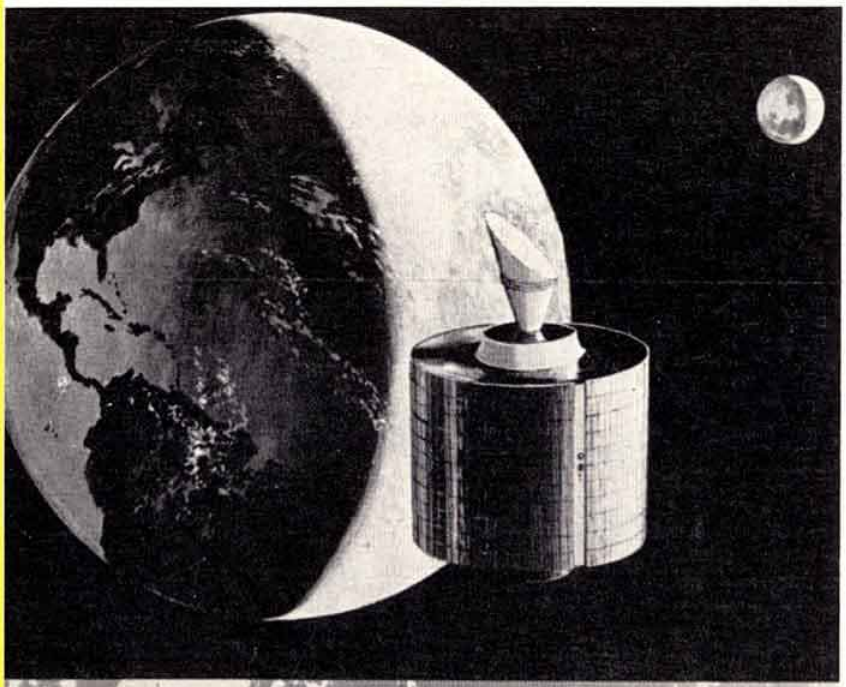
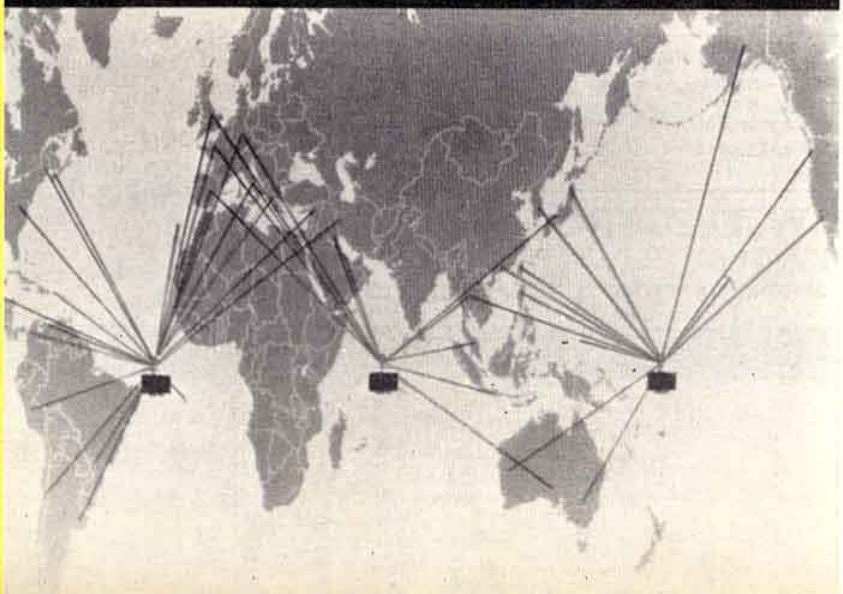
radio communication

May 1971

Journal of the Radio Society of Great Britain

17 MAY 1971





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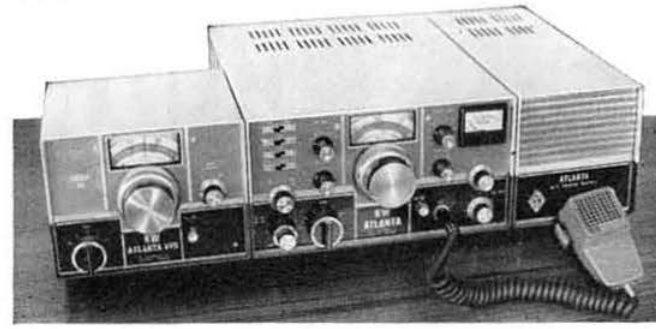

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FRONT COVER
An Intelsat telecommunication satellite in geostationary position. Below, the map shows areas covered by Intelsat satellites.

CONTENTS

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

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ABC
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AGENTS John G3JYG 16 Harvard Road, Ringmer, Lewes, Sussex. Ringmer 8071

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

Note the new address, Gentlemen.
Once again we have outgrown our existing premises and are moving into a new and more spacious emporium, even further up that mountain. We are now in fact pretty well on top of it. Take the next turning above our old shop—this is Cavendish Road and go right to the far end. There is a cul-de-sac by the tennis courts at the end of which crouch Alan and I, waiting to pounce on you and relieve you of your floating assets, fluctuating emoluments, or plain loot.
Actually, very nice premises in a beautiful spot. We have lashed up temporary dipole for 80m (responsible for the big signal from G3MME). Planning permission for a tower is imminent. The whole thing constitutes the dream shack set in delightful surroundings. Why not pop along and pay us a visit to look around—maybe work a bit of DX using top equipment from an ideal location, or just bend your friend's 'S' meter on 80. Maybe you'll just pop in for coffee—we've lashed out on a perc. which will be on at all times. You'll be welcome, you will meet other Amateurs—maybe even meet the guy who gave you RST 293 (no bloodshed permitted on trade premises), you'll see some very nice gear and you're welcome to try it on the air.
IC-2'fers—we'll monitor channel 1, so if you're in our area, give us a yell, we'll yell back.
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FL2000B linear £130
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FT-200 transceiver £132
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DC-200 D.C. p.s.u. £40
FTdx 400 transceiver £195
FTdx560 transceiver £195
FT-2F (2m FM allee same like IC-2F) £85
YD844 table mike £10·20
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Inoue
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73 de Alan and Bill

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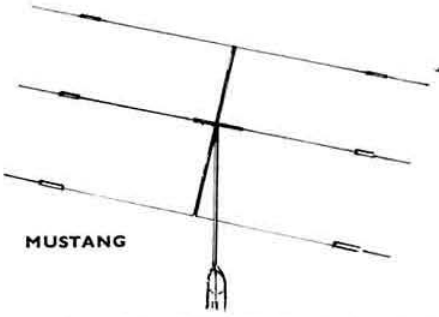

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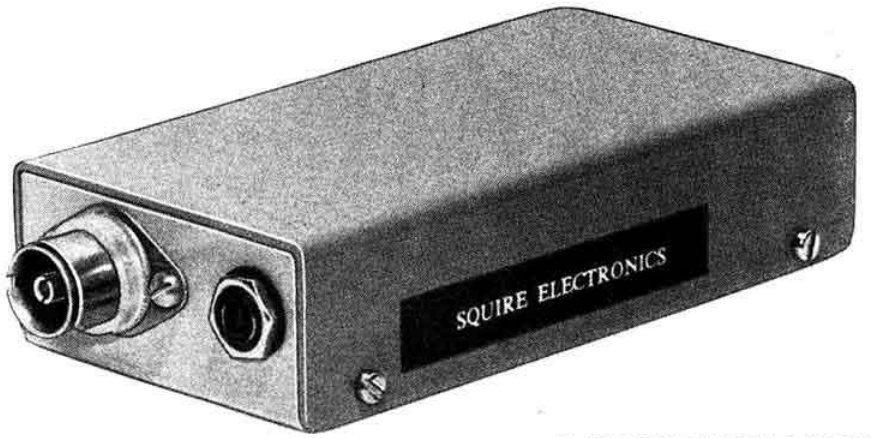

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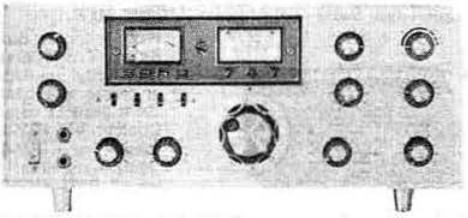

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CURRENT COMMENT

"*My* RadCom *is late again this month, don't they ever post on time?*"

The short answer is that every month, *Radio Communication* is despatched, or ready for despatch (notwithstanding postal disputes), on the first Tuesday in the month. What happens after the magazines are consigned to the care of the Post Office is anybody's guess.

Industry has been encouraged to move away from the central London area, with the result that Letchworth, the home of Garden City Press, has a sizable printing activity. Nowadays the number of books and magazines posted in that town is such that the Post Office is swamped and second-class mail is often held up awaiting sorting. This delay can be repeated at other offices en route. Why cannot the postal authorities provide facilities to meet the demand?

In January we had the great South London *RadCom* robbery. For some reason, as yet unknown and unexplained, most of the journals destined for this area were many days late. In fact some were not delivered until after the postal dispute had ended! Headquarters made enquiries from every head post office and district office through which the delivery might have passed, but, of course, no one could offer any help. Naturally, members affected were most unhappy.

(One side effect of the postal delays has been the increasing number of letters and telephone calls to RSGB headquarters enquiring the whereabouts of *RadCom*. Dealing with these has held up normal routine to the extent that day to day correspondence has been delayed, thus causing further frustration.)

Your *RadCom* is posted at Letchworth together with some 17,000 other copies and the Society receives a Certificate of Posting from the Post Office showing when this took place. From then on the *public service* takes over. The word *service* is a complete myth. The cost of sending *RadCom* by second class mail has now increased to 4½p, or an increase of nearly 100 per cent over the former figure of 6d, for a normal 72-page issue. With this has come a corresponding reduction in the service offered. The March issue suffered delays of up to 18 days and early returns show the April issue as receiving little better treatment. The cost of first-class mail is prohibitive, and recently a letter posted by the MPT in London SE1 took six days to arrive at 35 Doughty Street WC1!

The present position is that we are being held to ransom by a monopoly which could not survive for two days as a competitive business enterprise. Long overdue is a complete reorganisation and injection of new thinking, then perhaps the image of the Post Office as *public service* might be restored. Then, also, we might be spared the partially hidden costs of the existing inefficiency.

* * *

With the vicious increase in the cost of the necessities of life, members may well ask the question, "*Why should I belong to the Society?*" The brief answer is that if you have sufficient interest in amateur radio to care about its future then the RSGB must have your support.

The most obvious reason for this is the need to maintain and expand our frequencies and facilities. Make no mistake, there is a continuous and growing pressure from other services for a share of the amateur allocations. Without the efforts of the Society we would not now be enjoying reciprocal licensing, the 70MHz band and the Class B licence. After a time members tend to accept these and other facilities as an accepted part of the UK scene without giving any thought to their origin. The privileges obtained by the Society are to the benefit of all amateurs and not just to our members, which is a good reason for seeking 100 per cent representation of all licensed amateurs.

What are the other activities organised by the Society and which, with *Radio Communication*, form the visible return for your yearly subscription? Of direct interest to many are the numerous contests, both hf and vhf. Drafting of the rules and the laborious checking and compilation of the results takes many hours from the spare time of the members of the two committees. Your contest contacts breed QSL cards, and the RSGB QSL Bureau has a world-wide reputation for its efficiency. The collection of operating certificates may not be the choice of all, but to judge by the number of applications it is a popular activity. The vhf beacon station network is an example to the rest of the world. The supervision of this takes a great deal of time. Did you enjoy the VHF Convention? Contrary to some ideas it is not self organizing. Another popular function is the Woburn Mobile Rally. The various components of this do not simultaneously arrive without considerable planning. Raynet interests many members, and the co-ordination of the several aspects of countrywide emergency activity is effected by Society members.

The RSGB and the ARRL are the only national societies which publish ranges of books catering for the radio amateur. *Radio Communication* is in the capable hands of the Society's editor but almost all the other publications are produced by members who give freely of their time and knowledge to assist the RSGB and its members. The second reprint of the *Radio Communication Handbook* (present score: 30,000) was recently completed, and our North American agent has sufficient confidence in the second edition of the *VHF-UHF Manual* to order 500 copies without having seen the book. You are not interested in vhf? . . . granted, but the profit on this and other publications contributed some £15,000 during the last financial year. The status of *Radio Communication* is such that, while the sign "*Authors wanted*" remains in the window, we are fortunate in receiving a regular flow of first-class articles. The evaluation of these articles and the production of the Society's publications are in the hands of the Technical Committee. You, the member, have the benefit of their time (free to the RSGB) and professional expertise.

If the amateur is to continue to occupy the present allocations we must be in a position to show to outside bodies that these frequencies are partly used for scientific purposes.

Stemming from the work of the IGY and IQSY, propagation research programmes invite member participation and the monthly *SSC Bulletin* is a link between those interested. In the field of propagation studies there is collaboration with other national societies who are members of the International Amateur Radio Union. The RSGB was a founder member of both the Union and the Region 1 division and has never relaxed its efforts in the field of international understanding and co-operation. The current work concerning the Space Conference is one example. The Intruder Watch, the first of its kind, is a skilled operation essential if we are to limit the operation of unwanted stations in the amateur bands. Here again, co-operation is on an international level.

If you are still with us . . . congratulations! It shows that at least you are interested in the future of amateur radio and are willing to read the vital reasons why you (and every other UK radio amateur) should support your national society.

G2BVN

QTC AMATEUR RADIO NEWS

Rumour

Top Band, always fertile ground for unconfirmed gossip, now has another rumour of its very own. The word is that at any moment we are to be deprived of our 160m and 80m allocations. Not only this, but apparently the Council is well aware of the event but will not disclose it to the membership. Whatever unpleasant happenings may overtake us during the next few months, there is none of which certain knowledge already exists, and certainly none concerning Top Band or Eighty. Please help us to kill this particular fantasy without delay.

RSGB Diamond Jubilee, 1973

A committee has been formed to consider the Society's Diamond Jubilee Celebrations in 1973. This committee, whose members are Messrs John Bazley, G3HCT; L. E. Newnham, G6NZ; W. A. Scarr, G2WS; R. F. Stevens, G2BVN, and D. A. Findlay, G3BZG, would like to hear from members who have any ideas as to the form the celebrations should take.

IARC station 4U1ITU as 4U3ITU

A group of German amateurs from Darmstadt and Frankfurt, all members of VFDB and DARC, will operate the IARC station on the premises of ITU headquarters in Geneva from 15 to 18 May to commemorate the 3rd World Telecommunication Day on 17 May. A special callsign, 4U3ITU, will be used (3 stands for 3rd World Telecommunication Day). All contacts will be confirmed by a special QSL card.

Although this will not be a contest operation, the activity team which is headed by DL3WU and DJ1RZ of VFDB Darmstadt will endeavour to give as many QSOs as possible to the prefix hunters.

Licence fees by banker's order

It may not be generally known to members that it is possible to pay the amateur licence renewal fee by banker's order. This method of payment eliminates any danger of the licence lapsing through oversight.

The necessary form can be obtained from the Accounts Department, MPT, and your callsign should be quoted.

Permission granted

Referring to the report on page 25 of the January 1971 issue of *Radio Communication*, members will be pleased to know that in both of the cases mentioned planning permission has been given until 30 April 1976.

In stating his conclusions the Inspector said that he considered both aerial installations were unattractive features. He went on to say: "*However, it appears to me that it should be acceptable that the operators should be allowed a period in which to enjoy their hobby in their home and make such contributions as they are able.*" The Secretary of State did not dissent from the Inspector's opinion and therefore both G3WSN and G3YDY are able to participate in their hobby without hindrance.

There is little to add to this brief report except once again to stress the value of a well-presented case should the question of planning permission come to a public hearing. The documents in this case will be available from Gordon Bracewell, G3EGK, who, on behalf of the Society, is collating information relating to planning matters.

Pirates caught

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

Mr. P. G. Robins, 4 West Road, Woolston, Southampton, at Southampton Magistrates' Court on 12 February 1971. He was fined £25 on each of two charges, plus £5·25 costs and forfeiture of equipment.

Mr S. G. Lydiate, 68 Turner Road, Sholing, Southampton, at Southampton Magistrates' Court on 12 February 1971. He was fined £25 on each of two charges, plus £5 costs and forfeiture of equipment.

Mr R. W. Barnes, 3 Vincent Parade, Hanley Road, London N4, at North London Magistrates' Court on 22 February 1971. He was fined £20 on each of two charges, plus £25 costs.

Mr. A. G. Haylett, The Bungalow, Ascot Heath Golf Club, Ascot, Berks, at Windsor County Court on 3 February 1971. He was fined £5 on each of three charges, plus forfeiture of equipment.

