Thorogood, G4KD

At an RR meeting of our region, 14 ASRs and ARs came along to meet Tim Hughes, G3GVV, (zone manager), and hear what we and he had to say. Information and suggestions were discussed, and ideas put forward for Council.

Acton, Brentford & Chiswick (ABCRC)—16 June (Contest tx test), 7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick.

Addiscombe (AARC)—Second and fourth Tuesdays, 7.30pm Toc H Hall, 158 Lower Addiscombe Road.

Ashford, Echelford (ARS)—Second Monday and last Thursday of month. 8 June ("Vhf operating today", by Mike Dormer. G3DAH), 25 June (Surplus equipment sale, G2FNK at the auction block 7.30pm, St Martins Court, Kingston Crescent, Ashford, Middx.

At AGM: G3DXA re-elected president; R. McCowatt, G3WPK, chairman; R. Hewes, G3TDR, secretary; J. A. Hall, treasurer; A. Wheeler, G3RHF, PRO; K. Kanaly, G5AGX, social; D. Walmsley, G3HZL, technical; J. Ellis, G2FNK, editor.

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

Bexleyheath (NKRS)—Second and fourth Thursdays. 11 June (Nfd inquest), 25 June (Club station and natter), 7.30pm, Congregational Church Hall, Chapel Road, Bexleyheath.

30 members came to last meeting, eight non RSGB, when Peter Balestrini, G3BPT, gave an illustrated talk on communications in the Port of London Authority.

Cheshunt (CDRC)—First Friday of month, 7.30pm, Methodist Church Hall, opp Theobalds Station, Cheshunt. At the AGM the officers elected for 1970-1 were: chairman, G. L. Childs, G3XEW; secretary, J. V. Beavan, G3GBL; treasurer, D. Brett, G8ASB.
Chingford (RSGB Group)—Fridays, telephone 01-524 0308.
Chingford (SRC)—Fridays, 8pm, Friday Hill House, Simmons Lane, Chingford, E4.
Civil Service (CSRS)—First and third Tuesdays, 6.30pm, Civil Service Recreation Centre, Monck Street, Westminster.
Croydon (SRCC)—Third Tuesday, 7.30pm, Swan & Sugarloaf, South Croydon.

At the AGM last month, new officers were elected: chairman, G3GHI; vice-chairman, G3YRB; treasurer, G2RD; secretary, G3FWR.

Crystal Palace (CP & DRC)—20 June (Metal work and finishing, G3SBY, G3IIR. Also nfd inquest), 18 July ("Direction finding", by John Gould, G3JKY), 8pm, Emmanuel Church Hall, Barry Road, SE22.
Dorking (DR & DRS)—Second and fourth Tuesdays, 9 June (Informal meeting at "Wheatshaft"), 23 June (Vhf mobile night on 2 and 4m). 8pm, "The Cock" at Headley Heath, yl and xyls welcome.
Ealing (E & DARS)—Tuesdays, 7.30pm, Northfields Community Centre, Northcroft Road, W13.
East Ham (Newham RES)—At AGM, E. W. Bonson, G3JHY, nominated RSGB representative, and club transmitting activities on G3UVJ. Meetings will be every Wednesday, 8pm, please contact G3UVJ, at 53 St Albans Avenue, East Ham.
Edgware & Hendon (E & DRS)—8 June (Junk sale), 23 June (Lecture on tvi by G3HVA), St Georges Hall, 51 Flower Lane, Mill Hill, NW7.
Farnham, Bucks (Burnham Beeches RC)—Fortnightly on a Monday. 1 June (Final arrangements for nfd), 15 June (Film show), 29 June (Club station G3WIR), 8pm, Farnham Common, Village Hall, Victoria Road.
Gravesend (GRS)—Mondays, 8pm, Community Centre, Cedar Avenue, Kings Farm Estate, Gravesend.
Guildford (G & DRS)—Second and fourth Fridays, Guildford Engineering Society, Stoke Park.
Hampton Court (TVARTS)—First Wednesday, 7.30pm, the Three Pigeons, Portsmouth Road, Surbiton.
Harlow (DRS)—Tuesdays (General); Thursdays (Cw practice); Fridays (Junior), 7.30pm, Mark Hall Barn, First Avenue.
Harrow (RSH)—Every Friday, 8pm, Roxeth Manor School, Eastcote Lane, Harrow.
Havering (H & DARC)—Fortnightly, 8pm, British Legion House, Western Road, Romford.
Hemel Hempstead (HH & DARS)—First and third Fridays, 7.30pm, "Addmult", Sports Club, Hemel Hempstead.
Holloway (GRS)—Fridays (Club), 7.30pm, Whittington School, Highgate Hill, N19.
Ilford—Every Thursday, 8pm, 50 Mortlake Road, (off Ilford Lane), Ilford.
Kingston (K & DARS)—Second Wednesday. 10 June ("Biasing, coupling and decoupling of transistors", by D. Beakhurst, G3OSQ), 8 July (Vhf converters—towards club net), 8pm, Penguin Lounge, 37 Brighton Road, Surbiton.

Last meeting J. R. Vickers, G3ORI, gave an informative talk and film show on amateur df, 21 members attended and friends.

Leyton & Walthamstow—Tuesdays, 7.30pm, Leyton Senior Institute, Essex Road, E10.
Loughton—Fortnightly on Fridays, Loughton Hall, Rectory Lane, (near Debden station).
Maidenhead (M & DARC)—Third Tuesday of month, 7.30pm, Victoria Hall, Cox Green, Maidenhead.
New Cross—Wednesday and Fridays, 8pm, 225 New Cross Road, SE14.
Paddington (P & DARS)—Thursdays, 7.30pm, Beauchamp Lodge, 2 Warwick Crescent, W2.
Purley (P & DRS)—First and third Fridays, 8pm, Railwaymans Hall, Side Entrance, 58 Whytecliffe Road, Purley.
Reigate (RATS)—First Wednesday. 1 July (QSL Bureau by G2MI), 7.45pm, George and Dragon, Cromwell Road, Redhill.

At the AGM the following were elected to office: chairman, G3XSZ; secretary, G3NKS; treasurer, G8AMU; committee members, G3RAE, G3RIM, G3WUS, G3XOQ.

Romford (R & DRS)—Tuesdays, 8.15pm, RAFTA House, 18 Carlton Road.
Scouts (ARS)—Third Thursday of month, 7.30pm, Baden Powell House, Queensgate, South Kensington, SW7.
Sidcup (CVRS)—First and third Thursdays, Congregational Church Hall, Court Road, Eltham.

At the AGM the following officers were elected: chairman, F. A. Tickner, G3XFG; vice-chairman, K. Woolf, G3TCC; secretary, D. MacLennan, G3KGM; treasurer, D. R. Baker, G3XMD; committee, D. Buckley, G3VLX, I. R. Lever, G8CPJ, R. Treacher, GI3124 (ISWL); auditor, A. E. H. Swindon, G3ANK.
Slough (SDR Group)—First Wednesday, 7.30pm, United Services Club, Wellington Street.
Southgate (SRC)—Second Thursday of month, 7.30pm, Civil Defence Hut, Bowes Road, N11.
St Albans (Verulam ARC)—3 June (Informal evening at Salisbury Hall, London Colney), 17 June (Bill Bailey, G2QB, talks on "The good old days"), 21 June (1,296MHz contest and practice for vhf/nfd), 7.30pm, Town Hall, St Peters Street, St Albans.
Sutton & Cheam (SCRS)—Third Tuesday, 8pm, The Harrow Inn, High Street, Cheam.
Welwyn (Mid-Herts ARS)—Second Thursday of month, 8pm, Welwyn Civic Centre, Welwyn.
Wimbledon (W & DRS)—Second and last Fridays, 8pm, St John Hall, 124 Kingston Road, South Wimbledon, SW19.
Wembley (GECARS)—Thursdays, 7pm, Sports Club, St Augustin Avenue, North Wembley. (This club is open to non-GEC employees by invitation, telephone Wain Evans, G3RPE, 904 1262 for details).

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

Canterbury (EKRS)—Information of meetings from *D. N. T. Williams, G3MDO.*
Crawley (CARC)—Fourth Wednesday in each month. 13 May (Informal meeting), 27 May (Formal meeting). Meetings are held at Trinity Congregational Church, Ifield Road, Crawley. For further information contact the hon secretary, *G3YVR*, telephone Pound Hill 3253.
Eastbourne (SARS)—First Monday in the month. 1 June (Fourth AGM). 7.30pm, the Victoria Hotel, Latimer Road, Eastbourne, Sussex. Visitors are welcome.
Dover (SEK YMCA ARC)—Meetings every Thursday, 7.30pm, YMCA, Leybourne Road, Dover.
Maidstone (M YMCA ARS)—Tuesdays and Fridays, 8pm, "Y" Sports Centre, Melrose Close, Loose, Maidstone.
Mid-Sussex (MSARS)—6–7 June (Nfd, East Chiltington), 18 June ("Windmills" mobile evening at Jack and Jill, Clayton, nr Hassocks). Coming soon: W1BB's top band tape lecture "Dx the hard way".
Thanet (TRS)—19 June (Visit to SE uhf/vhf meeting at Keynes College, Canterbury).
Tunbridge Wells (WKARS)—All meetings held at the Adult Education Centre, Monson Road, Tunbridge Wells.
Worthing (W & DARC)—Every Tuesday, 8pm, the Clubroom "Rose Wilmot Youth Centre", Littlehampton Road, Worthing.
Worthing Schools (WSRS)—5 June ("Basic valve circuits", by Mullard), 26 June (Construction evening).

REGION 9 — RR J. Thorn, G3PQE

Bristol City & County (BARC)—Every Tuesday and Thursday. 16 June ("Semi-conductors", by G3JMY), 2 July ("Heathkit HW100", by G3SWH). Club HQ, G3TAD, 41 Ducie Road, Barton Hill, Bristol 5. *G6SXY.*
Bristol (RSGB Group)—28 June (Longleat Mobile Rally: Make this a definite date to meet amateurs and your friends together with your family at the group's annual rally. Also make a note of the group's picnic on 2 August), 29 June ("The 1 + 1 160m tx", by C. Parker, G3VBH, 7.30 pm, Becket Hall, St Thomas Street, Bristol 1. *G3ULJ.*
Bristol, City & County (Shirehampton)—Every Friday at Twyford House, Shirehampton. *G6YIQ.*
Bristol, City & County (University ARC)—Every Saturday afternoon, Dept of Physics, Royal Fort, Woodland Road, Bristol. *G8ADF.*
Burnham on Sea (BOSARS)—Contact *G3GIW.*
Cornish (CRAC)—Meet at SWEB Clubroom, Pool, Camborne. 5 July (Mobile rally at St Ives Secondary School, talk-in stations on the air from 1000gmt on 160, 80, 4 and 2m. *G6UCQ.*

Falmouth Club—Oddfellows Hall, near the Severn Stars, Penryn, *G3OJN.*

Newquay Club—Treviglas School. *G3THT.*

Exeter (EARS)—2 June, YMCA, St Davids Hill, Exeter. *G3HMY.*
North Devon (NDARC)—10 June ("Talk on a visit to Zambia", by G3EDW), 24 June (Natter night), 7.30pm, "Grinnis", High Wall, Sticklepath Hill, Barnstaple. *G4CH.*
Plymouth (PRC)—2 June, 7.30pm, Club HQ (G3PRC), Virginia House, Bretonside, Plymouth. *G3SPI.*

Saltash (S & DARC)—5 June (Rx alignment demonstration), Burraton Toc H Hall. 19 June (Fox hunt), assemble outside HQ, 7.30pm. *G3XWA.*
South Dorset (SDARS)—12 June, E2 Room, Weymouth Technical College, Newstead Road. *G3RZG.*
Taunton (T & DARC)—Every Friday, County Control Centre, The Crescent, Taunton. *G3WPJ.*
Torbay (TARS)—Every Tuesday and Friday and last Saturday of month, 16 August (Club rally), meetings at Club HQ (G3NJA), Bath Lane, Rear 94 Belgrave Road, Torbay.
At the AGM the officers were re-elected for another term. June meeting will be an nfd inquest. *G3NQD.*
Wells (EMI Social Club)—Contact *G3MVA.*
Weston-Super-Mare (WSMARS)—5 June (General ragchew), 7.30pm, Westhaven School, Ellesmere Road, Uphill.
Summer visitors to Weston are very welcome. The ORM has been postponed until next May. *G3GNS.*
Yeovil (YARS)—Wednesdays, the Park Lodge, Yeovil. *G3NOF.*

REGION 10 — RR D. M. Thomas, GW3RWX

Blackwood (ARC)—Fridays, 7pm, Blanche Cottage, off High Street, Blackwood, Mon. *GW3TUG,* 9 Cendl Road, Rassau, Ebbw Vale, Mon.
Barry College of Further Education (ARS)—Thursdays, 7pm, College of Further Education, Colcot Road, Barry, Glam.
Cardiff (RSGB Group)—8 June (Constructors contest), 7.30pm, TA Centre, Park St, Cardiff. *GW3GHC.* 14 June (Mobile picnic), Porthkerry Park, Nr Barry, Glam. (Please see separate notice).
East Glamorgan Raynet Group—First Tuesday in each month, 7.30pm, Cardiff Emergency Services HQ, Womanby Street, Cardiff. *GW3VNO.*
Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, Nr Merthyr, Glam. Secretary: *Mr F. E. Tribe.*
Port Talbot (ARC)—Meets on second Tuesday of each month, 7.30pm, Trefelin Club and Institute, Port Talbot, Glam. *GW5VX.*
Pontypool (ARC)—Meets on Tuesdays, 7pm, during school terms at the Educational Settlement, Rockhill Road, Pontypool, Mon. *GW3JBH.*
Pembroke (ARC)—Meets last Friday of each month, 7.30pm, at the Defensible Barracks, Pembroke Dock. *GW3LXI.* The club's annual "Bucket and Spade" party will be held on Sunday 14 June, at the Regency Hall, Saundersfoot.
Rhondda (ARS)—Meets at Rhondda Transport Employees Club and Institute, Porth, Rhondda, Glam. *GW3PHH.*
Sully & District Shortwave Club—Meets Tuesday, 7pm, at the Annexe, Sully Bowls & Social Club, 59 South Road, Sully, Glam. Secretary: *Mr Glyn Maggs,* 3 Thorley Close, Cyncoed, Cardiff.
Swansea Telephone Area (ARS)—Fridays, 7.30pm, at Telephone Engineering Centre, Gors Road, Townhill, Swansea. Secretary: *Mr M. D. E. Connor,* 54 Talley Road, Panlan, Swansea.
University College, Cardiff (ARS)—Meets Tuesdays, 8pm, in Geology Department, Main College, Secretary: c/o Students' Union, Dumfries Place, Cardiff.
University College, Swansea (ARS)—18 June (AGM), 21 June (Mobile rally takes place on the lawn fronting Singleton Abbey, University Campus, Singleton Park, Swansea). Further details from Philip Regan (PRO), Students Union, University College, Singleton Park, Swansea.

REGION 11 — RR P. H. Hudson, GW3IEQ

Conway Valley (CVARC)—18 June (AGM), the Parade Hotel, Church Walk, Llandudno. At the April meeting, J. E. T. Lawrence gave an excellent talk on modern electronics and produced, for the instruction of everyone, a great deal of equipment.
Rhyl (R & DARC)—9 June (AGM). Members and visitors will receive a further notification, together with the agenda.

REGION 12 — RR A. W. Smith, GM3AEL

Aberdeen (AARS)—Fridays, 7.45pm, 6 Blenheim Lane, Aberdeen. *GM3HGA,* tel Aberdeen 33838.
Dundee (RSGB Group)—Thursdays, 8pm, 3 Magdalen Place (off Roseangle), Dundee. *GM3KYI,* QTHR.
Inverness (IRS)—Thursdays, 7.30pm, 4 Falcon Square (near railway station), Inverness.
Lerwick (LRC)—Tuesdays and Thursdays, 8pm, Annsbrae House, Lerwick. *GM3XPQ,* tel Bixter 249.
Lhanbryde (MFARS)—Mondays, 7.30pm, St Andrews School, Lhanbryde, by Elgin, Morayshire. *GM3UKG,* tel Clochan 225.