Mr R. M. Jones, Little Gable, Winkfield Row, Bracknell, Berks, at Forest Gate Bracknell Magistrates' Court on 8 February 1971. He was fined £10 on each of three charges, plus forfeiture of equipment.

Northern Radio Societies Association's Annual Convention

Do not forget this year's NRSA Convention being held at Belle Vue Zoo Park, Manchester, on Sunday 9 May.

Details appear on page 161 of the March issue of *Radio Communication*.

Plagiarize and hybridize

An approach to receiver design

by PETER G. MARTIN, G3PDM/W1*

Part 3: The G3PDM receiver MK II

The prototype receiver was unit constructed so that building blocks could be removed for laboratory work or modification. The circuit is broken down into nine units and these will be discussed briefly in turn. The complete receiver circuit diagram (Fig 20) is given in eight parts; for clarity, switched tuned circuits are shown for one band only, and switch sections are denoted X. A list of special parts is given in Table 1.

Unit 1: Preselector, mixer and calibrator

Top-capacitance coupled tuned circuits are used in the preselector. The circuits are tuned by a two-gang 50pF variable capacitor, and coupled through a 0·2–3pF ceramic trimmer. The two sets of coils are screened from each other to prevent spurious coupling.

Table 1: Details of special components in the G3PDM receiver

C501–3	See Table 2
D401, 501–4	Brush-Clevite BA111
L101	Amateur band coils (see Table 2)
L302, 4, 6	See text
L501	Amateur band local oscillator coils (see Table 2)
L502	1·2μH (Electroniques BP21)
L601	2·4μH. Silver-plated coil on Cambion 3354–6 coil former with Carbonyl TH slug
T101	Amateur band aerial coils (see Table 2)
T102, 204	1·62MHz i.f. transformer. Primary 100μH centre-tapped, secondary 100μH
T201, 2, 3	1·62MHz ift, primary and secondary 100μH
T401	5000Ω:3Ω output transformer
T501	5·88–6·38MHz wideband coupler (Electroniques WBC–5 with 33pF capacitors reduced to 22pF)
T502	Primary tuned to 6·13MHz, turns ratio 2:1 (Modified Electroniques WBC–5)
T701, 2, 3	1·35–1·85MHz wideband couplers (Modified Electroniques WBC 1·8)
T901	100V RMS at 130mA and 6·3V RMS at 3A outputs
T902	16·3V 0·5A output
VC101, 201–4	Tubular ceramic trimmers
VC102	Rotary ceramic trimmers
VC501 2	Rotary ceramic trimmers (See Table 2)
VC601	75pF swing, double-bearing variable capacitor
VC602	Air-spaced miniature trimmer
VC603	Temperature compensating capacitor (Oxley Tempatrimmer)
X201, 3, 5	1620·2kHz filter crystals
X202, 4, 6	1618·4kHz filter crystals
X401, 2	See text
X501	See Table 2

Arthur D. Little Inc., Acorn Park, Cambridge, Mass. 02140, USA.

During alignment, the coupling coefficient is optimized by alternately reducing VC101 and re-peaking the tuned circuits, until the S-meter shows a slight loss of signal.

The inherently balanced nature of the 7360 mixer is preserved by the use of push-pull oscillator injection and a balanced output transformer (T102).

The circuit is balanced to dc by RV101, and to rf by VC102. VC501 in the synthesizer unit is used to equalize the amplitudes of the two anti-phase injection signals. The ends of RV101 are bypassed to rf so that the rf impedance seen by the push-pull oscillator (V501) is independent of the setting of RV101. Note that the maximum recommended grid leak resistance for the 7360 is 470kΩ.

During alignment, VC501 and VC102 are set to their centre values, and RV101 is adjusted for maximum i.f. rejection. A very pronounced null should be found. Fine adjustment can be made with VC102, if necessary. VC501 is adjusted to null the local oscillator radiation, using a general coverage receiver as a monitor. Readjustment of RV101 and VC102 will be necessary.

The 100kHz crystal calibrator is entirely conventional. There is no justification for using a valve here!

Unit 2: Product detector and i.f. amplifier

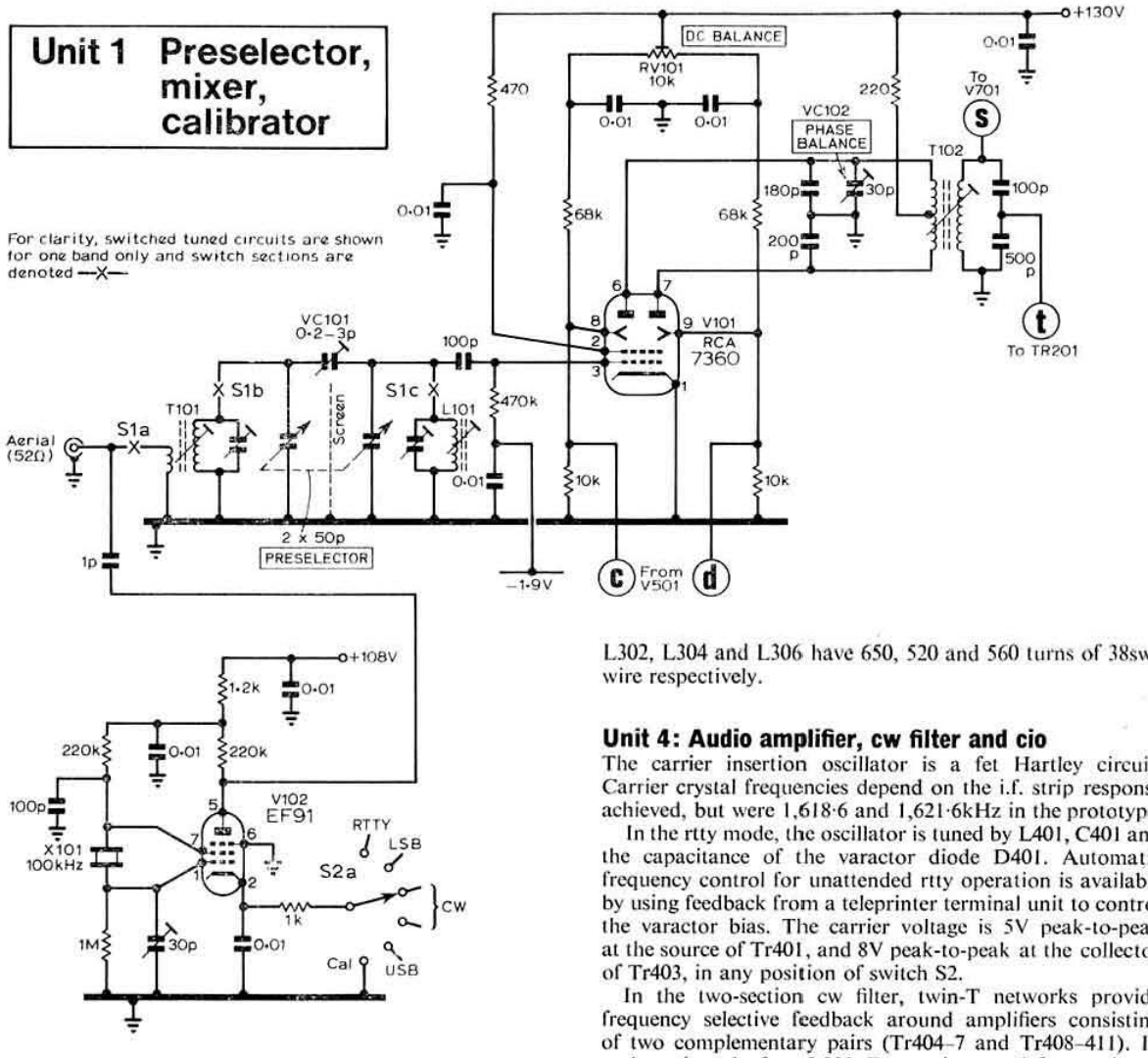
TR201 is the fet noise gate, which open-circuits the signal path when pulsed by the noise blanker (Unit 7). The receiver i.f. chain consists of three frame-grid pentode amplifiers, each preceded by a half-lattice crystal filter with resistive loading. Unbypassed cathode resistors are used on V201 and V202 to reduce the capacitive load on the first two filters.

The 7360 product detector (V204) is fed in push-pull from T204. The cathode of the 7360 is bypassed to rf and audio frequencies to reduce cross-modulation and noise modulation. The product detector output passes through a pi-section rf filter before reaching the main low-pass audio filter (Unit 3).

The filter crystal frequencies are 1,618·4 and 1,620·2kHz. Trimmers across the higher frequency crystals provide adjustment of the infinite attenuation frequencies of each section. (See discussion earlier).

The overall gain of the i.f. strip is in excess of 120dB. To maintain stability and prevent deterioration of filter performance, thorough decoupling of supply lines is imperative.

To align the i.f. strip, a simple wobbulator was breadboarded, designed to be swept across 1·62MHz by the timebase output of a standard laboratory oscilloscope. An audio output detector with a logarithmic response was made



to give a vertical display in decibels, to a reasonable approximation. In this way the skirt selectivity of the receiver can be monitored during filter adjustment. The two units are detailed in Fig 21.

The only satisfactory way to align each filter section is to remove the crystals from the other sections and short out *one* crystal socket in each pair. The two cores of the i.f. transformer driving the section under test are then adjusted for the optimum response, and the hf crystal trimmer is set to provide the correct infinite attenuation frequencies. To give the best protection against large-signal effects in the i.f. amplifiers, the first filter section should have $X_\infty = \infty$.

Unit 3: Audio low pass filter

This elliptic function filter was described earlier. In the prototype, inductors are wound on Mullard LA2303 pot cores. L302, L304 and L306 have 650, 520 and 560 turns of 38swg wire respectively.

Unit 4: Audio amplifier, cw filter and cio

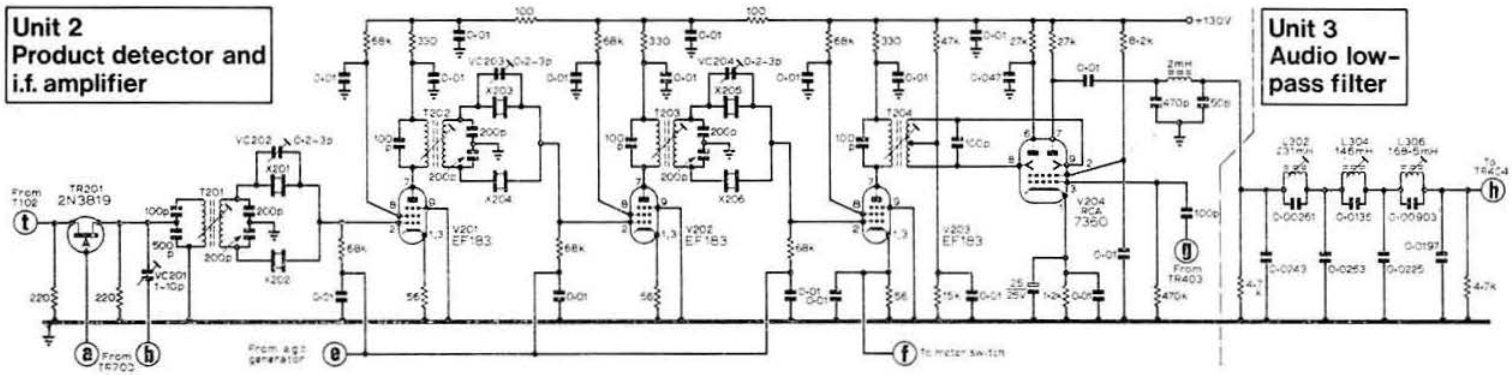
The carrier insertion oscillator is a fet Hartley circuit. Carrier crystal frequencies depend on the i.f. strip response achieved, but were 1,618·6 and 1,621·6kHz in the prototype.

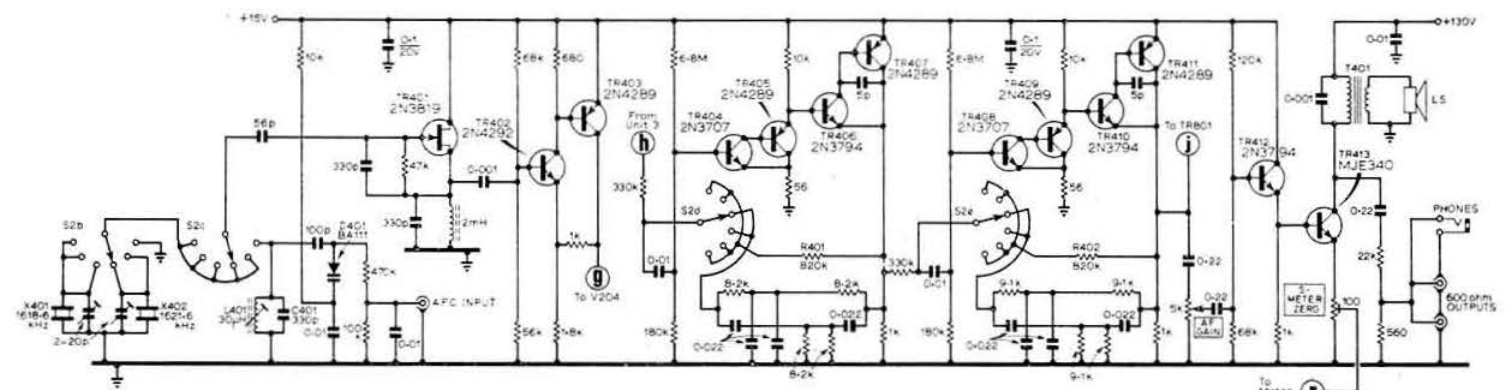
In the rtty mode, the oscillator is tuned by L401, C401 and the capacitance of the varactor diode D401. Automatic frequency control for unattended rtty operation is available by using feedback from a teleprinter terminal unit to control the varactor bias. The carrier voltage is 5V peak-to-peak at the source of Tr401, and 8V peak-to-peak at the collector of Tr403, in any position of switch S2.

In the two-section cw filter, twin-T networks provide frequency selective feedback around amplifiers consisting of two complementary pairs (Tr404–7 and Tr408–411). In each section, the four 0·022μF capacitors and four resistors must be matched to better than 1 per cent (preferably 0·1 per cent). The RC products of the two sections are staggered by about 10 per cent, to provide a cw bandwidth of around 180Hz. In the ssb and rtty modes, the twin-T networks are replaced by R401 and R402. These are selected to give a constant audio output level when switching from one mode to another. The 5pF capacitors from base to collector on Tr407 and Tr411 are for high frequency stabilization.

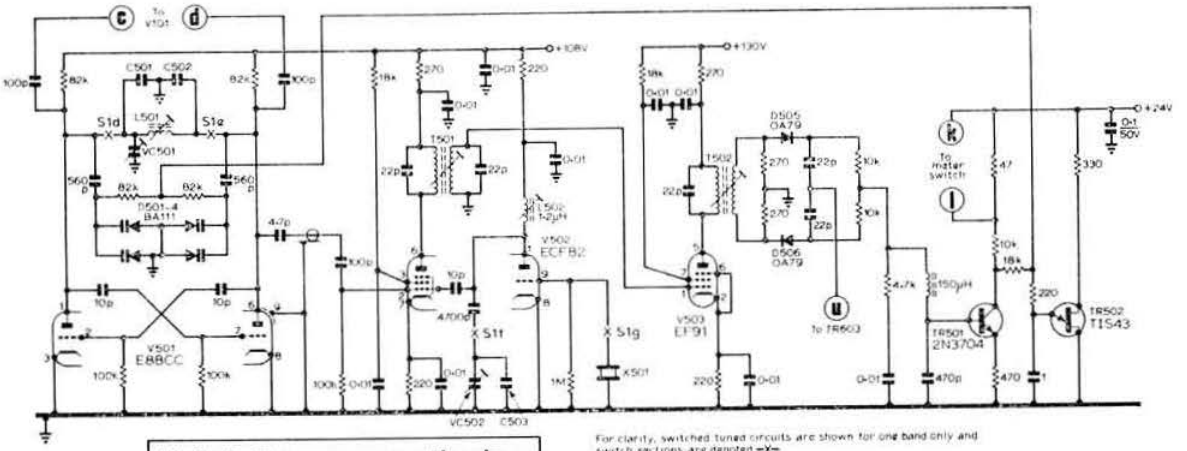
The audio output stage consists of an emitter-follower (Tr412) driving a high voltage power amplifier (Tr413) with a degenerative emitter resistor to reduce distortion. The Motorola MJE340 specified is a low-cost plastic-encapsulated device with a 300V collector-base rating. Three low-level outputs are provided; for headphones, an rtty terminal unit, and other accessories. T401 transforms the loudspeaker impedance to a 5kΩ load for Tr413.

A high-voltage output stage was used to avoid the necessity for a low-voltage high-current supply in the receiver.





Unit 4 Carrier injection osc, cw filter & audio amplifier



Unit 5: Frequency synthesizer

The synthesizer unit is assembled in a 7¼ by 4½ by 2in die-cast box, with screens between each section. V501 is the band-switched push-pull local oscillator driving the main receiver mixer, and the remaining circuitry is used to phase-lock this oscillator to the reference vfo (Unit 6).

Although the use of a phase-lock loop in amateur equipment might be discouraging to some constructors, it is reassuring that when the prototype receiver was first switched on, the frequency synthesizer was the only unit to function correctly! Phase-lock systems are notorious for loop instability, but provided some simple ground rules are observed, few problems arise [40].

The pentode section of V502 mixes the outputs of the push-pull oscillator and the crystal-controlled translation oscillator to provide a signal in the reference vfo range (5·88–6·38MHz). The triode section of V502 is a Miller-type crystal oscillator operating on frequencies between 9·5 and 37·5MHz. Overtone operation is used above 20MHz. The entire frequency range of this oscillator can be tuned by a single inductor (L502) and switched capacitors (C503 and VC502). See Table 2. Wideband couplers are used between the mixer, synthesizer i.f. amplifier (V503), and phase-sensitive detector (D505–6).

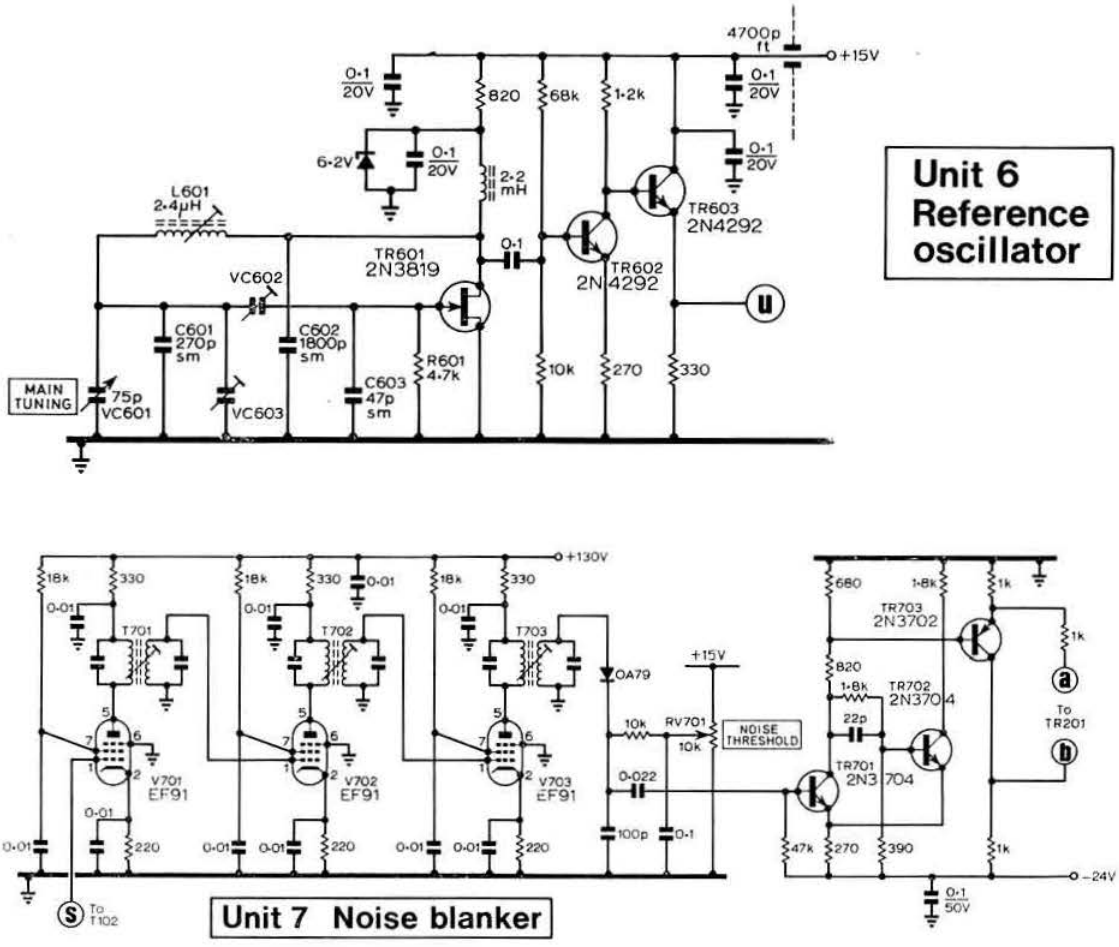
The psd diodes must be matched for forward resistance and reverse-bias capacitance. If this is not carried out with sufficient accuracy, a trimming capacitor will be needed across one of the diodes. "Matched" pairs of germanium diodes supplied by one retail outlet have been found to be hopelessly unmatched.

The several filtering networks associated with the psd and dc amplifier (Tr501) determine the phase-lock loop frequency response, and hence its stability. Circuit values should not be changed without a thorough understanding of the consequences (see [40]). If phase-lock is lost, the collector voltage of Tr501 increases towards +24V. This causes the unijunction sweep generator (Tr502) to sweep the varactor bias voltage between zero and + 20V. The push-pull oscillator frequency sweeps in sympathy until a beat note is detected at the psd output, and phase-lock is achieved.

To align the synthesizer, the reference oscillator is disconnected from the psd. The receiver is switched to the 14MHz band, and L501 is adjusted so that the local oscillator is sweeping over the range 15·62–16·12MHz. The crystal oscillator output on 22MHz is peaked by VC502. If a high-frequency oscilloscope is connected across one of the 270Ω resistors in the secondary of T502, the unijunction sweep generator will cause the synthesizer i.f. strip to wobbulate itself. T501 and T502 can be visually aligned to give a

Table 2: Frequencies and component details for the phase-lock synthesizer and preselector. Inductors are described by Electroniques part numbers.

Band (m)	Signal frequency range (MHz)	Local oscillator range (MHz)	Crystal (X501) frequency (MHz)	T101	L101	L501	C501, 2 (pF)	C503 (pF)	VC501 (pF)	VC502 (pF)
160	1·8–2	3·12–3·62	9·5	LZ1·8	BP1·8	OS1·8/16	47	100	40	40
80	3·5–4	5·12–5·62	11·5	LZ3·5	BP3·5	OS3·5/16	0	68	40	40
40	7–7·5	8·62–9·12	15	LZ7	BP7	OS7/16	68	22	40	40
20	14–14·5	15·62–16·12	22	LZ14	BP14	OS14/16	68		20	20
15	21–21·5	22·62–23·12	29	LZ21	BP21	OS21/16	33	0	20	20
10A	28–28·5	29·62–30·12	36							20
10B	28·5–29	30·12–30·62	36·5	LZ28	BP28	OS28/16	0	0	20	20
10C	29–29·5	30·62–31·12	37							20
10D	29·5–30	31·12–31·62	37·5							20



flat-topped response over the synthesizer i.f. range of 5·88–6·38MHz. If the oscilloscope is now connected to the psd output, any signal seen is due to imbalance in the psd diodes. This should be less than 50mV peak-to-peak. Reconnection of the reference oscillator should cause phase-lock, and the local oscillator should be tunable over its full range by varying the reference oscillator frequency between 5·88 and 6·38MHz.

The synthesizer should function correctly on each amateur band once the local oscillator sweep range is set to overlap the required operating range. VC501 should be set on each band to minimize oscillator radiation from the receiver. A meter switch is included on the rear panel of the receiver so that the varactor diode bias can be monitored. On each band L501 should be adjusted so that the bias voltage is between +5V and +17V over the receiver tuning range.

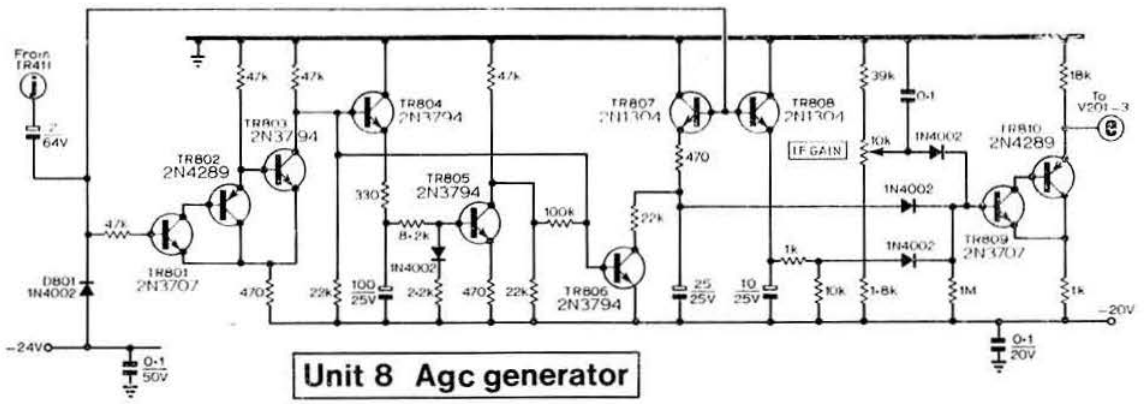
Unit 6: Reference oscillator

The reference oscillator was designed according to the principles laid down by Vackar [46]. The oscillator capacitor values are selected so that

$$\frac{C602}{VC601 + C601} = \frac{C603}{VC602} = 6 \text{ approximately.}$$

The tuning inductor L601 is a silver-plated coil on a highly stable ceramic former with an iron dust core mounted on a sprung screw thread. The core material is high stability Carbonyl TH powdered iron with a temperature coefficient of permeability of +0·0015 per cent/°C. VC602 is an air-spaced trimmer capacitor used to set feedback just above the level needed to sustain oscillation. The oscillator dc supply is double-stabilized and decoupled at several points to reduce feedback and spurious a.m. or fm on the output. C601, 2, 3 are silvered mica capacitors secured to surrounding solid objects by epoxy resin. VC603 is a 6·5pF bimetallic temperature-compensating capacitor with an adjustable coefficient of ±2,000ppm/°C.

Tr602 and Tr603 form a buffer/isolator to reduce oscillator loading effects such as frequency pulling and to increase the oscillator output to a level suitable for driving the psd (8V peak-to-peak).



If the oscillator is run away from sources of heat, a medium-term stability of ±2Hz should be achieved without adjustment of VC603. Warm-up period is about one minute, corresponding to the thermal time-constant of Tr401. Warm-up frequency drift should be less than 500Hz.

Once the oscillator is placed inside the receiver cabinet, heat from the valve circuits necessitates adjustment of VC603 to minimize thermal drift. This is a time-consuming process, but with care it is possible to null out the effects of temperature changes inside the receiver cabinet. The problem is reduced considerably by running the receiver valve circuits from a +130V ht supply, and by using a cabinet designed to maximize ventilation of heat sources. In the prototype receiver, the hottest part of the cabinet stabilizes less than 15°C above ambient.

The reference oscillator tuning range is set to 5·88–6·38 MHz by judicious adjustment of L601 and C601.

Unit 7: Noise blanker

The noise silencer circuit shown has not been tested in the current receiver, but is based on the design used successfully in the earlier model [1]. An extra stage of

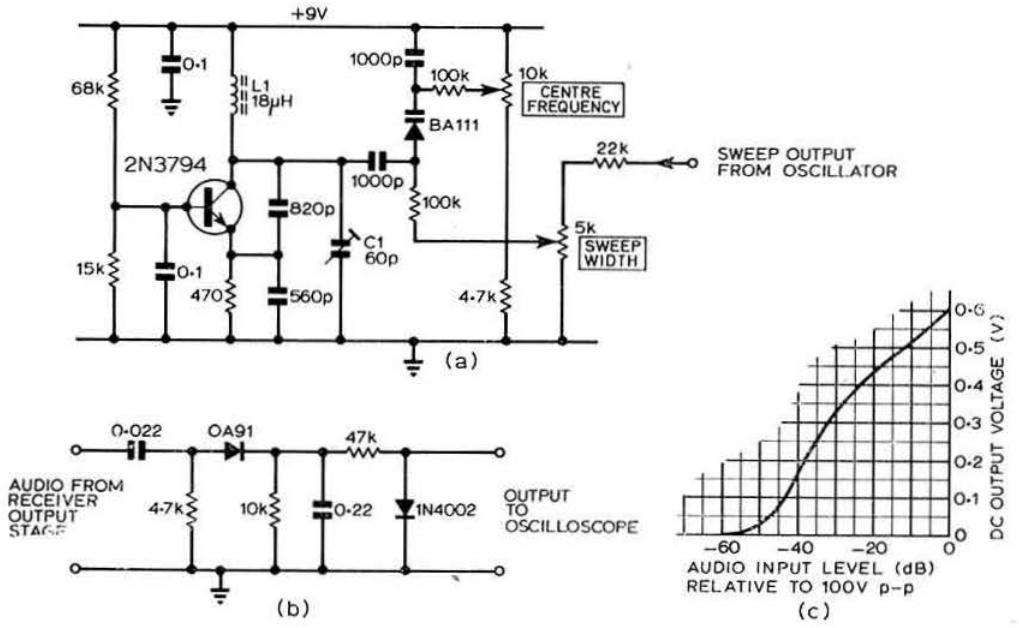
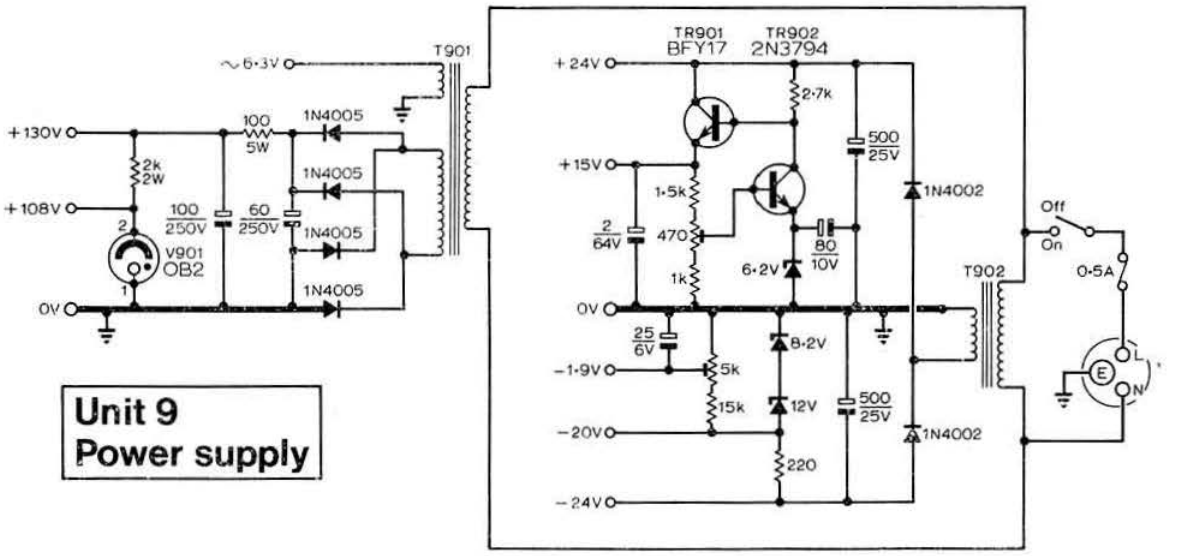


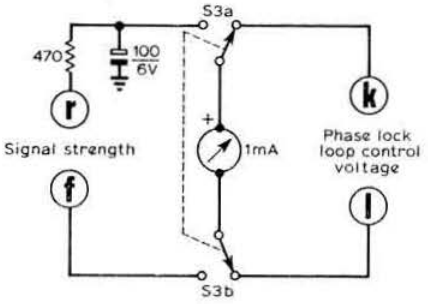
Fig 21. Circuit used to display filter response curves on an oscilloscope during receiver alignment. (a) Sweep frequency generator with adjustable centre frequency and sweep width. L1 is 13 turns of wire on a Mullard FX1595 ferrite ring. C1 is used to set the correct operating frequency. For most purposes direct coupling between the oscillator and the receiver under test is not needed. (b) Audio detector used to give a roughly logarithmic display of filter attenuation. The actual detector characteristic is shown in (c).



Unit 9
Power supply

amplification is shown so that the noise gate will be operated by lower level impulses, and the pulse shaping circuit has been modified. The envelope detector is ac coupled to the Schmitt trigger pulse squarer so that the receiver is not muted by strong signals inside the noise silencer passband. The three noise amplifiers (V701–3) are wideband-coupled by T701–3, and the detector threshold is set by the front-panel control RV701. The phase-splitter (Tr703) provides inverted blanking pulses which are coupled to the noise gate output through VC201 to eliminate switching transients in the main receiver signal path.