REGION 13 — RR V. W. Stewart, GM3OWU

Lothians Radio Society (LRS)—11 June (2m tx construction), 25 June, (AGM), 7.30pm, Board Room, YMCA, St Andrew Street, Edinburgh.

REGION 14 — RR N. G. Cox, GM3MUY

Ayrshire (Ardeer Recreation Club ARC)—2, 4, 9, 11, 16, 18, 23, 25, 30 June, 7.30pm, Ardeer Recreation Club, Amateur Radio Section, Stevenston, Ayrshire. Details: *J. F. McCreight, GM3DJS,* 10 Auchenharvie Road, Saltcoats, Ayrshire.
Ayrshire (AARG)—Nfd, no meetings.
Glasgow University (GURC)—12, 26 June, 7.30pm, George Service House, University Gardens, Glasgow W2.
Greenock (G & DARC)—5, 12, 19, 26 June, 7.30pm, Watt Library, Union Street, Greenock.
Mid-Lanark (RSGB Group)—19 June, 7.30pm, YMCA Brandon Street, Motherwell.

REGION 15 — RR J. Thompson, GI3ILV

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

REGION 16 — RR W. J. Green, G3FBA

Basildon (VARS)—Thursdays, 7.30pm, The Scout Hall, Fairview Road, Vange, Basildon. *G3VOP.*
Chelmsford (CARS)—First Tuesday in each month, 7.30pm, Marconi College, Arbour Lane, Chelmsford. *G3VCF.*
Colchester (CARS)—Wednesdays, 7pm, NE Essex Technical College, Colchester. *G3VAG.*
Gt Yarmouth (GYRES)—Fortnightly, 7.30pm, 98 South Market Road, Gt Yarmouth. Details from *G3HPR,* telephone Gt Yarmouth 62008.
Ipswich (IRC)—Details from *G3UJR,* QTHR.
Lowestoft (LARS)—Visiting amateurs are requested to contact Mr L. Taylor, *G3JMU,* 121 London Road North, telephone Lowestoft 3119 (day), 3067 (night).
Maldon Essex (MYGRC)—Thursdays, 7.30pm, The Friary, Chequers Lane, Maldon.
Norwich (NARC)—8 June (Visit to GPO sorting office), 15 June (Nfd inquest), 22 June (VFOs—general discussion and demonstration. Hf and vhf), 29 June (Summer sale). Meetings, unless stated otherwise, at the *Brickmakers Arms,* Sprowston Road, Norwich. *G2CDX,* QTHR.
Southend (SDRS)—Details from *G8BSB.*

REGION 17 — RR C. Sharpe, G2HIF

Chippenham (CDARS)—Meetings on the second and fourth Tuesday in each month, 7.30pm, Boys High School, Hardenhuish Lane, Chippenham.
Fareham (FDARC)—6, 7 June (Nfd), 14 June ("So what went wrong", discussion), 21 June (Txers turn), 28 June (Listeners ladder finals and committee meeting), 7.30pm, Porchester Community Centre, Porchester, Fareham. *G3XIV.*
Maidenhead (MDARC)—1 June ("GDOs", by R. Rickets, G3VGY), 16 June (Informal), 27 June (G3WYK on the air at the community association fete), 7.30pm, Victory Hall, Cox Green Lane, Maidenhead. *G3VMR.*
N Berks AERE (Harwell) ARC—Meetings on the third Tuesday in each month, 7.30pm, Social Club, AERE, Harwell. *G3NNG.*
Reading (RDARC)—Meetings on alternate Tuesdays at the *Victory* Public House, Meadway, Reading. *G3NBU.*
Southampton (Southampton Group)—6, 7 June (Nfd at Holt Farm, Fair Oak, Eastleigh), 13 June (Monthly meeting), 7.30pm, Lanchester Buildings, Southampton University, Southampton. *G3GOY.*

RSGB SLOW MORSE PRACTICE TRANSMISSIONS

These slow morse practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the honorary organizer, Mr M. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Sundays

Clock time	Callsign	MHz	Town
0930	G3TNF	1·920	Gateshead
0930 †	G3KZZ	1·920	South Shields, Co Durham
1000 †	G3WNR	1·920	
0930	G3HZL	1·940	Isleworth, Middlesex
0945	G3YRO	1·860	Fareham, Hants
0945	G3USK	1·975	Mablethorpe, Lincs
1000	G2FXA	437·000 to north	Stockton-on-Tees
1015	G3CGD	1·875	Cheltenham
1030	G2FXA	437·000 to south	Stockton-on-Tees
1030	G3NPB	1·875	St Ives, Cornwall
1100	G2FXA	1·900	Stockton-on-Tees
1100	GW3UMB	1·880	Colwyn Bay
1130	G3KKU	1·940	Liverpool
1130	GW3VPL	1·918	Porthcawl, Glam
1130	G3VVP	1·880	Plymouth, Devon
1200	G3HVI	1·890	Stoke-on-Trent
1200	G3GNS	1·910	Weston-super-Mare
1330	G3FWW	1·880	Burnham-on-Sea, Soms
1330	G3XDV	1·910	Canterbury, Kent
1400	G3XGJ	1·830	Huddersfield, Yorks
1730	G3TN	1·920	Gateshead
1930	G3YFO	144·19 to south	Burnham, Bucks

† Alternately

Mondays

1730	G3TNF	1·920	Gateshead
1800	G3SWR	1·980	Birmingham
1830	G3NCZ	1·920	Blackburn, Lancs
1830	G3RXH	1·910	Skipton, Yorks
1900	G3WGU	1·880	Bispham, Lancs
1900 †	GC4LI	3·600	Jersey, CI
	GC2FMV		
1900	G3YJA	1·920	Coventry, Warks
1900 †	G3WFY	1·850	Thornton Cleveleys
	G3YEI		Fleetwood, Lancs
2000	G3KAN	1·990	Northampton
2000	G3IBJ	1·910	Southampton, Hants
2000 †	G3WDW	1·915	Leeds, Yorks
	G3VTY		
2000	G13JEX	1·855	Belfast
2015	G3YMH	1·845	Wraysbury, Middlesex
2030	G3YEB	1·915	Harlow, Essex
2030	G3JHM	70·050	Worthing, Sussex

† Alternately

Tuesdays

1730	G3TNF	1·920	Gateshead
1800	G3XDV	1·910	Canterbury, Kent
1900 †	G3UFO	1·980	Wirral, Cheshire
	G3XAM		
1930	G3SWP	1·850	Doncaster, Yorks
1930	G3WGU	433·500 to south-east	Bispham, Lancs
2000	G3UPA	1·850	Meriden, Warks
2000 †	G3FAU	1·980	Stevenage, Herts
	G3KSS		
	G3OVT		
2000	G3FWW	1·880	Burnham-on-Sea, Soms
2000	GM3UWX	144·045	Bishopton, Renfrewshire
2000	G3WGD	1·860	Leicester
2000	GM3PIP	3·590	Mintlaw, Aberdeen
2030	G3HZL	1·845	Isleworth, Middlesex
2030	G3PRN	1·915	Harlow, Essex
2100	G4RS	1·865	Blandford, Dorset
2100	G3XUS	1·970	Newhaven, Sussex
2200	G3HZM	1·925	Manchester

† Alternately

Wednesdays

1730	G3TNF	1·920	Gateshead
1830	G2FXA	1·900	Stockton-on-Tees
1900	G3YPZ	28·700	Harlow, Essex
1930	G3VVP	1·880	Plymouth, Devon
1930	G3WGU	433·500 to south-east	Bispham, Lancs
1930	G3YFO	144·19 to north	Burnham, Bucks
1930	G3UJD	1·825	Farnborough, Hants
2000 †	G3AJX	1·925	Winchester, Hants
	G3TWP		
	G3YSK		
2000	G8QU	1·970	London, N22
2000	G3JHM	70·050	Worthing, Sussex
2015	G3UNV	1·845	Ashford, Middlesex
2030	G3KGU	1·915	Theydon Bois, Essex
2100	G3HVI	1·890	Stoke-on-Trent