The noise silencer is aligned by connecting a fast pulse generator to the aerial socket, feeding in 1μs pulses with a repetition frequency of about 100Hz, and adjusting the wideband couplers so that the output pulse resembles the input pulse. It is important that the output pulse should have the fastest possible rise-time, even at the expense of pulses being appreciably lengthened. VC201 is set so that the gate output is free of switching transients.



Meter switching

Unit 8: The agc generator

The agc circuit has already been described in detail. The agc threshold can be varied by means of the voltage at the anode of D801, which should be between −20 and −26V. No setting-up adjustments are necessary.

Unit 9: The power supply

The power unit must provide eight separate supplies for the receiver circuits. T901 provides 6·3V ac at 3A rms for valve heaters, and 100V rms at 130mA for bridge rectification to provide the main +130V ht line. An OB2WA stabilizer (V901) gives a +108V supply for valve oscillators and some other voltage-sensitive circuits. T902 gives 16·3V rms at 0·5A for two half-wave rectifiers providing +24V and −24V supplies. Tr901–2 form a series regulator giving a stabilized +15V supply for the reference oscillator, and zener diodes give −20V for the agc generator. The adjustable −1·9V supply biases the main receiver mixer.

Reference

[46] "LC oscillators and their frequency stability", J. Vackar, *Tesla Technical* reports (Czechoslovakia) December 1949.

To be concluded

As Electroniques ceased trading on 1 April 1971 certain components named in this article are no longer available from that source. The Society is endeavouring to obtain information on alternative sources of supply and this information will be published as soon as possible. —Editor.

The A-frame mast

by J. N. H. CARTER, G3OWB*

SUPPORTING an aerial is one problem common to all amateur radio men with or without calls: hf, vhf, uhf or what have you. The author has used many forms of mast and bracket, mostly to support rotary beams, but, partly as a result of changing QTH a few times, a simple portable general-purpose structure, cheap and easy to assemble, has proved to be of the most value.

The idea is not new and was first discovered in basic form in an ARRL *Handbook* circa 1957. However, it is probably old enough to be back in fashion now and several visitors have been so impressed with the execution of the idea that it was thought worthwhile to pass on some constructional details to members of RSGB. One virtue of the construction used is that although it uses very low-cost materials it is light enough in its basic form to erect with one hand—but two are better! It can be free-standing with very little in the way of guying and can be used to support either the end of a long wire or, with slight modifications, various forms of rotary beam. As a two-man haul its height can be extended considerably (over 40ft in fact) providing some additional guying is provided.

Another application of this mast is to fix it against the wall of a house using a suitable stand-off bracket, in order to avoid the gutter, positioned almost at the top. In its shorter version no guying is needed and aerials can be attended to in a few minutes.

The mast at G3OWB is now in its third form, as it started life as an all-wooden erection 42ft high way back in 1960. At that time it supported the far end of a 5RV, the other end being fixed to a short mast lashed to the chimney. In its second form it was attached to the house as described above and carried a Multibeam for 70cm and a 2m 8-over-8. At present it carries the end of a long wire for 160m but could be lowered in a few minutes to take a beam with a rotator and quickly re-erected.

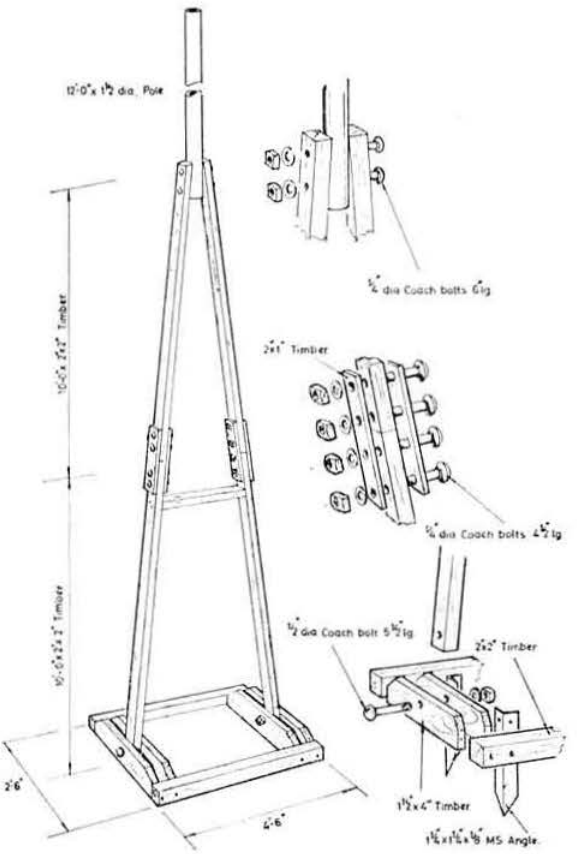
If a lot of weight is being hoisted on the mast a ladder can be used to form a running strut to assist in passing the vital angle. One forward stay wire can always be left in position to avoid the possibility of going past vertical.

* 37 Highfield Avenue, Cambridge.

Construction

Construction is simplicity itself. All that is required is a set of 10ft or 12ft lengths of 2in by 2in, enough 2in by 2in to make the base frame, and wooden or metal strips to form the joint and pivot supports, with coach bolts for securing and for pivots. Actually the 'OWB version is all wood except for the bolts and the top 12ft section which is a second-hand 1½in dural domestic tv mast. The illustration is self-explanatory and shows its basic form but it can easily be adapted to meet exact requirements.

Providing it is well staked down no side guy wires are needed, fore and aft guying at about three-quarter total height being adequate. Should vast gales develop, a temporary side holding rope is not a bad idea if there is a lot of weight atop. However, normally the garden is very free from obstructions and this is an asset in any garden, particularly with XYLs and harmonics about. The 'OWB mast is guyed to a stout section of a hawthorn hedge at the back and fairly high up a short tree at the front. The base is at present overgrown with grass but although the wood is well creosoted this practice is not recommended. Creosoting the woodwork or spraying with Aquachek every two years seems to provide adequate weather-proofing, although one worthwhile refinement is to top the wooden sections with square aluminuim caps to protect the end grain of the wood.



A simple high-accuracy frequency standard

by C. BOWDEN, G3OCB*

IT IS becoming increasingly necessary for amateur operators who do any experimental work to have accurate standards for use in the workshop, and it is probably in the field of frequency measurement that they are able to be most accurate; for example, an error of 1kHz at 30MHz is approximately ±0·0033 per cent. They cannot measure other quantities (voltage, current resistance, capacitance, inductance etc) to an accuracy of even one per cent unless very complex equipment is available, but fortunately they rarely need even one per cent accuracy in these cases. When measuring frequency, however, an error of one per cent is intolerable and an error of 0·0033 per cent may be too large—consider band-edge operation on 144MHz, where 0·0033 per cent represents approximately 5kHz.

Most amateurs have available at least a 100kHz calibrator in the station receiver, and such a device is capable of providing an accuracy of about ±0·001 per cent under normal conditions, provided it is carefully used and rechecked against an external standard very frequently. However, it is often forgotten that the crystal in the average calibrator operating at 100kHz may be sensitive to temperature at a rate of approximately 1Hz/°C temperature change. Thus frequency changes of appreciable magnitude can occur in a relatively short time. Constant rechecking is inconvenient, especially if the required standard is off the air or subject to interference (eg MSF or WWV), and in any case many modern receivers do not cover standard frequency transmissions.

The author required a highly stable source of accurately known frequency in order to "gate" a frequency counter, and the unit described here, making use of one of the available standard frequency transmissions as an active signal source, was the eventual result. It provided a cheap and relatively simple solution to the problem. Alternative methods would use phase lock circuitry [1, 2] or oven-controlled crystal oscillators.

A number of standard transmissions are broadcast on a variety of frequencies which are held to very fine limits [3]. These can be received, amplified and processed in order to provide extremely stable reference signals, provided certain precautions are taken. Standard frequency transmissions broadcast on hf (2–30MHz) are subject to interference, fading and breaks in transmission which makes their use more difficult; but on lf they are much less subject to these effects, and in some cases there are no breaks in transmission (if one ignores the night-time shutdown of certain stations). Consequently it is preferable to use a low frequency transmission as a source, and this has an added advantage in that there will be more closely-spaced harmonics available for calibration purposes from a suitable harmonic generator. In order to achieve high accuracy it is also necessary to remove modulation from the signal and this is extremely difficult with the type of modulation used on MSF or WWV.

*Tregwyn, Stithians, Truro, Cornwall.

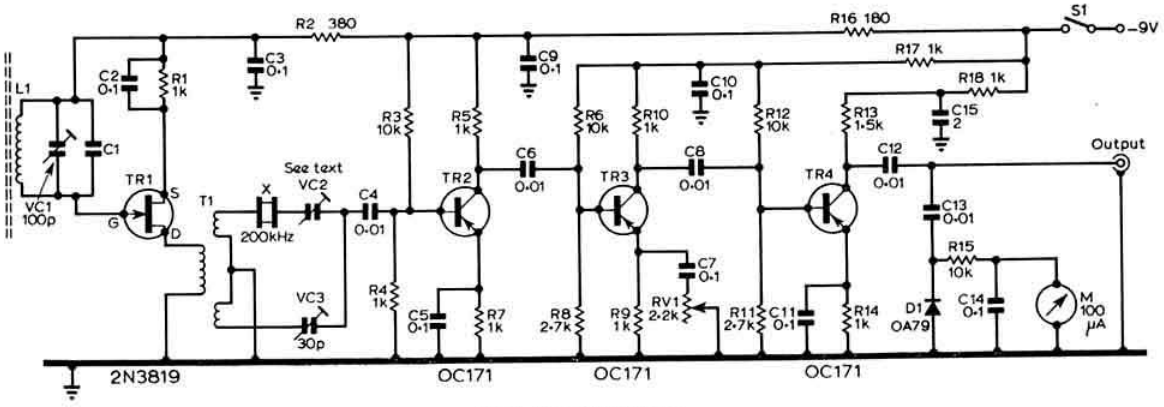


Fig 1. Circuit diagram

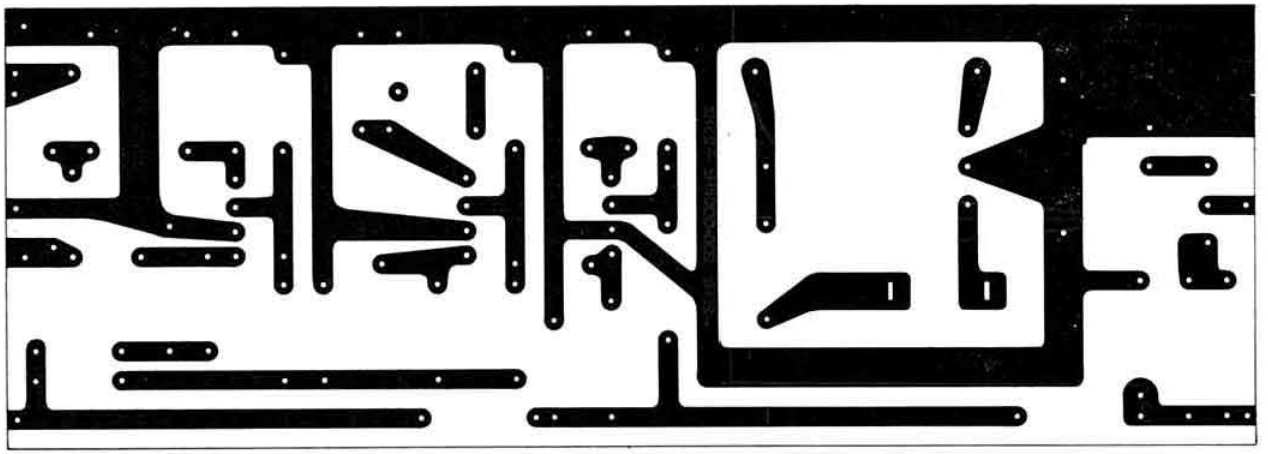


Fig 2(a). Printed circuit board etching and drilling (Full size)

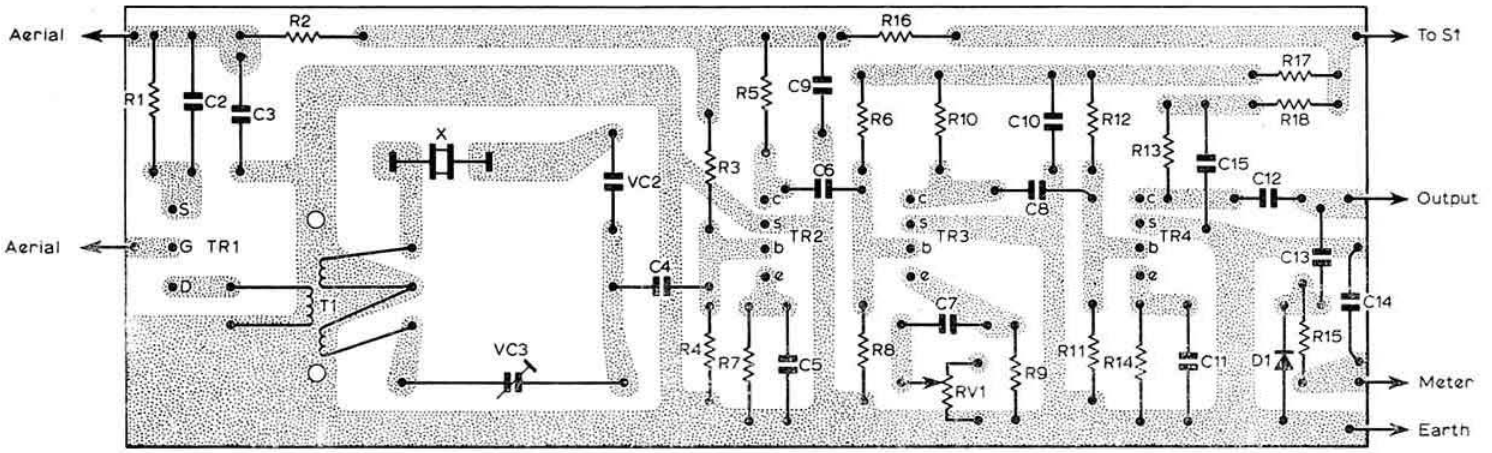


Fig 2 (b). Component positions

The logical signal to use is the 200kHz transmission by the BBC from Droitwich which is on the air all day and most of the night. It puts a fairly consistent signal over most of the country and it is not normally subject to severe ionospheric effects. The transmission accuracy is better than ± 5 parts in 10^{10}, which is roughly equivalent to an error of one second in a thousand years.

The accuracy of the signal from the standard will depend on three major variables:

1. Residual modulation on the carrier.
2. Ionospheric effects which may amount to 1 part in 10^7 at dusk but will probably be much less during the day.
3. The total error will depend on the time at which the signal is used, especially for time measurement purposes. Since short-term errors tend to cancel out, the total error remains constant. Thus accuracy may be 1 part in 10^7 for 1s, increasing to 1 part in 10^8 for 10s etc, up to a limit imposed by the accuracy of the standard transmission itself.

Variable 2 cannot be controlled and variable 3 will be independent of the actual method of obtaining the signal; but variable 1, residual modulation, can be removed by either filtering or phase-lock techniques. The author decided to use the filter method because of the greater simplicity of the equipment, and the results are entirely satisfactory with a final accuracy of better than 1 part in 10^7—surely adequate for even the most exacting task.

The circuit (Fig 1) consists of a 200kHz TRF receiver incorporating a single-pole crystal filter, and having a ferrite rod aerial located within the carrying handle. Only the long-wave coil is used and this is positioned centrally on the ferrite rod for maximum sensitivity. This aerial is tuned by a 100pF preset capacitor mounted just below the handle. The rf stage uses a fet operating into an untuned inductive load. The input impedance of the fet at 200kHz is extremely high, resulting in an extremely high value of Q in the aerial coil. Tuning is very sharp and quite considerable sideband suppression is obtained.

The secondary winding of the rf stage output load is a balanced centre-tapped winding which drives a 200kHz crystal filter. This filter reduces the remaining sidebands down to a very low level. The resulting 200kHz carrier is then amplified in a 3-stage RC amplifier and the output is presented at the front panel. An output level meter is incorporated in order to simplify tuning adjustments and to indicate the output level. The meter registers 0·05mA at the author's QTH, which is equivalent to a peak output signal of approximately 0·5V. This output is more than sufficient to drive an ic squaring circuit. A preset gain control (RV1) is incorporated, and this is adjustable to give a reasonable output depending on the received signal level.

The unit is operated by means of a small 9V battery mounted inside the case. If a suitable power supply or battery space is available it should be possible to replace the three-stage RC amplifier by an ic amplifier, resulting in the saving of a lot of space and components. However, most of the components will be found in the average junk-box, and component values are not critical except for the crystal frequency. The author used pnp transistors that were available. If suitable npn bipolar transistors or an ic are used it will not be necessary to "invert" the fet.

The layout of the printed circuit board is shown in Fig 2(a) and the component positioning in Fig 2(b). It may be possible to place the 200kHz aerial trimmer within the case, but additional screening would probably be necessary in order to avoid instability.

If the number of turns of the filter input transformer secondary is increased, gain increases but filter performance begins to deteriorate. The actual selectivity curve of the filter is shown in Fig 3.

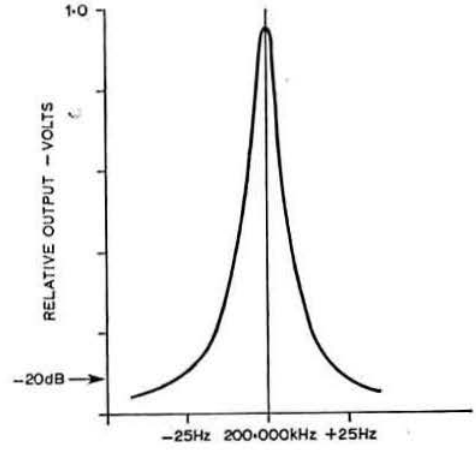


Fig 3. Selectivity curve of receiver filter as plotted with BC221

Adjustment

On completion of the unit, power may be applied after the usual check for errors or faults. Current drain should be about 4–8mA. It is unlikely that the unit will be on frequency initially, so the adjustment should proceed as follows:

Set preset gain to maximum. There will be no indication on the meter (unless the aerial coil happens to be tuned to 200kHz). A check should be made for instability; if all is well detune the aerial from 200kHz and inject a steady signal of a slightly lower frequency (say, 199kHz) from a stable source. The "neutralizing" or "phasing" capacitor VC3 should then be adjusted for minimum signal out. It is advisable to use a receiver tuned to 199kHz and fed via a coaxial cable as the signal level indicator. The meter will be too insensitive at these low levels. (The author used a BC453 [Q5'er]).

The aerial coil should then be tuned to 200kHz and the series tuner VC2 *very carefully* adjusted for maximum indication on the meter, using the received 200kHz signal for this adjustment and not a signal generator (not even a BC221). Capacitor VC2 varies the series resonant frequency of the crystal over a small range, and will set it to 200kHz exactly when the output is indicating a maximum. The setting will be very sharp if the crystal is more than a few hertz off initially. If the crystal is just a few hertz below 200kHz a much larger value of VC2 will be required and this may be selected by trial and error. Its value will not be so critical.

Once VC1, VC2 and VC3 are set, it only remains to adjust the gain control (RV1) for a reasonable output level and the unit is ready for use. The ferrite rod aerial will be found to be highly directional.

Making use of the standard

The output from the unit will be a 200kHz sine wave at low gain levels, while at high levels, especially in strong signal areas, some limiting may occur. In order to obtain strong harmonics, however, it is preferable to "square" the signal. This can be done by using a Schmitt trigger or similar circuit. A very simple circuit making use of an ic is shown in Fig 4. This makes use of a μL914 dual 2 input gate and it will trigger at frequencies in excess of 10MHz.

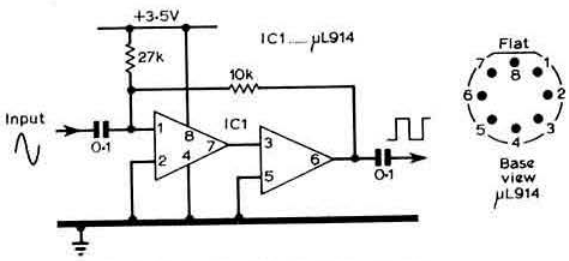


Fig 4. Simple square wave generator

The output from this circuit will consist of a 200kHz square wave. Some control over the mark-space ratio is available by adjustment of the input signal level. The harmonic content of the square wave will be quite considerable due to the fast rise and fall times, and markers should be available at 200kHz intervals well into the vhf range. Alternatively the square wave may be subdivided in order to obtain more-closely-spaced harmonics or for timing purposes. The simplest way to divide is by means of a JK flip-flop type ic. This type of device normally divides by two, although other ratios can be obtained by suitable feedback or interconnection circuits.

Components list

A suitable 200kHz crystal was formerly obtainable from Henry's Radio Ltd, or J. Birkett of Lincoln. All of the remaining components should be obtained from most suppliers.
Values are as circuit diagram unless otherwise stated.

R1—R18	Miniature carbon ¼W
RV1	Miniature preset variable
C1	If required (depending on inductance of aerial coil), up to 50pF
C2, 3, 4–10	Disc ceramic or moulded
VC1	100pF variable /preset
VC2	See text. Any value between 0 and several hundred picofarads
VC3	30pF preset
X	200kHz—see text
L1	Ferrite rod aerial with long-wave coil only
T1	Filter transformer: 50t primary, 15+15t secondary, 34swg enamel. Former: Denco 10D Neosid pot core.
TR1	2N3819.
TR2–4	OC171
D1	OA79
M	100μA.
S	Single-pole toggle type.

References

[1] "Portable 1MHz frequency standard", *Wireless World*, February 1968.

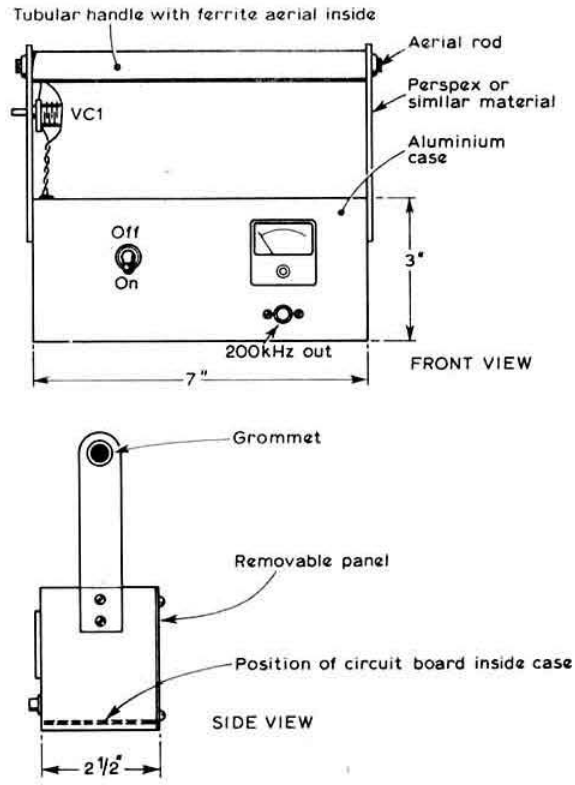


Fig 5. Layout of author's 200kHz receiver

[2] "A Droitwich-locked frequency standard", *Radio Communication*, April 1970.
[3] "Standard frequency transmissions", *Wireless World*, September 1967.

APPENDIX

The recovery of a stable carrier from an a.m. modulated signal.

Principle of carrier recovery

Since an a.m.-modulated signal consists basically of three parts, two sidebands and a carrier, and since these are separated from each other by certain frequency "gaps", any method of carrier recovery must centre about the use of a narrow-bandwidth filter.

In using a recovered carrier as a stable frequency reference, however, it is necessary to consider two related factors: frequency stability required and the subsequent use of the recovered carrier.

Frequency stability of the recovered carrier

(a) Frequency domain filtering

It is well known that a voltage waveform of a single frequency is sinusoidal. What is perhaps not appreciated

so well is that in order to obtain a single frequency, the bandwidth of the associated filter must be zero. Hence it must follow that if a filter bandwidth is greater than zero, more than a single frequency is passed by the filter. In frequency standard applications, where one seeks a signal which has high frequency stability, the bandwidth of the filter must be correspondingly narrow. But if one is able to recover a signal *in the absence of any others* immediately adjacent, it is only necessary to possess a filter with a bandpass narrow enough to exclude the unwanted signals in the proximity of that sought, and to ensure that the amplitude of unwanted signals, very near to the carrier to be recovered (say, noise), is very small compared to the amplitude of the desired carrier. Where an acceptable signal-to-noise ratio is available and the signal possesses a "guard-band", the filter requirement is not nearly so stringent as the first analysis would have predicted.

Since the carrier of the 200kHz transmissions by the BBC from Droitwich is maintained at a known frequency within certain narrow limits, it provides an ideal source of a secondary frequency standard. The use of this carrier is facilitated by the fact that the modulation impressed upon it is limited to frequencies which are in the audio spectrum; the 10Hz contest of the modulation, for example, is some 60–80dB below the content at mid-band (say, 1kHz). Because of the nature of the modulation, there exists at each side of the carrier a natural "guard-band" where essentially no signals are present. This guard-band may thus allow relaxation of the filter requirement as long as the noise amplitude within the region is much less than the carrier amplitude.

Again, this is a requirement easily met in the case of the Droitwich transmissions due to the radiated power associated with the service.

Since the Droitwich carrier frequency is 200kHz and the "guard-band" is 20Hz in extent, the implied Q of a filter circuit would be

$$Q = \frac{f}{\Delta f} = \frac{200 \times 10^3}{20} = 10^4$$

This requirement of Q is most easily met by a single quartz crystal.

(b) Time domain filtering

A second method of entirely different technique may be employed. Since frequency and time are inversely related, one would expect to be able to separate signals of different frequencies using delaying or response time methods as well. The only difficulty which arises is that the circuit methods are not as simply related as the quantities of frequency and time. Nonetheless, if one wishes to use extended response times to separate signals, this may be done.

In the case of the Droitwich signals, however, the problems become rather severe. As a stability of one part per million requires a response of at least five seconds (1/5Hz), any method using this type of filtering to provide a signal whose frequency stability is, say, 10^{-7}Hz, would require a response of the order of a minute long. With such extended time delay, other circuit parameters begin to dominate and the method becomes difficult to implement in practice.

In any event, for the Droitwich signal case, the best solution to the filtering problem may be seen to be that of using a single crystal as a frequency domain filter from the points of view of economy, simplicity and freedom from operational complications.

The subsequent use of the recovered carrier

The second of the two related factors mentioned at the outset is that of carrier amplitude stability. Since the change in carrier peak amplitude can be considered as the result of additional frequencies being present therein, the two topics are in reality inseparable. It is convenient, however, to consider the two as different effects of the same cause.

Since the recovered signal will almost certainly be used in some sort of amplitude-sensitive circuit—eg a squaring circuit or synchronizing circuit—one must be concerned with variation in amplitude of the recovered carrier.

In the frequency-domain filtering method, carrier amplitude variations will arise from noise passing through the filter due to its finite bandwidths and from incomplete removal of low-frequency modulation products. In the time-domain filtering case, incomplete removal of high-frequency modulation products and noise whose frequency components are near the carrier frequency will perturb the carrier amplitude, and if the carrier amplitude was not much greater than the ambient noise, some time-domain filtering as well as frequency-domain filtering would almost certainly be required to ensure that the peak carrier amplitude was nearly constant.

In the Droitwich case, where the received carrier amplitude may be of the order of millivolts before amplification, frequency-domain filtering is adequate.

The author would like to acknowledge the assistance given by Dr L. E. Schnurr, G5AAN, in the design of the filter circuitry and also with the theoretical analysis given in the Appendix.

BOOK REVIEW

Electroacoustics; microphones, earphones and loudspeakers. by M. L. Gayford, published by Newnes-Butterworth, 289 + 12 pages, £4.50

Every amateur uses at least one of these important transducers, most use all three—although in recent years the gap between "communication quality" and high-fidelity or broadcast quality has grown dangerously wide. This new book does not ignore the simple but often-forgotten fact that the vast majority of microphones and earphones are used in the world's telephone and other communications services. In this, as in other respects, it is thoroughly down to earth with masses of practical information on hundreds of types of transducers.

For the professional electroacoustics engineer, for the high-fidelity enthusiast and for the non-professional with a deep interest in recording, broadcasting or audio, this is clearly a most worthwhile new book and one which can be recommended. For the radio amateur, as such, it must be doubted whether a £4.50 book, competent guide though it is, is really "his" book—though almost anyone would be well advised to borrow a copy from his library if only to fill in the many gaps left in the subject by the amateur handbooks.

It is interesting to reflect that despite all the work in recent years, this is a subject where further progress is still possible: good quality telephone handsets; Lavalier microphones which would not change the timbre of the voice; better radio microphones—all would be welcome.

For hi-fi enthusiasts a good deal of information on loudspeaker enclosures has been collated. Contents covered are shown by the chapter headings: Transducer design principles and techniques; Communication microphones and earphones; High-quality microphones and general-purpose units; Loudspeakers; Acoustic measurements on loudspeakers and transducers; Appendices.

G3VA

Aerials for portable operation

by J. E. HODGKINS, G3EJF*

IT IS an old adage that the aerial is the most important part of the station, and in portable operation with low-power equipment the "odd length of wire slung from a convenient tree" is just not good enough if reliable communications are to be achieved. The aerial systems described here were designed for 3·5MHz cw operation with the following specification in mind:

(1) Quick and easy to erect and dismantle single handed or with only one assistant;
(2) Self contained with the minimum amount of kit;
(3) Suitable for short periods of operation from a vehicle or for longer periods from a caravan during annual holidays;
(4) Good efficiency; and
(5) No aerial tuning unit required.

After much thought it became apparent that some form of loaded vertical together with a dipole would cover all eventualities, and the ex-army "golf bag" aerial seemed a good starting point. This type is available on the surplus market at under £5 and comprises 10 3ft screw-in sections of approximately 1in diameter, a 12ft whip, a whip adaptor, an insulated base, and numerous odds and ends—even to the hammer to knock in the pegs. The rope guys and chain-link insulators supplied are extremely clumsy and should be removed from the two stay-plates and replaced with line made of polypropylene or similar insulating material. Quite thin line, about $\frac{1}{8}$in diameter, can be used and will look much neater.

The dipole

A horizontal dipole for 3·5MHz needs to be under considerable tension if it is not to sag at the centre, and the screw-in sections are too flexible to support such an aerial. The answer is to use an inverted-V configuration, allowing the mast to support the weight of the coaxial feeder, and cancelling the sideways pull on it by having the legs of the dipole under equal gentle strain. The length of an inverted-V dipole is less than that given by the usual half-wave formula; it was found that an overall length of 128ft loaded satisfactorily throughout the 3·5MHz cw band with the ends of the dipole at heights of 1ft to 8ft.

The 22ft loaded vertical is self-supporting at normal wind speeds. Guys may be added during gales

A dipole complete with feeder is an awkward aerial to carry around as it tends to become tangled. However, if the feeder is kept separate the aerial may be wound on to a piece of plywood or hardboard and easily run out when required. To keep the weight down, insulators were made from small pieces of Perspex, a coaxial socket being mounted on the centre insulator, and the aerial was made from Radiospares insulated 14/·0076 wire. This is available in several colours, black or brown being the most inconspicuous. Two 25ft lengths of coaxial cable fitted with plugs at each end together with a line connector were carried.

The procedure for erecting the aerial is as follows. Screw five sections together to form a 15ft mast and fit a stay plate at the top. Run out the dipole, plug in the feeder, and tape the centre insulator and coaxial cable to the top of the mast, making sure that the outer of the coaxial plug is insulated from the mast. Erect the mast and anchor the guys about three paces from the mast using the pegs provided. Slope the legs of the dipole down to bushes, fence posts or even pegs in the ground. The author prefers to have the ends of the dipole about 7ft high; apart from the danger to passers-by it is a well-known fact that, given several hundred acres of hill country, sheep will insist on grazing the small areas near the ends of your dipole.

* Bridge House, Hunton, Bedale, Yorks.

The complete aerial kit is compact and self contained; it is here shown laid out in the following order:

Aerial bag

Ten 3ft screw-in sections

12ft whip with loading coil and adaptor

Lead-in for vertical aerial	**Base insulator**	**25ft coaxia**
		Base spike
Bag containing pegs and hammer	**Dipole**	
		25ft coaxail
	Insulating tape	
Stay plate with guys		**Stay plate with guys**
	Rope	

The loaded vertical

A "top band" loading coil had graced the author's junk box for several years. Measuring 10in long and 1¾in in diameter, it had screw fittings, male at one end, female at the other. The male screw was turned on a lathe to give a tight fit into the whip adaptor and the 12ft whip was silver soldered into the female end.

The pi-tank commonly used in transmitters will only load into short vertical aerials if they are accurately resonated at the operating frequency. Unfortunately the process of resonating the aerial requires considerable patience. Almost any variation in configuration will alter the resonant frequency; the lead from the transmitter and the earth lead are part of the system and as such must be standardized. Even pouring water over an earth spike in dry ground will alter the loading considerably. The only earthing system which could be reproduced at any location was the vehicle used as a counterpoise, and the transmitter earth terminal was connected to the nearest convenient point on the bodywork using the shortest possible lead; it is inadvisable to rely on the earth return of the power lead. A connecting lead from the transmitter to the aerial base was made up using 6ft of coaxial cable and 6ft of insulated wire. The coaxial portion takes the lead clear of the vehicle body and prevents changes in loading due to its position. The inner conductor is joined to the insulated wire which should not trail on the ground. Having standardized these factors the loading coil can be adjusted for resonance with a single 3ft screw-in section between the coil and the insulated base.