† Alternately

Thursdays

1730	G3TNF	1·920	Gateshead
1800	G3SWR	1·980	Birmingham
1830	GW3VBP	3·590	Barry, Glam
1830	GW3UMB	1·880	Colwyn Bay
1830	G3NC	1·968	Swindon, Wilts
1900 †	G3WFY	1·850	Thornton Cleveleys,
	G3YEI		Fleetwood, Lancs
1900	G3WGU	1·880	Bispham, Lancs
1930	G3GNS	1·910	Weston-super-Mare
2000	G3WDS	1·975	Carlisle
2000	GI3JEX	3·590	Belfast
2030 †	G3SJE	1·875	Harrow, Middlesex
	G3GC		
2030 †	G3ROE	1·915	Harlow, Essex
	G3RSF		
	G3YMJ		
	G3YFC		
2100	G4RS	1·865	Blandford, Dorset
2100	GW3XNI	1·930	Crosskeys, Mon

† Alternately

Fridays

1730	G3TNF	1·920	Gateshead
1800	G3XDV	1·910	Canterbury, Kent
1830	G3NCZ	1·920	Blackburn, Lancs
1900	G3WRO	1·915	Romford, Essex
1900	G3NPB	1·875	St Ives, Cornwall
1930	G3PQF	1·825	Farnborough, Hants
2000	G3EEL	1·980	Peterborough
2000	G3WGD	1·860	Leicester
2000 †	G3KEP	1·910	Bingley, Yorks
	G3UCZ		Pudsey, Yorks
	G3WTF		Bradford, Yorks
2015	G3SAZ	1·845	Ashford, Middlesex
2030	G3JHM	70·050	Worthing, Sussex
2030	G3ZEV	1·930	Harlow, Essex

† Alternately

Saturdays

0930	G3UNV	1·935	Ashford, Middlesex
1000	G3PLE	1·820	Stourbridge, Worcs
1300	G2FXA	1·900	Stockton-on-Tees
1400 †	GC4LI	3·600	Jersey, CI
	GC2FMV		
1730	G3TNF	1·980	Gateshead
1800	G3ZCC	1·915	Chingford, Essex
1930	G3EFS	1·913	Bromley, Kent
2000	G3KPO	1·980	Peterborough

† Alternately

Members might like to be reminded that the Royal Naval Amateur Radio Society, using their call-sign G3BZU, transmits cw as a proficiency test at 1900gmt on the firs Tuesday of each month. Frequencies used are 1·875MHz for practice only, and 3·520 MHz for speed proficiency tests. Certificates are issued against correct copy submitted to: The Royal Naval Amateur Radio Society, HMS Mercury, Leydene, Hants. A small charge is made to cover costs.

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

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

The closing date for each issue is the 7th of the preceding month, but no guarantee of inclusion in a specific issue can be given. No correspondence concerning this free service can be entered into

See the current order form for further details.

FOR SALE

KW Vanguard Mk2, 10–80m, £30 ono. Pref buyer coll. GM3BGW, QTHR.

Labgear LG50 tx, mint, no mods. Offers. EI7BS, McCurtain Street, Clones, Co Monaghan, Eire.

Eddystone EC10 Mk1, no mods, as new, £35. Buyer coll evenings and weekends due to bereavement. G2DUS, 113 New Haw Road, Addlestone, Weybridge, Surrey. Tel Wey 45412.

HRO 5T + psu, 9 gc coils, gd cond, £15. Wharfdale slimline spkr, £10. Buyer coll. Gainsborough, 26 Rodney Close, Bilton, Rugby.

DX100, £30. VF1U, £3 5s + carr. G3DBU, QTHR.

Heathkit GD1U gdo with hndbk and coils, £5. G8CLH, QTHR.

Dentsu DA1 electronic keyer, quiet relay, £7 ono. Lafayette KT320 gc rx + hndbk, £14. Carr extra all items. G3YOU, 201 Bishops Oak Ride, Tonbridge, Kent. Tel Tonbridge 61656.

CR100, £10. R107 with hndbk, £5. Top bnd 1155 rx, £3. Panda Explorer, 150W tx, £25. TCS comp tx, rx, psu, £20. Class D wavemeter with hndbk, £3 10s. G3TNB, QTHR.

RTTY gear: 7B printer, 7TR, Auto 6S reperfs, psus, auto trnsfmrs, etc. Sae list. G3LDI, QTHR. Tel Wymondham 3463.

DX100U, vy gd cond, £40. Canadian Marconi 52 tx and 12V psu, £10. Buyer coll. G3TCJ, QTHR. Tel Liskeard 2073.

17in shadow mask colour tv tube, brand new in orig box, £25 ono. Buyer coll. G8ASI, QTHR. Tel Radlett 3252.

KW1000 lin amp, £95. G3VLW, QTHR. Tel Chertsey 2109 after 6pm.

KW Vanguard, 50W, 10–80m tx. Heathkit RA1 rx + xtal calib. Class D wavemeter. G3XUE, QTHR. Tel Bradford 639542.

1000W ssb tx, phase locked synthesizer driver unit, 1·5–22MHz, a.m., cw, usb, lsb, 2 tone osc, built in monitor scope, prof equip, comp with psu and manual. Offers. G3KBR, QTHR. Tel Chelmsford 72576.

Swan 500 + ac psu, vox, £190. KW 1000 lin amp, £90. Both gd cond. G3EFP, QTHR.

DX100U tx, ex cond, £40. J Beam 2m 14 ele Parabeam, £4 + carr. G3VJF, QTHR. Tel Chestfield 2872.

10–80m 50W rack mounting a.m. tx, £25. Eddystone S640 rx, £15. BC221 with mains psu, £20. Harding, 43 Wantage Cres, Wing, Leighton Buzzard, Beds. Tel Wing 429.

Heathkit Mohican Mk2 rx, factory built with hndbk, £25. Codar AT5 tx with hndbk, £12. Both are as new. Buyer coll. G3VYU, QTHR.

Codar CR45 with coils, £8 ono. R1155 with S meter, agc, ps/amp unit, ant trimmer, slow motion drive, £7 ono. PR30, £3 ono or lot for £14, Buyer coll. Fry, 35 Owen Road, Eastleigh, Hampshire.

Knight Kit 600A tube tester, £8. Heathkit RA1 with xtal calib. 20m band needs alignment, £18. Marconi TF913 fm rx tester, £5. Buyer coll Coulsdon, Surrey. Lloyd, Tel Downland 53532 after 7pm.

Cow-Gill motor, £2. 2m/70cm tx comp mod, psu, ant relay, etc, 50W on 70cm, 15W on 2m, £30. Buyer inspect and coll both items. G8BKK, QTHR. Tel 01-850 3492.

Marconi base tx, wkg 2m, hi level mod, 6.40 pa, £5 10s. G8ARV/Mullard solid state 2m tx, 2W a.m., BLY33 pa, comp mod, PC5, and 48MHz xtal, £7 10s. Hallicrafters rx, 550kHz-32MHz, bndspread, £12 10s. R1155N, £6. Carr at cost. G8BSR, QTHR. Tel Wolverhampton 29201.

Exchange Hallicrafters S27 rx, 19–144MHz, for B40. Wanted: FT243 xtals, 4860kHz or grindably below. Transport available reasonable distance. Jackson, 38 Haslemere Road, Thornton Heath, Surrey.

813 valves (5), £1 ea. Xtals: 11105, 11906·8, 12575, 36950kHz, 7/6d ea. G8CUO, 13 Fleming Drive, Newark, Notts.

Xtals: 10XJ—6015·5, 6030, 6032·222, 6040 (2), 6050, 6057, 6070, 8014, 8057. FT243—6006·667, 6025, 6050, 6075. All 10s ea. Sommerkamp handie-talkie, 28·5MHz, as new, cost £18 10s, sell at £12 10s. Stevenson, 19 Johnstone Road, Newent, Glos.

B40 gc rx, 600kHz–30MHz, xtal filt, variable bfo, ex cond, £15. GW3YQM, 4 Green Park, Pentlepoir, Saundersfoot, Pembs. Tel Saundersfoot 3351.

12V 35/40A alternator, £15. Regulator to suit, £5. Strong beam rotator, 230V, will take the largest beam, £15. G2MF, QTHR. Tel Sheffield 360210.

Minimitter lpf, 75 Ω, black crackle finish, offers. Wanted: 150W mod trnsfmr, Minimitter or sim. G3YMH, QTHR. Tel Staines 53765.

Wayne Kerr rf bridge B601 comp with source detector, £35. Transistor tester, £4. Solartron 7115/2 scope, double beam, dc–12MHz, £40 ono. Hall, 22 Maple Drive, Beverley, E. Yorks. Tel 0482 885854.

Commercial 70cm tx, 90W, £32 10s. 28·5MHz tx/rx, £12 10s. Katsumi elbug, as new, £5 5s. Selection of 2m xtals. R1132A, int psu, £3. List of other lf/vhf/uhf gear on request. G8AIH, QTHR.

Still have large quantity of 2m, 4m and 70cm xtals available. Send large sae for list. Drake R4–B and T4–X. G5AGX, QTHR. Tel 01-894 6880.

Heathkit RF1U sig gen, £12. Heathkit V7AU valve voltmeter with rf probe, £10. Both items property of late G3PBP. G3WLX, QTHR. Tel Beaconsfield 4965.

Excellent Brush xtal mic, £2. Instant heat soldering iron, £1. Heavy duty smoothing chokes. Foot operated c/o switch. Wanted: Small mains trnsfmr, 100V at 50mA. G3KH, 133 Station Road, Cropston, Leicester. LE7 7AH.

2m Hallicrafter SR42 trnscvr with HA26 remote vfo, int 12V dc psu and 115V ac psu, manual and 6/6 ant, mint, £105. Agfa Supersilette CRXVXM, erc, hood, filts, flashgun, projector, mint, £24. Wanted: HW32A. G3VKC, 178 Park Street Lane, Bricket Wood, St Albans, Herts. Tel Park St 3638.

Creed 7B teleprinter, friction feed carr, £15. Motor psu available separately. G3LYD, QTHR. Tel Sharnbrook 306.

Eddystone vhf rx model 770R, 19–165MHz, exc cond, £100. Two used English Electric videcon camera tubes type P862, £7 10s pair. Brand new KT88s (GEC), 15s ea. Carr extra all items. G3RUB, QTHR.

Tiger TR150, spare valves, £20 ono buyer coll. Z match, 30s. Raymark bandchecker, £1. R1155, unmod, needs attention, £1. 400W 230–115V autotrnsfmr, £2. Cambridge microammeters, locking pivots, mirror scale, teak cases, precision insts, write details. G5XB, Little Orchard, Gallows Tree Common. Tel 073–525 2195.

Short Wave Mag, 5 bound vols 1962–1967, offers. BC221 with charts, psu, spare xtal + headphones, no case, £16. G8AKA, 29 Rectory Ave, Corfe Mullen, Wimborne, Dorset. Tel Broadstone 5297.

Trio JR500SE, mint, orig carton + guarantee, £50. Halson whip, coils 160–20, £8 10s. Pair Eagle 28MHz w/talkies 12 trans, £27. Eagle headset + boom mic, £7 10s. Geloso 1110/SR xtal mic, £5. G3OUV, QTHR. Tel 021-354 7240 evenings.

Mobile station comp, KW76 rx, 10–160m, Minimitter tx, 40–80–160, 12V transistor psu, control box + whip ant 80–160. Working in Cortina, £30. G3TVX, 32 Huntingdon Rd, Cleveleys. Tel Cleveleys 4758.

Home workshop, Myford lathe, bench drill, Wolf grinder, hand shaper, + tools, screw cutting gears, etc, as one lot or sep, £90 the lot. Buyer coll, G3UDO, QTHR. Tel 01-654 8043.

Emigrating: Valves, capacitors, transformers, chokes, coax, plugs, sockets, psu, scope, CR300 rx, G2DAF tx, teleprinter type 3X, cfs tu, speakers, xtals, 70ft aluminium tubing, 2 × 813 lin, shelving, Ventaxia fan, etc. G3VUT, QTHR. Tel 01-550 9300.

KW2000B, ac psu, new, mint, with unused Shure 444, £200. G5NN, QTHR. Tel Winslow 2494.

Brand new perf cond, Trio 9R59DE rx, also Wither 160 Communicator transcvr, £50 ono. G5ZT, QTHR. Tel Plymouth 76552.

HRO, psu all coils. APS13 unmod. 2m, 70cm, 23cm, 50W rack tx. 40W, 4m tx + mod. Ssb monitor scope, pair 88 sets with mic, etc, 9 trs 27MHz walkie/talkies. Sae list, what offers. G8ANY, QTHR.

Eagle headset with boom mike, type HMA209, orig price £9 10s, going for £6. Still in makers box, unused. G3XPU, telephone RSGB HQ.

R216 rx 19–157MHz, mint cond with psu, offers or exch for two mobile or EC10 with 2m convtr + cash adj. Also wanted: CCTV gear any type. Clearing shack, sae for list. Hill, Berkeley House, New Street, Ross on Wye, Herts. Tel 3870.

4 speed Brennel tape-deck capable of taking 14in tapes, with ten unused EMI tape + two used tape. Best offer sec. Buyer coll, G3MTX, QTHR.

10MHz and 100MHz xtals, 18s ea or swap for 2m 36 or 72MHz overtone xtals, pref zones A or B. G8BQR, QTHR. Tel 01-722 5572.

Hallicrafters S40A rx, modernized front end and i.f., £10 or swap for 2m rx, tx or trnscvr, buyer coll from Deal, Colchester or London. Thompson, University of Essex, Colchester, Essex.

R1155B rx 80, 40, 20m output stage, psu, variable bfo exc, £8 ono. Z12 amp, smart case, 70s ono. 12V vibrator/dynamotor, 250V output, 30s ono. EE8 beginners kit, comp, 30s ono. Sae for list. Valves, w/w resistors etc. T. N. Price, Greenbanks, Cuckney, Nr Mansfield, Notts.

Pye 5W dash rangers, aligned/overhauled on 2/4 with 12·7MHz xtals, £15. BCC69G, aligned/overhauled on 2m with tx xtals, psu, cables + mic, £15. Circ diag included. G3RWL, QTHR. Tel 01-366 4297.

Comps for sale, sae for list. Aladdin formers with ferrite slugs, 8s doz. Laminated board with copper surface, ideal printed circ work, various sizes, average 4in × 15in, 3s sheet. $\frac{3}{16}$in Rawlnut set into rubber plugs length 1$\frac{1}{4}$in, 3s doz, post extra. J. Harvey, 22 Elm Grove, Norton, Bromsgrove, Worcs.

Converters, 24MHz i.f., 2m, 70cm, £4 ea. 23cm, £5. QP166 unused, £7 10s. G3IAS el bug, £2 10s. Audio oscillator, £3. Pye inverter 25s. 100kHz freq standard, 25s. Valves, xtals, sae details. G3NNW, 87 White Hart Lane, Portchester, Hants. Tel Cosham 73276.

Lafayette KT320 rx, £18. Periodicals, few missing: *Practical Wireless* Feb 1962–July 1966, £2. *Practical Electronics* Dec 1964–May 1966. 10s. The *Radio Constructor* Sept 1962–July 1966, £1. G8AOV, Hiron, 215 North End Road, London W14.

Creed 7B teleprinter as new in maker's packing case, £25 p/p extra. Line tu unit with polar relay, new £2. G8BCL, 11 Greencroft Ave, Northowram, Halifax, Yorks. Tel Hx 21885.

Heathkit HP23A psu with man, unused. RCA AR77E rx, good wkg order, clean, with man, any reasonable offer. G3XYD, QTHR. Tel Watford 43516.

Comp station: DX40U, R1155, vfo, Z match, massive psu and all tx/rx switching. All mounted on two 5ft PO racks with castors, quick sale, £50. G3VFT, 15 Belmont Lane, Stanmore, Middlesex. Tel Orpington 25281.

Tiger 100 tx, 160–10m, only few hours use since new, £55. Trio JR500SE, unused, £59. Tiger Z match, £6, KW swr bridge, £6. 813, £1. All unused. Phillips, Shandon, Willesley Pound, Cranbrook, Kent.