Initial adjustment was made using a grid dip oscillator. An earth peg was driven into the ground close to the aerial base and a short lead containing a two-turn coil, into which the gdo was coupled, connected between aerial and earth. The loading coil was adjusted until resonance was obtained at approximately 3·2MHz. Bearing in mind the effects of the factors listed above, this is probably as near as one can get using the gdo. Remove the earth lead and connect the transmitter to the aerial using the standard lead and vehicle earth. It probably will not load, so remove turns from the loading coil **one turn at a time** until correct loading is obtained. Any attempt to change the coil more quickly will almost certainly result in removing too many turns.

There are two useful hints to assist in adjusting the coil. If it is too large, the addition of capacitance in series with the aerial lead will increase the resonant frequency, the bigger the capacitor the smaller the increase in frequency. A 1,000pF variable capacitor may be connected between the aerial lead and aerial base and further capacitance added if necessary to enable the transmitter to be loaded. If the coil is too small the addition of an extra foot or two of aerial lead may produce correct loading. In addition, checking whether the transmitter shows any sign of loading at either end of the band will give a clue to the resonant frequency of the aerial.

After a considerable amount of work it should be found that the transmitter will load fully at the required frequency. The author's coil consists of 56 turns of 20swg enamelled wire close wound at the bottom of the former plus two turns in a helix to the top of the former, which allows the transmitter to be fully loaded throughout the cw portion of the 3·5MHz band. The coil was covered with pvc tape to prevent the turns slipping, and once the aerial had been checked by use from various locations it was given several coats of polyurethane varnish as weatherproofing. In order to keep to a minimum losses due to the ohmic resistance of the aerial, all contacting surfaces were thoroughly cleaned and smeared with petroleum jelly at frequent intervals to prevent corrosion.

Although adjustments to the loading coil were made with a single 3ft section below the coil it was found that the aerial remained resonant with up to five sections below the coil. No attempt was made to use more than five sections, it was felt that greater lengths would make the aerial difficult to erect. Although the transmitter would load into these different lengths it was soon apparent that the efficiency of the aerial increased rapidly as sections were added. On one occasion using a single section below the coil a report of RST339 went up to RST579 when two more sections were added. This was typical of the results achieved. Unfortunately the use of all five sections necessitated guying the aerial below the coil. A reasonable compromise was achieved by using three sections; provided the base spike is driven firmly into the ground this aerial with a total length of 22ft is self supporting, it will even stay up in winds strong enough to rock the vehicle. The aerial is usually erected two paces from the side of the vehicle allowing two of the guys when used to be attached to front and rear bumpers.

Conclusion

How does this meet the original specification?

1. It takes some 3min to set up or dismantle the 22ft vertical single handed. With one assistant the longer vertical with guys takes about 5min and the dipole roughly 10min.

2. In addition to the contents of the original golf bag, the following are carried: Aerial lead for the vertical, dipole on its piece of hardboard, two 25ft lengths of coaxial cable, insulating tape, and two pieces of rope (the original guys) to secure the ends of the dipole.

3. There is sufficient equipment for the dipole to be erected at the base site and the vertical aerial carried on short expeditions.

4. Results using the transceiver described in the November 1970 issue of *Radio Communication* have been quite satisfactory. The 22ft vertical aerial regularly produces reports averaging RST579 from all parts of UK from sites varying from reasonable to superb. The dipole has been used from locations which no right-thinking amateur would choose, and as expected gave good high-angle radiation enabling the signal to be pushed over the surrounding mountains to produce similar reports from distances of up to 300 miles.

The results obtained with this aerial kit have been well worth the effort. No more searching for suitable trees followed by the frustration of trying to get a rope over a high branch almost hidden in the foliage, the author can drive into his chosen location knowing he will be on the air in a matter of minutes.

COLOUR TV TEST

by PER WALLANDER, SM0DLL, technical secretary of SSA

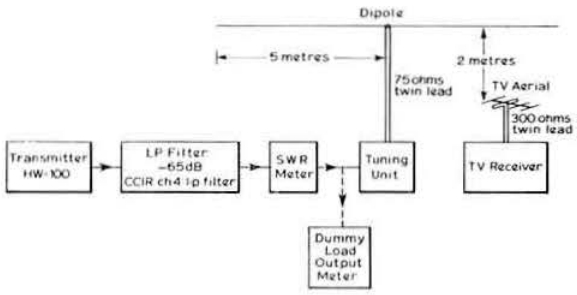
DURING 1970 the Swedish government institute SIFU made its second consumer test on colour television receivers, and the SSA was allowed to test these sets for performance in the neighbourhood of a hf amateur radio transmitter.

In all, 16 different sets were tested, and these represented 15 different types of chassis which are to be found in 25 different makes and models. With a few exceptions all these are on sale in Sweden, and they were picked at random from those going through the test at SIFU. This was done after the test had been in progress for about 1,500 hours.

The intentions of the SSA were not to match different makes against each other, merely to prove that there are some sets that are very prone to interference and that there are others that are completely immune.

Each tv was fed with the ordinary colour programme on CCIR Channel 4 (corresponding to UK Channel 5) from an aerial in the laboratory. The signal strength was 2·3mV over 60Ω as measured with a realiable instrument. The lower limit for acceptable reception is 2mV, which determined the choice of input signal strength.

Through the laboratory ran a 2 by 5m dipole, fed with 75Ω twin lead from a tuning unit which took care of the transformation from 50Ω unsymmetrical output from the amateur transmitter to 75Ω symmetrical. Between transmitter and tuning unit there was an swr meter which was calibrated against a Philco 50Ω dummy load with built-in output meter.



A low-pass filter which was used had practically no attenuation below 40MHz, but it had an attenuation of 65 to 81dB on CCIR Channel 4.

The transmitter was a Heath HW-100 with a maximum carrier output of 100W on 14MHz. The reason for using this frequency was to avoid direct harmonics into CCIR Channel 4. Unmodified carrier was used because it is easier to measure with reasonable precision. The transmitter was tested on a dummy load without causing any interference; thus the rf energy could be assumed to be radiated from the aerial only.

The table shows the carrier levels from the transmitter which caused audio interference and picture interference to the receivers. *None* means that there was no interference at 100W output from the transmitter.

The questions "When is the audio interfered with?" or "When is the picture interfered with?" are debatable but as the tests were all made by the same person it is reasonable to suppose that no particular set was favoured.

The results of this test have been sent to the manufacturers and agents for the sets under test. It might at least be food for thought for some of them.

Make and model of tv receiver	Audio interference	Picture interference
Bang and Olufsen 300	27·5	12·5
Blaupunkt CTV600 S	*None*	*None*
Graetz Burggraf Color	32	2
Grundig Electronic Triumph 2650	22	14·5
ITT Schaub-Lorenz Weltspiegel	4·4	0·5
Luma-Korting	72	58
Luma LF 22G04 (ITT)	0·7	0·5
Luxor Colorama	72	32
Monark Mallorca Color	13	2·5
Normende Color 2530	*None*	38 (loss of synchronization)
Orion CT4212	8·3	72
Philips S26K497	58W	27·5W
Radionette Colormatic 70	*None*	*None*
Salora Finlandia	*None*	32
Tandberg CTV1-91	26	4·4
Telefunken Palcolor 74CT	*None*	*None*

TECHNICAL TOPICS

A monthly feature by PAT HAWKER, G3VA

SOME RECENT experience, in connection with the *Wireless World* GB3WW station, of the decidedly unusual role (for me) of "plug-in appliance operator" proved an interesting and thought-provoking exercise. Certainly it has shown that many of the modern trends in overall station design have much to commend them from the viewpoint of operational simplicity and convenience. A basic ssb/cw transceiver (with effective, detachable "irt" tuning), plus an associated linear amplifier for extra power, in conjunction with a multi-band aerial, means that one can be on-the-air with an effective signal after the briefest familiarization and can then dodge about from band to band and mode to mode in what—to one who is used to concentrating on one band and one mode for many months at a time—seems like the twinkling of an eye. This, of course, must be very old hat indeed to the many amateurs to whom this type of operation has long become almost a way of life—but it still comes as quite a shock to those of us who tend to think of station design as a conglomeration of separate pieces of equipment and sometimes almost as "individual" circuits and bands.

One can well see how the amateurs who have changed over to this type of packaged station must inevitably find they are developing a different set of technical information requirements. One senses this increasingly in surveying many of the overseas journals and magazines. A very real quandary does in fact face those concerned with the editorial content of such periodicals. If one accepts that, in a few years' time these cleverly packaged and undoubtedly effective equipments will have become almost the rule, rather than still in the minority, then obviously technical articles must either be directed at giving readers a better idea of what is happening inside these "grey boxes" and how to check that all is working as it should be, or else one goes for constructional articles on secondary and almost gimmick equipment: resulting in titles such as "Fun with transistors", "Take a sardine-tin rig on your travels", "You can build for microwaves" or "Roll your own linear". This approach takes it for granted that while there may still be interest in home construction and experimentation, for the vast majority of readers, the basic station equipment is outside the design arena except in so far as newcomers will need to know what to look for in choosing equipment.

It is not an adverse comment on appliance operation to suggest that this is a very real problem that faces the future of the hobby. It is not just that we are being "seduced by sales talk, everyone"—these equipments are often most attractive in very real terms. It would be so simple to be dogmatic if only the factory equipment were not so effective! And yet undoubtedly they *are* inhibiting and restrictive on our thinking. I have not yet been converted to packaged equipment for the home station! But certainly one looks at a set-up far more critically after a spell with "how the other half lives". A useful broadening of experience!

Folded multi-wire dipoles

While the conventional ½-wave folded dipole is extremely well known, very much less attention has been given to some other interesting types of multi-wire dipoles, including the two-wire ¾-wave aerial and the four-wire ⅜-wave aerial. It is true that both turn up occasionally in amateur journals and handbooks. But there is also an interesting variation to the ¾-wave dipole—the ⅜-wave vertical working against ground—that, to the best of my knowledge, appears to have escaped the attention of amateurs and to be omitted from all those handbooks which have come to my attention.

Recently, however, John Brodzky, G3HQX, drew my attention to a section on "multi-wire dipole antennas" by John Kraus, W8JK, in *Electronics Manual for Radio Engineers*, a book based on articles which appeared in *Electronics* during the 'forties and early 'fifties. This reviewed a number of multi-wire systems. Fig 1 shows three, all of which have been used by amateurs, though only (a) is well known. A two-band version of (b) with stub switching has long been described in *Radio Handbook*. The ⅜-wave "shortened dipole" has been given before in *TT* and *ART*, and has recently formed the basis of a "shortened ZL-Special" (see later). In all these aerials, the feed point is at a current lobe and is purely resistive.

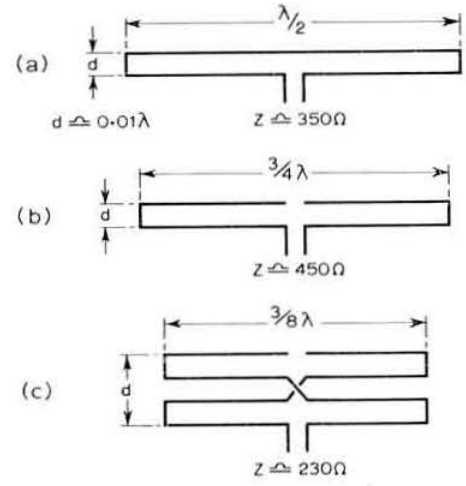


Fig 1. Three of the multi-wire dipoles discussed by Kraus in the *Electronics Manual for Radio Engineers*: (a) the conventional folded dipole (he also gives variations using additional wires for termination impedances of about 875 and 1,500 Ω); (b) the ¾-wave dipole; and (c) the ⅜-wave dipole

⅜-wave vertical

But, in addition, Kraus shows that, just as a conventional ½-wave dipole can be used as a ¼-wave vertical monopole by replacing half of the aerial by earth, so it is possible to adapt the ¾-wave dipole of Fig 1 (b) to form a ⅜-wave vertical. This has the interesting terminal resistance of about 250Ω, so that losses in earth currents should be less than with the usual ¼-wave vertical. A feature mentioned by Kraus is that the ⅜-wave vertical has a current distribution similar to that of top-loaded verticals such as the T-aerial, with maximum radiation lifted some way up the aerial, as indicated in Fig 2. The height of a 14MHz version would typically be about 24ft with a 1ft spacing between wires, so that the extra height, compared with a ¼-wave, is well within manageable bounds on this and higher bands. We tried one fed directly from 300Ω feeder—results promising but inconclusive.

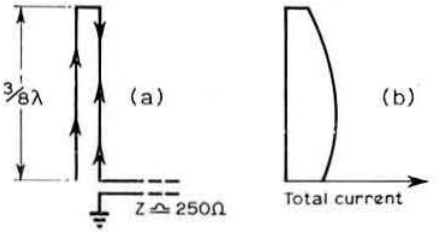


Fig 2. The ¼-wave vertical aerial working against ground and the total current distribution resembling a top-loaded vertical

Dr Kraus wrote: "An interesting property of this antenna is that due to the multi-wire construction, a current distribution is produced which is similar to that of a vertical top-loaded single-conductor antenna." Altogether, it does seem that the ⅜-wave vertical is worth looking into for amateur applications. The possibility of switching at the base of the aerial so as to form the more conventional "unipole" aerial suggests that, as in the *Radio Handbook* design for ¾-wave dipoles, it should be relatively easy to devise at least a two-band version.

The shortened ZL-Special

In *CQ* (July 1959) Rolf Schick, DL3AO, described a ZL-Special aerial in which the elements, instead of being based on the customary ½-wave folded dipoles, used the four-wire ⅜-wave system described above, constructed from two side-by-side lengths of 300Ω twin feeder rather than separate spaced wires. This arrangement has now turned up again in *QST* (January 1971) under the title "Five for five" (5dB gain for $5!): Fig 3.

The typical dimensions given by J. E. Kear, K4MI, are for 14,175kHz, with the reflector about 6 per cent longer than the radiator. This technique brings the overall length of a 14MHz ZL-Special down from about 34ft to around 28ft, a saving of space which might be useful in some gardens. The basic structure is made with bamboos.

Another way of reducing beam size and weights can be seen in American advertisements for a new range (Kirk Electronics, 116 Westpark Road, Dayton, Ohio 45459) of glass-fibre helicoidal beams. The basic beam weight for 14MHz is given as only 17lb (even 7MHz is 46lb). The helical wound elements are about 25 per cent to 35 per cent shorter than for non-loaded elements, based on a W8FYR design.

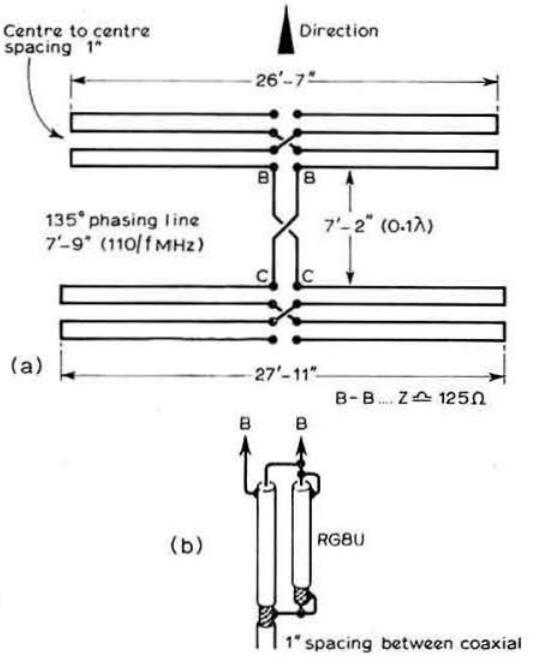


Fig 3. The shortened ZL-Special based on the ½-wave dipole and using 300 Ω twin-lead feeder and fed with a balanced feed equivalent to about 125 Ω at B-B (a bazooka balun is used in the *QST* design as shown in (b))

Feeding the ⅝-wave vertical

Many references have been made in *TT* and elsewhere to the attractive vertical radiation pattern of the ⅝-wave vertical monopole. This works out at about 41ft on 14MHz and many readers may have noticed that one of the popular military-surplus rod and whip aerial masts makes up to precisely 41ft overall and is complete with a base insulator. This suggests that there could be plenty of interest in a simple coaxial line matching transformer described in *QST* (January 1971) by Robert Earl, W1DRV, specifically for feeding a 14MHz ⅝-wave vertical from 50Ω coaxial: see Fig 4. W1DRV based his design on an article by Pete Czerwinski, W2JTJ, (*QST*, June 1961) who used a coaxial-line transformer to feed a ½-wave "beer-can" vertical for 14MHz.