New boxed valves 5–50L6 GT, 5–35Z5 GT, 2–12SK7 GT, 5–12SA7 GT, 4–12SQ7 GT, 2–6L6 GT, £4 10s the lot. Buyer coll. G3IFG, Dudley, Anstey Lane, Alton, Hants. Tel Alton 3610.

DX100U, fair cond, changeover + ae relay, £35. HE30 + spkr, good cond, £20. PR30X, £5. TA32Jr, £12. AR22 rotator + control unit, £12. 35ft aluminium mast with accessories, £8. All insp and coll. G3YTU, 48 College Road, Ardingly, Sussex. Tel Ardingly 486.

1052 Cossor scope, £12. R209, 6V, £6. Nombrex, c/r bridge, as new, £5. Heathkit RA1 fair cond, £15. Magnavox 363 deck, £10. G8ARQ, QTHR.

Sig gen type 30, 1·8–72MHz, £7 10s. Also WS No 38 Mk3 with xtal calib No 9, £4 ono. Wanted: Hdbk for BC348N. Tye, 101 Stonecross Road, Hatfield, Herts. Tel Hat 67564.

30ft self supporting lattice tower, comp with rotor etc, must be sold or scrapped. Also 800W 6HF5 lin, needs tidy up and 2 new valves, otherwise ok, £10. G3WPB, 76 Southfield Rd, Hinckley, Leics. Tel Hinckley 6520.

Heathkit DX100U, exc cond, sell £35 or exch super 8 cine camera or projector. G3IQM, QTHR. Tel 0602 264988.

Lafayette HA500, £30, as new with man, 3·5MHz to 30MHz + 50MHz. Perdio Town and Country rx, lw/mw/shipping bands, £10. G2BNZ, QTHR.

Minimitter Mercury. Advance sig gen. Moseley tribander ant. Electronic bug key. 2m 4m txs. Eddystone 888A. SB10 + home built 10–80m ssb tx. Write details sae. G8DT, QTHR. Tel Chelt 57969.

Olivetti T2FN teleprinter/reperf, 50 bauds, 230V ac, with hndbk, £17 10s. G3FRV, QTHR.

Mixed untested valves, many types, four to nine pins. Many old expensive types. Also trnsfmr, 240V pri, 117V sec, 200W, fused. Carr by arrangement. Saes pse. Howard, 2 Castle Close, Reffley Estate, Kings Lynn, Norfolk.

2N3055s, 7/6d ea. G8CHC, QTHR.

Lafayette HE80 rx, 550kHz–30MHz and 142–148 MHz, vgc, £30. KW Vanguard, 80–10m, £25 ono. GM3VEY, 25 Elmwood Road, Dundee. Tel Dundee 66241.

4 valve 2m convtr. 45W transistor amp. *Practical Electronics,* Nov 1964 to Dec 1968. 19 set 12V psu. Offers pse. G3YQV, 4 Northese Drive, Hove, Sussex. Tel Brighton 735694.

Cossor double beam scope 1035 Mk2, £20 ono. QQV06–40A (several available) 25s ea + post. Wanted: Mech filt, Kokusai MF455–150K or similar. G3YGR, QTHR. Tel 01-850 9248.

Lambda stock, £100, will split. Offers to G3KHA, QTHR.

RA1, vgc, int ldspkr, £29. KW Valient and psu, 6146B, 160–10m, relay cont, £28. Lo band Ranger, £9. Class D and accessories, 6·3V ac, £6. Phillips dictation recorder, £5. 22 Set and 12V psu +accessories, £4. Wanted: HW12A. G3RAS, 17 Oakdale Drive, Wrose, Shipley, Yorks.

Trio TS500 with PS500. Trnscvr in mint cond, asking £130 ono. G3WTN, 5 Argyle Road, Whitby, Yorks.

GEC Selectest multimeter, £3. Joystick ant with atu, £3. Cowl Gill motor/indicator ant rotator, £5. G3KYM, 107 Station Road, Lower Stondon, Henlow, Beds. Tel Henlow Camp 298.

Ssb station: KW Viceroy tx, Minimitter rx, both little used. 4 band KW dipole, Dow ant relay, low and high pass filts, vox cont panel. Offers to G5NG. Tel Holford Chertsey 2502.

Geloso G209, £27 ono. Eddystone S504, £20 ono. Buyer coll. G3RKH, QTHR. Tel Bristol 20587.

R107 rx, vgc, REME rebuilt, bargain, £9. BSR mains 3$\frac{3}{4}$ips tape deck, little used, £4. Mini-5 ssb tx, £10. Class D wavemeter, £3 10s. Haydon, Moorcot, Kents Road, Torquay. Tel Torquay 23710.

6 large p.a. exponential horns, exc cond, £20 set. Buyer coll. Also HRO/MX and psu, late model, little used, vgc, set 9 coils, no mods, spare valves, £20. G3YPO, 12 Bence Close, Darton, Barnsley, Yorks. Tel Darton 2874.

FL200B tx, FR100B rx, vgc, £165 ono the pair. KW2000 with ac psu, good order, £135 ono. G3SUK, QTHR. Tel Rattlesden (Suffolk) 352.

Hammarlund SP600 rx, excellent, £75 ono. Wanted: gen cov rx reasonable for beginner. GW3NKZ, 71 Station Rd, Llanishen, Cardiff. Tel 753743.

TN-1B/APR1 and TN-2B/APR1 covering 35–90 and 75–300MHz respectively. Silver plated coils and 2 × 9002 in 4m version. Butterfly tuned circs and 2 × 955 acorn in 2m. 28MHz i.f. output, £28 ono. Young, 18 Wincroft Rd, Caversham, Reading, Berks. Tel Reading 71761.

Journals and proceedings of IERE, 1964–70 and journals of the I Prod E, 1965–69. Any offers, why? G3MPH, QTHR. Tel Cheltenham 59935.

RF24 and RF25 + 3 × SP61, new, £1 ea. 1 hp Batwin motor, £5. SCR522, £1. 600–0–600V transfmr, 30s. 550–0–550V transfmr, £1. Many oddments, valves, etc. Sae your needs G3SAX, 14 Nightingale Close, Hazlemere, Bucks. Tel Holmer Green 2105.

DX4OU and VF1U, top band tx. Offers. G3VDG, QTHR. Tel Aldridge 51377.

Galaxy V Mk2 with G1000DCPU and hb ac psu, 400W /M or fixed, with manual. Delivered reasonable distance. Mint, airtested only, £230 ono. G3KPO, Jersey House, Eye, Peterborough. Tel Eye 351.

3 gang 365pF variable capacitors, 4s ea. 5Z4G, 2/6d. 6V6G, 1/6d. 6Q7G, 2s. 4 pole 3 way Yaxleys, 2/6d. Gromets, ⅛in, 9d a doz. 1A fuses, 3d. All new, please add postage. G8BUC, QTHR.

TW nuvistor convtr, 28–30MHz, no psu, £5 plus post. G8BI, QTHR. Tel Welwyn Garden City 23676 after 6pm.

Pye 2 in 1 transistor car portable Mk2, lw/mw, 12V pos/neg and 9V batt, car receptacle circuit, ex cond, £10 10s. RAF xtal monitor type 4, vhf, with manual, mains supply, £3. G3IEE, 14 Leewood Way, Effingham, Surrey. Tel Bookham 5439.

6AC7 (11), 6SH7 (2), 6SQ7 (1), 6H6 (1), 6AG7 (1), 6SG7 (1), 12SK7 (3), 12SR7 (1), untested, 1s ea, 10 for 6s. BSR autochanger record deck, 78/45/33, wooden plinth base, gd cond, 30s. 19 Set psu, R1155B, heavy duty resistors. Post extra. Sae lists. Price, Greenbanks, Cuckney, Near Mansfield, Notts.

AR22 rotator, new, boxed with indicator, £20. BC348 rx, built in psu, £8. KW E Z match atu, £8 pair KW traps, new, £2. Heathkit HX100 ssb rx with psu, £25 ono. G3KFB, 12 Hill Rise, Sundon Park, Luton, Beds. Tel Luton 54549 (after 8pm or weekends).

3BP1, £1. VCR139A (new), 30s. HRO psu, £2. 10in Reentrant horn, marine, £3. 220/110 autos, old valves, sae list. Wanted: 898. Cook, The Old Lodge, Seven Hills Road, Cobham, Surrey. Tel 3117.

National NCX5 trncvr, quality rig with digital read-out to 100Hz, £175. Delivered fair distance. Cossor 339 scope, £10. G3AAO, 6 Egerton Road, Bournemouth. Tel 36727.

Two No 38 AFVSets, wkg, £4. 15a Midmore Road, London, SW12.

Vfo complete unit BC221 and amplifier with psu in cab. Xtal not working but inc book, output 5W, 40 and 80m, £20, wkg order, includes spare valves. Buyer coll. G2MI, QTHR. Tel 01-462 1877.

Df compass, liquid marine type, 2¼in diam, 3½oz, perm beta light, precision optics, will take bearings to one degree land or sea. Brand new, £13 10s pp. G3TJY. QTHR. Tel Lychett Minster 142.

Exchange Hallicrafters S27 vhf rx for B40 rx, cash adjustment. Wanted: FT243 xtals 4,860kHz or grindably lower for xtal filt. Jackson, 38 Haslemere Rd, Thornton Heath, Surrey.

American Johnson Viking Adventurer cw tx, 80–10M 50W, £12 10s. Adventurer accessory modulator, £3 10s. SR200 rx 160–10m, £30. VF–1U vfo, new, £10. Pair field telephones type F, £3 10s, coll or carr ex, offers considered. G3JFC, QTHR. Tel 01-854 6646.

BY100 type rectifiers 1/6d ea, 6d pp. 2m convtr, transistorized, 12–14MHz i.f., £7. Wanted: Command rx covering 4–6MHz; BC454; 70cm gear; QQVO3-20A. G8DAD/A. Springfield, Wycliffe College, Stonehouse, Glos.

160 and 80m 10W am/cw tx, £10. Kimble, 23 Heol Illtyd, Caewern, Neath, Glam. Tel Neath 3197.

CR100, £10. Panda Explorer tx, £25. Class D wavemeter £3 10s. R107, £5. 1155N rx, £3 10s. TCS–6 comp station, £20. G3TNB, 71 Long Grove, Baughurst, Basingstoke, Hants.

Viceroy Mk3, mint, little used, gone trnscvr, £75. G3DBM, QTHR. Tel Mursley 393.

Transceiver wireless set, compact unit, needs 2 new valves, £4. Also HRO MX plus many extras to make comp rx station, £14 10s ono. Write for details. Lamb, 70 Dudsbury Rd, Ferndown, Dorset. Tel Northbourne 2496.

LG300 with comp mod psu, £30, buyer coll. GM3WIL, 2 Falkland Place, Ayr, Ayrshire.

HW17 exc cond, £65 ono. Will deliver reasonable distance. G8CEJ, QTHR.

Inoue IC–700R communications rx, 10–80m, solid state, vy gd on ssb, 6 mths old, perf cond, £55 no offers. Cannan, 340 Woodchurch Rd, Prenton, Birkenhead, Cheshire. Tel 051-608 4043.

AR88 with cab and spare valves, gd wkg order, £18 pref buyer coll. Also driver trnsfmrs type TA17, prim 10KΩ, sec 50–0–50kΩ, 10s ea. Beadle, 37 Esmonde Gds, Bishopmill, Elgin, Morayshire.

4 trnscvrs for /M use. 4m: one 5W output comp, three 15–20W, two comp the other requires leads and spkr. All less xtals, supplied with ccts, £12 10s the lot, will not split. G3VYN, QTHR. Tel Hempnall 423.

SB200 imac, £115, Heathkit ant imped meter, £5. Dentsu keyer DA1, £12. Two 813s, 30s ea. All ono. G3JEC, 11 Astley Cres, Hunstanton, Norfolk.

Sale or exc. Linear 4 off 5B/254Ms, any reasonable offer. Wanted: 80, 40 or 160m trnscvr. G3HQU, QTHR. Tel Barrow 22303.

Second-hand telephones, all types, send for lists. G3YAI, QTHR.

Trio TS500, PS500, VFO-5, exc cond, £160. G3YKF, QTHR.

R107, vgc, new capacitors, no mods, hndbk, £12 ono. Buyer coll. Bell, 20 Sunderland Ave, St Albans, Herts. Tel St Albans 60020.

Special white plastic, black figs, photo copy, R1155 dial and logging scale for illuminating, £1. Philips tech lib bks, gen, £1. Four rx valves, 15s ea. Tx valves 15s ea. RCA transistor man, 10s. G3JMO, QTHR.

RA1, good order and preslector, buyer coll, £25. Roberts, Phone Room, Queen Elizabeth Hospital, Edgbaston, B'ham 15. Tel 021-472 1311.

Teleprinter 7B with term units, not wrkg, £3, also 1200V psu for 1154T, £2 10s. Wanted: Vespa Mk2. GW3ACF, QTHR. Tel Briton Ferry 3433.

TW Communicator, two, £40. Lafayette HA600 rx, £32. Comp codar AT5/T28 160–80 outfit w/fx/mob, psu, controller, connectors etc, £30. Several beams, quads, etc, cheap. Some test gear, spkrs, etc. Going abroad. G3DKS, QTHR. Tel 01-449 4934.

LG300 with comp mod and psu, £30 buyer coll. GM3WIL, 2 Falkland Place, Ayrshire, Scotland.

Eddystone 358X rx, 49kHz–22MHz, ten plug-in coils, 250V psu, gd wkg order, buyer coll. Plumb, Banksfield, Haw Lane, Yeadon, Nr Leeds. Tel Rawdon 4648.

KW 1000 lin amp, £90, can deliver 50 miles. 14 AVQ with 80m mod, £10. G3VBE, 65 Montgomery St, Hove, Sussex. BN3 5BE. Tel 778546.

AR88 plus hndbk and 100kHz and 500kHz xtals. Needs recalib, £15. Vanguard tx plus hndbk, not wkg and in poor elec cond. Suit club, £10. King, 35 Ampney Orchard, Bampton, Oxon. OX8 2AE.

40 copies of *Short Wave Magazine*, March '52 to Feb '56. Also 19 copies of *Practical Wireless* from '61 to '65. Gd cond, £2 the lot. Cook, 75 Windmill Lane, Castlecroft, Wolverhampton. WV3 8HN.

Marconi CR150/6, psu, manual, mint, £40. BC221 with charts and psu, £17 10s. Labgear wideband multiplier, unused. Two Jennings vacuum variables and rough BC348. Offers. G3DGW, QTHR. Tel Yardley Gobion 219.

Swan 350, ex cond, hardly used, bargain at £160. Will deliver 50 miles. Hi-fi spkr FR8, £3 10s inc post. G5AJS, QTHR. Tel 01-455 2677.

No 52 rx/tx/psu, atu, in carrier, spare valves, hdphns, mains psu for rx, circuits, can be delivered. £30. G8BFJ, QTHR. Tel 01-845 5192.

Marconi Electra rx, £18. Collins mech filter, 455kHz 2·4kHz bandwidth, £15. Elizabethan tx, 150W, £10. Joystick type 4RF atu, £3. Carr ex. G3XMX, c/o Sunnycroft, Cross Roads, Tehidy, Camborne, Cornwall. Tel Camborne 3080.

Furzehill scope 0100, dc-4MHz, calib time and volts, £15. Assorted meters, send requirements. Uhf osc, 430–480MHz a.m., modern psu, ideal for conversion. Mfrs: Hewlett Packard, £4. G8APS, QTHR. Tel 021-308 3044.

WANTED

Collins TCS12 rx, 12/250/40V psu, manual and key reasonable to volunteer naval training unit. Lewis, 33 Osborne Parc, Helston, Cornwall.

TW160 or 4m Communicator or single units. Have car, can travel. State price and cond. G3IPH, QTHR.

Buy or borrow hndbk or any info on P58 70cm rx. Sansom, 24 Rowan Ave, Greenhill. Tel Coalville 4004.

Radio Communication, Jan and Feb 1969. Pse state price. G8DGA, 111 Woodhouse Lane, Bishop Auckland, Co Durham.