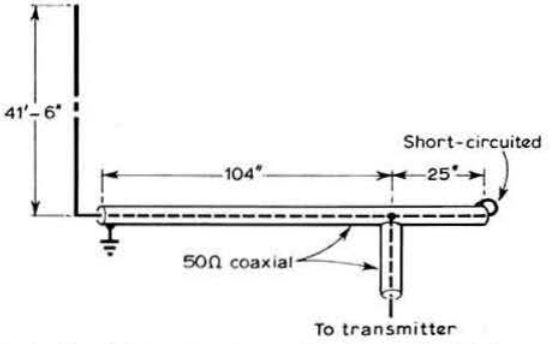


Fig 4. Coaxial line transformer for feeding 14MHz ½-wave aerial, originally proposed by W2JTJ (*QST* June 1961)

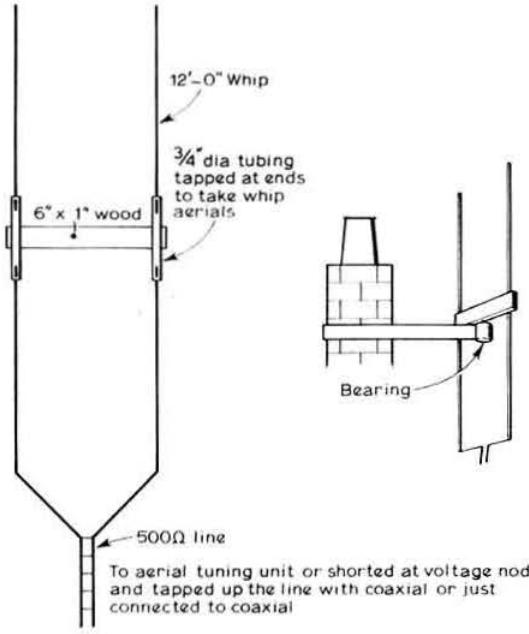


Fig 5. The horizontal or vertical W8JK beam built by BRS31208

Vertical/horizontal W8JK

S. M. de Wet, BRS31208, writing from Irene, Pretoria, supplies a further aerial idea for this month. This consists of an end-fed W8JK constructed in such a way that it can easily be mounted either horizontally or vertically: Fig 5. The elements are made from four stainless steel whips, screwed into the centre supporting section. The whole array is completely symmetrical and has a gain of about 3 or 4dB. The open wire line is easy to match to coaxial cable at any given frequency, or an atu can be used. The lobes are virtually two spheres and are about 90° wide. Mounted vertically on a spar projecting from a chimney, this forms a simple bi-directional beam requiring only 90° rotation to cover all points of the compass. BRS31208 has made his so that the whips unscrew from the centre section and make a light portable package.

Beam direction indicator using reed switches

Recently we suggested that there were many applications for reed switches which remain to be developed for the amateur station. One interesting application has come along from Rex Morrison, G3KGA, following a lecture-demonstration to the Surrey Radio Contact Club: this is for a beam direction indicator.

His system uses eight reed switches arranged in a circle on two halves of a 4in diameter Perspex cylinder, which is fixed concentrically around his 2in diameter mast. Each reed switch is connected to a bulb at the shack end (12V, 0·1A lamps) and these are arranged in a circle indicating the eight points of the compass. The reed switches are normally open, but a magnet mounted on the mast closes each relay in turn as the mast rotates, so completing the circuit and lighting the appropriate bulb. Positional adjustment of the magnet (a round bar type, 5·0 by 0·5cm, mounted in a plastic pill tube) in relation to the reed switches is arranged by sliding it horizontally along an arm mounted at right angles to the mast, using a Terry clip. Movement of the clip provides vertical adjustment. A simple coaxial cable anti-twist device consisting of a relay in series with the bulb in appropriate direction, open circuits the supply to the rotator. Some semblance of automatic operation can be achieved by using the same relay switched to other compass points by means of a push-button (as in G3KGA's case) or a rotary switch.

This system is thus suitable for all methods of rotation, requires no mechanical coupling to the mast, has no exposed electrical contacts and is reasonably cheap—G3KGA suggests that £1 should cover the cost of surplus reed switches, 12V bulbs and relay. Greater precision could be obtained, if required, by using 16 instead of eight reed switches and a larger diameter mounting cylinder. The G3KGA system has been in use for about nine months with no component failures.

The LCL approach to pi-networks

It seems an incredibly long time since anyone seriously suggested an output tank circuit for hf valve power amplifiers other than the conventional CLC pi-network (or the occasional variation of the CLCL pi-L arrangement). Recent correspondence from Brian Rose, G3ULR, however, indicates that it might be well-worth thinking more about another significant variation which, although used in some commercial and military transmitters, appears to have been almost totally ignored by amateurs. This is possibly because this approach, which represents the electrical conjugate of the conventional CLC network, requires the use of either one or two variable inductors of the roller-coaster type and several high-current capacitors. But surplus inductors of this type are, in fact, knocking around in fairly large numbers.

Furthermore, G3ULR shows how a modification of the network can be used to eliminate completely the need for an effective all-band radio-frequency-choke, the key component in the conventional pi-network tank circuit. He does this by operating the anode(s) of the power amplifier at earth potential to dc. This involves having the cathode of the pa below earth to the extent of the ht potential, but—once you are used to the idea—this can provide improved safety, since adjustments to the tank circuits can be made more safely. When amateurs began using pi-network tank circuits they quickly came up against the problem of series and parallel resonances in the rfc; although modern design has largely removed the problem of hf resonances, there often remains vhf resonances which can increase harmonic output.

Basically, the arrangement which G3ULR proposes is the electrical conjugate of a CLC pi-network; this means that each C is swapped for an L and L for C; in other words one arrives at an LCL network. One of the well-known military transmitters which used this was the "53 set" which at one time was favoured by quite a few British amateurs. But the 53 set still retained the familiar parallel-feed calling for an rf choke between ht positive and the anodes. By connecting ht positive to chassis, not only does the entire network operate at earth potential from a dc viewpoint, but one eliminates all the troubles arising from the rf choke—G3ULR believes this can materially reduce harmonic output (a subject we shall be returning to later).

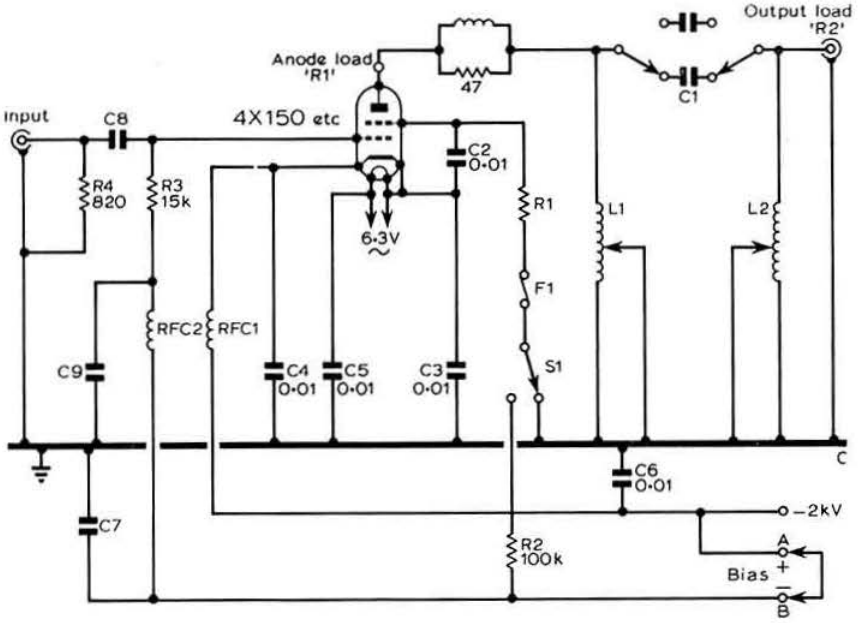


Fig 6. Tetrode power-amplifier with anode at dc earthpotential. R1 is the usual screen voltage dropping resistor. Output uses the LCL network (L1, C1, L2)

Fig 6 shows a tetrode rf amplifier employing the conjugate pi-tank circuit. Ideally, variable inductors should be used for both L1 and L2; however, since the loading inductor L2 does not require critical setting, a preset tapped coil can be used if the transmitter is intended to work into a constant load impedance, for example a coaxial line. The capacitor C1 should be a mica unit with adequate rf voltage and current rating. Even if C1 fails, no high voltage reaches the antenna terminal, since the entire tank circuit and anodes are at earth potential. Tuning is carried out by critical adjustment of L1, so that this must almost certainly always be a roller-coaster unit.

A number of capacitors—C3, C4, C5, C6, C7, C8 and C9—must be capable of withstanding the full ht potential; C3, C4, C5 and C6 additionally carry rf current and should be mica types. Since the cathode is at high dc potential, it must be connected to the filament circuit (preferably to the centre tap on the heater winding of the transformer if directly-heated valves such as the 813 are used). The heater transformer insulation must, of course, be capable of withstanding the ht potential, but most windings will do this. The bias supply is applied between cathode and grid, and is thus floated at the ht line potential. No bias is required for telegraphy operation provided the drive is increased into grid current, allowing adequate bias to be developed across R3; in this case, the bias supply terminals, A and B, are shorted, and RFC1 replaced by a suitable protective resistor to give key-up protective bias. In the test amplifier, keying was by means of the relay S1 in the pa screen circuit. Note that the short-circuit on the variable inductor L1 should be wired as shown to prevent the anode return becoming open-circuit when the slider slips off the inductor; otherwise excessive current will flow in the screen circuit should the fuse F1 be omitted. R1 is the usual screen voltage-dropping resistor. Any of the conventional neutralizing arrangements can be employed; G3ULR prefers to use a passive-grid pa stage, in which case the grid load resistor, R4, should be reduced in value until the stage is stable under all conditions; G3ULR finds 820Ω provides sufficient loading. The driver can use a pi-network or an L-network adjusted to match the 800Ω load, which is mounted as close to the grid pin of the pa as possible, and fed via a short length of coaxial cable from the driver. Unless required to match the driver, there is no need to waste a considerable amount of drive by using an 80Ω grid resistor.

G3ULR stresses that the only novel feature of the test amplifier is the technique for eliminating the rf choke. The circuit becomes very attractive economically when applied to grounded-grid linear amplifiers using zero bias valves such as the 811 (Fig 7 indicates the modifications to the cathode circuit). He points out that a commercial aerial tuning unit has appeared on the surplus market (originally intended for use with STC's type ST18C aircraft transmitter); this can be

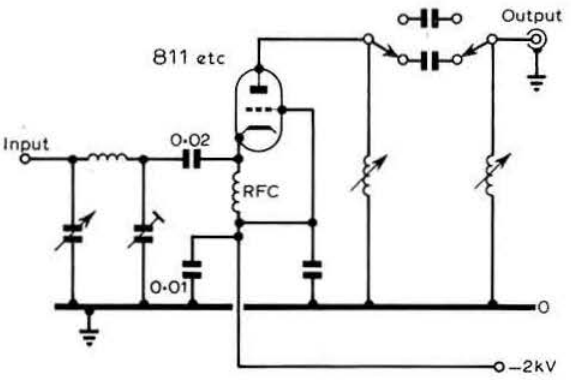


Fig 7. Simple zero-bias grounded-grid stage using the modified pi-tank. Details of the electrode connections for a 4X150 for use in this configuration are given in *Radio Handbook*, 17th edition, page 684

used in reverse to provide a compact ready-made tank circuit for a linear. Tank circuit values for use with a pair of 6146Bs in parallel AB1 are (for 3·5MHz): L1 10μH, C1 180pF, L2 1·8μH. These inductances can be obtained (using 16swg on 2in diameter) with 5 turns, 1in long for L2, and 17 turns 2in long for L1, assuming 70Ω output. In calculating the tank circuit values, the reactance of L1 should be made the same as the reactance of the tuning capacitor for a conventional CLC pi-network. Similarly the reactance of C1 should be the same as for the L of the usual pi inductor, and that of L2 equal to the loading capacitor. If an exact equivalent capacitor cannot be found for the C, then G3ULR considers that better performance results from values of C1 which are slightly greater than the correct value; where C1 is correct on 21MHz it will often work on 28MHz, but not vice versa. The approximate resonance condition with a resistive load is that neglecting valve capacitance, L1 and L2 in series are parallel resonant with C1.

Harmonic suppression of the LCL network

A possible reaction (it was certainly mine) to the LCL network is to question its harmonic suppression performance, particularly since a good deal is often made of the fact that the CLC pi-network is essentially a low-pass filter; whereas the LCL is a high-pass filter and might thus be assumed to have a markedly poorer harmonic suppression than the conventional arrangement.

G3ULR, however, notes that the 53 transmitter has considerably less output at 42MHz when used on 14MHz than some relatively modern transmitters. There is, in fact, a series inductance in this transmitter for tuning out aerial capacitance, and a "shotgun" test used by the MPT in checking for harmonics is to set this to zero. Why then should this type of performance be achievable on a "high-pass" configuration?

It should be noted that in the 53 transmitter the inductors and capacitors are large (C1 about the size of tea-cups) and have appreciable self-inductance. Similarly the inductors have stray-capacitance to earth of the order of 50pF. And it is the circuit strays that may be expected to provide the dominant susceptance paths at the higher harmonic frequencies. Now the circuit *strays* of the LCL network have the configuration of a *low-pass* filter; that is to say the strays of the LCL resemble the arrangement we associate with the ordinary CLC network— and vice versa. G3ULR wonders whether it is this that may account for the fact that the harmonic attenuation of many pi-networks falls off at the important vhf part of the spectrum; resulting, he believes, in a form of harmonic boost. This is a problem which has been recognized in the design of low-pass tv filters (see for example the absorptive filter approach to tvi—*ART3*, page 125). The configurations of the "ghost" networks, formed by circuit strays, are shown in Fig 8.

Even if this were not the case, an argument could still be made for suggesting that tank-circuit attenuation of harmonics is considerably less important than that achieved in external low-pass filters, at least in fringe areas of television. G3ULR has made a rough-and-ready analysis of the high-pass characteristics of the conjugate pi-tank circuit (neglecting improvements due to the "ghost" low-pass filter resulting from the strays). This does suggest that performance at third harmonic will be much worse than at any other harmonic number. It is not intended to go fully into this subject here—perhaps when his work is completed we can expect a

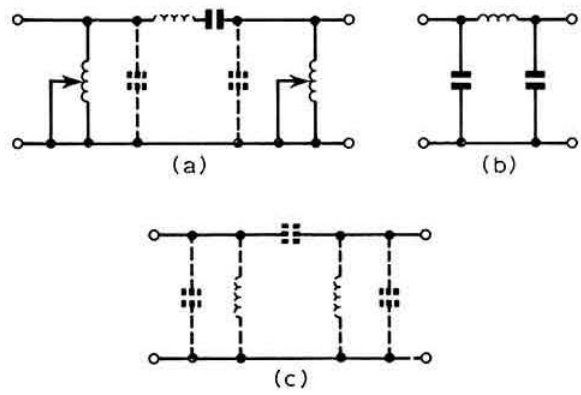


Fig 8. The "ghost" networks that result from circuit strays. (a) The real and ghost networks of an LCL network: (b) the conventional CLC pi-network forming an apparent low-pass network; (c) the "ghost" network of the CLC network has a high-pass configuration

full-length article? Sufficient to say, G3ULR is convinced that in practice one of the strong points of the LCL configuration is good harmonic performance. Altogether an interesting subject for further investigation.

Error-count measurement of aerial performance

A lot of professional development work in communications these days is based on the technique of counting the number of errors in the reception of rtty messages. Although the arrangement is not perhaps quite so appropriate for amateur work (where the main problem is often unpredictable interference from other stations rather than fading or multipath), it is not without interest. The technique has in fact been used by E. H. ("Bill") Conklin, K6KA, as a means of checking aerial gain down to a small fraction of a decibel. For instance, during his service with the US Navy he once investigated a twin rhombic correctly laid out in California to beam a signal into Guam but which did not give the expected gain. He discovered that the direction of fire had been very slightly skewed by the presence of another feedline. Another time he was able to show that a Lazy H aerial gave a 5dB gain on a low-angle circuit compared with 3dB gain on shorter hops.