Exchange late model Pye base station (QQV06–40) on 2m for TW or Heathkit /M tx/rx in any cond. G8CDP, QTHR.

Philips T-Vet /P tv. Does not need to be in wkg order. G3YFG, 11 Clarendon St, Accrington, Lancs.

SB10U. Have AR88D in gd cond, £35. Will take cash adjustment. AR88D is in Glasgow. G2ARW, QTHR.

Marine radio telephone. Landor, L'Auge, Rue des Raisies, St Martin, Jersey, CI. Tel Jersey East 186.

International radio tube encyclopaedia (Bernards) by Babani. Reasonable price and cond pse. G8DOR, 85 Mayfield Drive, Caversham, Reading. RG4 0JR.

Trnsfmr to give 2–2·5KV at 350–500mA. G3MPN, QTHR. Tel Wymondham 3382.

Circ and operating manual for USA army sig gen type I–130–A, 100–156MHz. Reynolds, 224 Station Road, Rolleston, Burton on Trent.

Wireless set No 11 unmodified. State price and cond. G2ATM, 44 Birkland Ave, Mapperley, Nottingham. NG3 5LA.

Info on Cossor tx/rx type HO108B. Want to modify for 4m. GM3ZDH, 20 Summerfield Cottages, Glasgow W4.

455kHz mech filt for use in ssb tx. G3XAQ, QTHR.

Gen RCA S meter for AR88D. Johnston, 27 Wickfield Ave, Christchurch, Hants.

Full set of official AR88D trimming and realigning tools. Hall, 30 Montagu Cres, Leeds, Yorkshire. LS8 2RF.

VP8HJ requires dial pointer and escutcheon Gelso 4/104 vfo. Would consider buying comp dial. G3AAE, QTHR. Tel 01-508 3669.

Transistor trnscvr for 2m. G3JGJ, Rose Cottage, Pepperdon, Moretonhampstead, Newton Abbot, Devon.

B2 trnscvr manual. 10X xtals for tx unit 3·5, 7, 14MHz. Any further bndspread to rx. Lenn, 708 Lynmouth Road, Stamford Hill, London N16.

Case for psu type 360. Cylinder dial, plastic window, 4 pointers, avc and n l switches for R1475 rx. Must be mint cond. 2 VCR138 crts, £2 ea + post. Chapman, 83 Courtenay Road, Great Barr, B'ham 22a.

701A or 708A crt. G3XPU, QTHR. Tel RSGB HQ.

Labgear companion modulator and psu for LG300, gd cond essential. Will coll 60 miles. G8BMQ, 2A Convent Hill, London SE19. Tel 653 8489.

Calibrated audio osc. Manual/circ of Admiralty uhf test set type 15077. *QST* for Feb 1964. Sale: Pair Eagle 10 transistor walkie-talkies, 28·5MHz, £10. Carr at cost. G8AXC, 49 Station Road, Snainton, Scarborough, Yorkshire. Tel Snainton 252.

4m trnscvr, 12V negative earth. Alternatively—hf trnscvr similar. GI3AOB/M on 70·26MHz 28 July–14 August, Dunbartonshire area. GI3AOB, 44 Toome Road, Ballymena, Co Antrim, N Ireland. Tel Ballymena 2351.

Hndbk, circ or any other info on R209 Mk2. State price. Also details of any suitable mods. Lightbody, 42 The Uplands, Harpenden, Herts. Tel Harpenden 61383 after 6pm.

Borrow or buy *QST* Nov 1968. G3NWG, 1 Groton Road, London, SW18.

Dec 1969, Jan, Feb 1970 *Radio Communication*. Will pay 5s each. Rf and i.f. coils for G2DAF rx Kokusai filt 2·1kHz bndwidth. G3WGN, 4 Walcot Green, Dorridge, Solihull, Warks. Tel Knowle 4193.

Heathkit 80m single band trnscvr. G3VGO, QTHR. Tel 2912.

Transistor gdo model TE15 or sim. Must include 1·8–144MHz. Details pse. Bass, 43 Prospect Road, Carlton, Nottingham.

FT243 or HC6/U filter 5·2MHz xtals for G3RNL Mini-5 rx. 25 unwanted but new Russian transistors for disposal, £1 or swap. G3YOZ, Marlborough College, Marlborough, Wiltshire.

QQV06–40As. QQV03–20As. Trnsfmrs 450–375–0–375–450, 200mA plus or similar. Xtals 36–36·4 or 60–60·6MHz HC6/U. Xtals HC18/U–HC6/U any frequencies. G8CCH, 84 Elmwood Way, Basingstoke, Hants.

January and April 1968 *Radio Communication* urgently required. Copy price paid. Also FL8A filt. G3KGB, Luzern, Sellicks Green, Taunton, Somerset.

Ssb filt, hf or lf, and conversion xtals for amateur bands to 5MHz i.f. Also Electroniques HB166T. G3UDI, 80 Coleridge Road, Cambridge.

Spider for boomless quad, Labgear or sim. Please reply by airmail. ZL1AH, QTHR.

Prop pitch motor or heavy duty ant rotator. GM3UBJ, QTHR. Tel Banff 2345.

Handbook for AR88D. G8AWN, QTHR.

UM2 or UM3 mod trnsfmr. G3GYQ, QTHR. Tel Blunsdon 298.

RAE correspondence course. CR70A in gd cond. Webb, 123B Lower Cippenham Lane, Cippenham, Slough, Bucks.

R114 (TR1986) rx. Your price please. Grayson, 54 Hinde House Lane, Page Hall, Sheffield 4.

Linear for hf bands, G2DAF or similar. G3DRS, 9 Meadow Bank, Hollingworth, via Hyde, Cheshire. Tel Mottram 3286.

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Mains trnsfmr TA10034 for Cossor oscillograph model 339. G3PKO, QTHR. Tel Whaley Bridge 2558.

T & R Bulls, May and August 1929, January 1930, July 1933, August 1937. G3IDG, QTHR.

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Old 405 line tv camera for experimental purposes. Must be cheap. Naulls, 31 Hamilton Road, St Albans, Herts.

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KW E Z match. Also Trio 9R59DE rx. GI3YMT, 15 Everton Drive, Cregagh, Belfast 6. Tel 644688.

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Rx for military aircraft, will coll in 25 mile radius, gd price paid. Allen, 89 Flore Close, Westwood Est, Peterborough, PE3 7AG.

Lin amp; tri-band beam and rotator; antenna and radio amateurs hdbks; atu. G3ODT, Station Cottage, Brampton, Nr Tiverton, Devon.

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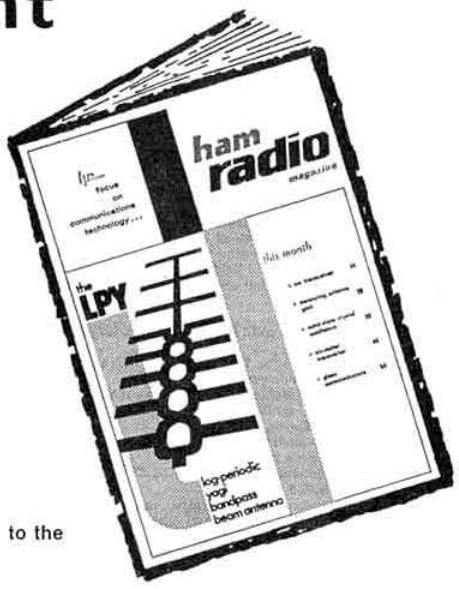

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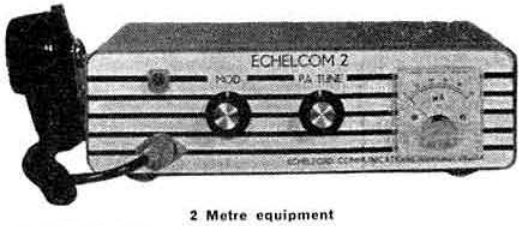

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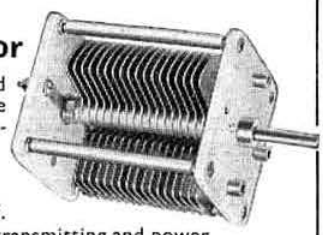

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