The T2FD again

K6KA also discovered, using this technique, that a US Navy "T2FD" aerial (see *TT* August 1969) was some 6dB down on a dipole—further confirmation of the doubts about this particular type of aerial. In using error count techniques, K6KA simplified the operation considerably by using a test tape containing only *non-printing* characters, allowing him to count how many corruptions occurred simply by counting the number of characters printed out. On hf the percentage of errors varies inversely as field strength, provided that the copy does not run into "perfect" or "uncountable" copy; "the latter occurring around 90 to 95 per cent," says K6KA. On the T2FD, K6KA also found that the original "broadband" effect claimed by the US Navy was only intended to be at the most a few hundred kilohertz, rather than the octave or so often claimed for it. This is not perhaps important for

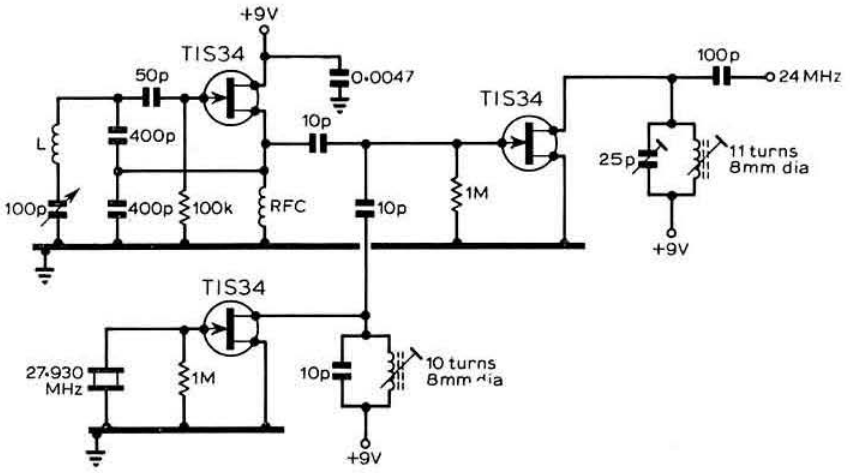


Fig 9. The all-fet mini vfo for 144MHz suggested by I1HF, but see text regarding possible spurious output (this would be reduced by using twin-tuned bandpass output circuit)

amateurs who use harmonic frequencies, but at some of the intermediate frequencies he suggests that most of the power ends up in the terminating resistor. One result of K6KA's letter on this aerial was that we included a note in *ART3* commenting that the aerial is not recommended except where space is at a premium.

Mixer vfo for 144MHz

One gathers from G5UM's *FMD* that some differences of opinion are developing on the subject of the choice between straight vfo, mixer vfo or the vxo for vhf operation. With the present trend towards single-channel operation on "Two" one of these techniques must surely emerge soon as the dominant mode. In the past we have reported a considerable number of examples of straight vfo and vxo arrangements suitable for vhf applications, but few, if any, mixer vfo circuits.

So this month we reproduce a "mini-vfo for 144MHz", using a mixer arrangement, described by Sandro Federici, I1HF in *Radio Rivista* (No 1, 1971), the journal of ARI: Fig 9. This has a 3·5MHz fet vfo and 27·930MHz crystal oscillator to provide a heterodyne output on 24MHz, and is thus suitable for use with many 144MHz transmitters. We feel constrained to add what may be an unnecessary warning: if the transmitter circuits are sufficiently broadbanded to permit unwanted mixer products to pass through, there could well be spurious radiation unless extra tuned circuits are fitted at, say, 24MHz to form a more efficient bandpass filter output to the unit. But at least the basic circuit ideas may be useful.

Reprise

In launching a monthly quota of ideas and circuits on unsuspecting readers, there always remains an interest in learning whether the ideas prove useful in practice, or the opposite. In many cases there can be no doubt—quite a few of the circuits and ideas which have made their UK (and occasionally world) debut in *TT* are now very widely used. But, of course, there are many circuits which do not result in immediate "feedback" (one likes to think they all worked at first go!) and vanish from sight—although not infrequently one finds them turning up again years later in practical equipment designs. And often one idea leads on to another.

Some recent feedback from G3JGO relates to the suggestion by Jim Evans, GI3DVB, (*TT* February 1971) that 90° phase shifts could be produced simply by means of transistor-logic. G3JGO writes to say that he has actually tried the idea and it works. But he points out that even at 1MHz 360° represents only 1,000ns, so that the 10ns rise time of typical ttl logic represents 3·6°. This is equivalent to a maximum sideband suppression of 30dB without taking into account other phase errors. G3JGO notes that with extra circuits to equalize the delays the system worked, but with two separate dividers (no longer quite GI3DVB's system, the 90° could be lead or lag depending on the switch-on states of the divide-by-two circuits!

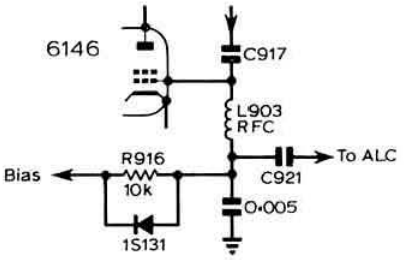


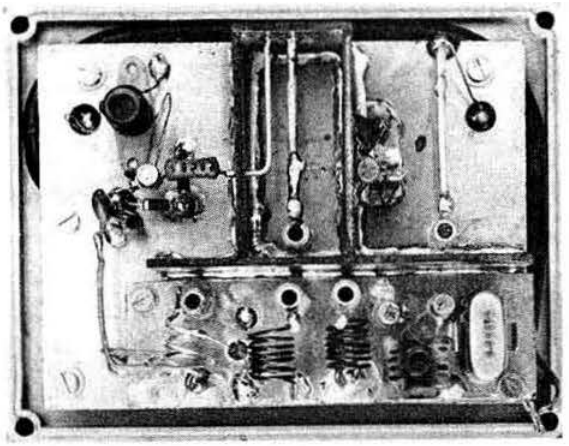
Fig 10. Modification of Heathkit SB101 to include diode in grid circuit

He also mentions that he has tried using a diode (see *TT*, April 1971) in the grid circuit of his SB101 linear with no snags, although he has not a pair of 6146s with grid emission to prove whether drift is reduced. Fig 10 shows his modified circuit. The diode was an IS131 but he considers an OA200 would probably be just as good (in fact anything with a good reverse resistance). As the corresponding resistor is much larger in some rigs, the life of output valves (particularly "sweep tubes") could be significantly increased.

EQUIPMENT REVIEW

The Garex 70cm converter

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



Introduction

WHEN reading through the advertisement pages of *Radio Communication*, there appears to be a welcome rash of vhf and uhf converters available. The reader's problem is to discriminate between those available and to make his mind up which is the best value for money. One fact is certain, very few vhf or uhf workers have test equipment available to carry out a critical appraisal. It is also probably true that few of the manufacturers have suitable test equipment anyway, and in the past, optimistic obeisances to the great god noise factor have been paid. In these days of the Trade Descriptions Act more caution is rightfully shown.

To the best of the writers' knowledge, the only uhf signal generator suitable for narrow band a.m. testing on 432MHz costs over £4,000. As has been mentioned before in these reviews, a professional noise generator normally has an accuracy of ±0·5dB, which makes a mockery of claims in the 1 to 2dB region based on such noise generators. Better accuracy costs real money. If the reader remembers that to a first approximation 1dB change in noise factor results in a 1dB change in signal to noise ratio, the audible difference between a 3dB and 6dB noise factor is negligible.

General description

The subject of this review is the Garex 70cm Converter manufactured by Garex Electronics, Chinnor, Oxon. The price is £14·87½ plus postage.

It is constructed from double and single side printed circuit board, some of which is SRBP and some glassfibre. Printed wiring is not used. The wired assembly is mounted in a 4½in by 3½in by 2in ITT box finished in blue hammertone paint. Input and out coaxial connectors are tv style, and a short screened battery lead is taken out through a grommet in the side of the box.

Of the seven tuning adjustments, three are accessible from outside the case—input and output of the GM0290 rf stage, and the last multiplier output.

A style D 44·8888MHz crystal is used to give an i.f. of 28-30MHz. Three transistors are in the oscillator line up 2N708—2N708—2N3478. Bipolar transistors are used in the rf side, a GM0290 as an rf amplifier and another as a mixer.

Tests

No claims are made by Garex. The tunable rf used during the tests was a Yaesu-Musen FR100B with known performance.

Gain—this was measured by feeding a uhf signal to the converter and noting the FR100B S-meter level. The signal generator was then connected direct to the FR100B at the converter i.f. and its output level adjusted for the same S-meter reading as before. The difference in level was 16dB. This is the approximate gain of the converter.

Bandwidth—the variation in gain over the range 432—434 MHz was less than 3dB.

Frequency accuracy—crystal frequency error resulted in an error of 25kHz at 432MHz. In most overtone oscillators the associated tuned circuit could be expected to pull the crystal frequency enough to compensate for this error, but this point was not checked. Since no internal stabilization is employed the frequency sensitivity to voltage was measured as ±3·8kHz for ±2volts.

Noise factor and signal/noise ratio—the noise factor was measured with an American Meganode noise generator which showed just under 12dB. The signal to noise ratio at 1μV pd, 30 per cent modulation was 9dB.

Image response—the image response appears below 400MHz and thus the 34dB rejection measured is unlikely to give rise to any problems.

Blocking—the blocking performance was measured by feeding in a wanted signal through a three port combining network at such a level to give 10dB signal to noise ratio. A second signal generator was tuned 50kHz away from the wanted signal and its output increased until the wanted signal to noise ratio was degraded by 3dB. The unwanted level was over 70dB above the wanted—a good figure.

Current consumption—26mA at 12V dc.

General comments

The only adverse mechanical comment concerns the tuning slug of the rf output coil. It was extremely loose on the model tested and wound itself down the former at a surprising rate of knots with light tapping of the box. Application of some locking compound is essential.

The purist may well frown at the measured noise factor, but this would almost certainly be improved by patient adjustment of line tapping positions. There were indications of some regeneration in the rf amplifier, but oscillation was easily avoided by adjustment of the rf trimmers.

Conclusions

In spite of the disappointing noise factor, the Garex 70cm converter is likely to give adequate performance as it stands for the man who has no wish to dredge around in the noise for exotic dx. It is almost certainly capable of marked improvement with some patient tweaking, but this might be at the expense of the good blocking performance.

We are advised by the manufacturer that a new model converter will be introduced in the near future—Editor.

Derby & D ARS Diamond Jubilee

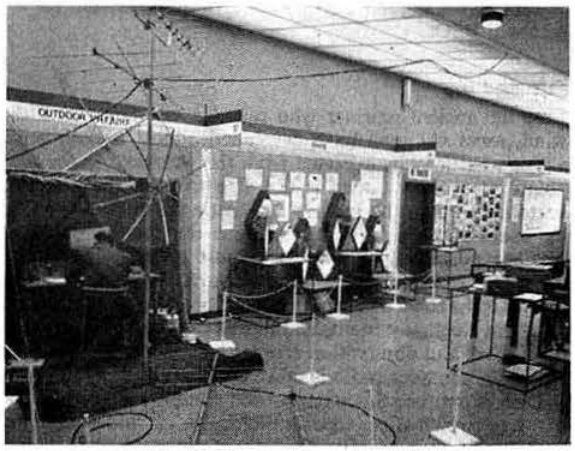
The Diamond Jubilee Exhibition of Derby and District Amateur Radio Society took place in early April at Derby Museum and Art Gallery. It was opened by the Mayor of Derby, Alderman Miss M. E. Grimwood-Taylor, daughter of one of the founder-members, Mr S. Grimwood-Taylor.

Three stations were in operation at the exhibition, two on the hf bands, and one on vhf, the latter taking the form of a mock-up of a typical field-day site. The stations used the special callsign GB3ERD (the society's callsigns are G3ERD, G2DJ and G8DBY).

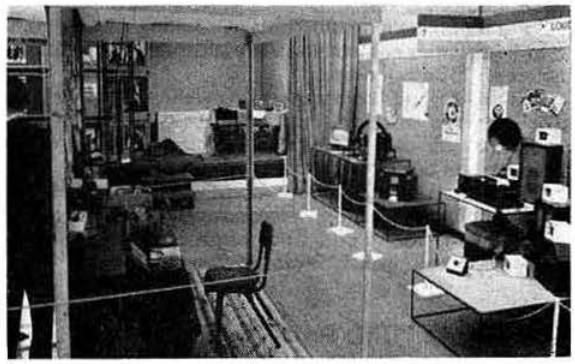
The aim of the exhibition was to illustrate the various activities of the society, but space was also devoted to items from the society's extensive collection of equipment from the early days of amateur radio. Mr F. C. Ward, secretary of the society and this year's President of RSGB, says that the society hopes to be able to establish a national amateur radio museum at Derby.

The exhibition was directed at the public rather than the radio amateur, and there were many electronic gadgets to add interest. There was also a life-sized reproduction of a typical amateur station of the period 1911-13. The exhibit was based on a 1913 photograph of the society's club room. For comparison, a mock-up of a garden shed shack was shown next to the old station.

Visitors to the exhibition came from all over the country. Mr Ward said that the society was very pleased with the response and they planned further events to commemorate the society's 60 years of amateur radio.



Mock-up of VHF NFD site, left; with RSGB stand, centre



The two hf stations can be seen in this view of the exhibition

SPECIAL EVENT STATION

Commemoration of Bristol Channel Tests, 1897

The Barry College of Further Education ARS will be commemorating the Marconi-Kemp radio experiments on Sunday 23 May. They will be operating on 160 to 10m, cw and ssb, and on 2m, a.m. Stations will be established on Flatholme Island (GB3FI), and at Lavernock Point Holiday Estate (GW3VKL/A). It is hoped that there will be special stations operated simultaneously by the Cornish ARC and the ARC of Bologna, Italy. A special QSL card will be issued to all contacts and SWLs submitting reports. (If a card is required directly, please enclose a stamp *but not an envelope.*

There will also be a social evening on Saturday 22 May at Lavernock Point Holiday Estate, to which members of local clubs are invited. A free buffet will be provided, and the estate directors have made available the social club and ballroom. XYL/YLs are included in the invitation. The station GW3VKL/A is to be located in a chalet on the estate. Visitors are requested to notify the society secretary, Mr Dan Adams, GW3VPB, of their intention to attend the function as soon as possible in advance, in order that adequate catering arrangements may be made.

FOUR METRES AND DOWN

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

New operating awards for microwave work

The collision of the VHF Convention with the copy date for the May *Radio Communication* means that the full story of the "Seventeenth Annual" must wait until June. What may be reported now, though, is the initiation of a new series of microwave operating awards which was announced by G3FZL in his opening address at the convention's lecture session and amplified by G3RPE during his microwave discourse that followed.

These awards, offered with the objective of stimulating activity on 13cm and down, may be applied for in exactly the same way as the existing Four Metres and Down Operating Awards are to be had. There are five of them, and they may be claimed for:

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

A member will be entitled to claim the award upon submitting a QSL for the first contact he makes in any of the above categories.

So in future, so far as the FMD Operating Awards go, it is to be counties and countries on 23cm and up, and kilometres on 13cm and down.

It is not beyond the bounds of possibility that two portable operators working from well-chosen sites and using equipments for each of the five bands, could clean up all the awards in one afternoon.

With these new competitive incentives before them, and the G3RPE penchant for "microwaves made easy" setting an example to all, it would not surprise us to see a claim emerge from the pipeline before very long.

Next month's "OXD Social"

There is an appropriate venue for the Midland VHF Assembly and Dinner (which in effect is a vhf convention in all but name): it is to be held at the home of one of the most famous collective callsigns there is, G3OXD, amasser of big scores in all RSGB metre-wave contests, and owned by the Albright and Wilson Recreation Club at Oldbury to the west of Birmingham. It will be possible for many of us to meet, probably for the first time, some of the operators who help make "OXD" in its various portable, fixed and alternative address ramifications so potent a contender in any contest.

The assembly opens at 2.30pm on Saturday 19 June. Then at 4pm RSGB VHF Manager Geoff Stone, G3FZL, will lecture on "VHF in the Seventies". At 5pm a 15min break for afternoon tea, then at 5.15pm a film show. Four "Queries Desks" will be in operation, manned by leading vhf men, during the free periods. Assembly for the dinner is at 7.15pm.

Admission is by ticket only: ticket application forms may be had from Graham Badger, G3OHC, 50 Essex Road, Four Oaks, Sutton Coldfield, Warwickshire. Remember to send him an sae. Ticket prices are: Full day, tea and dinner £2; Ladies, dinner only, £1.75; Day only including tea, 25p.

Location is within a quarter of a mile of Exit No. 2 on the M5 motorway and junction M5-with-A4123. A map will be provided with tickets.

Talk in stations will be G3OXD/A on 144·3MHz and G3TGL/A on 70·26MHz from 12 noon until 3pm.

Should be a good "do" with lots of opportunities for personal QSOs.

A proposal by the MPT to reduce the 70cm allocation to 432 to 440MHz was announced by Mr Stanesby at the VHF Convention.

DX and wx

Like the ancient mariner who raised a wet finger into the wind, most vhf men have developed almost a sixth sense about what may be expected from the weather. As the next "high" approaches, then is the time to pack the wife and harmonics off to the in-laws and settle down for a spell of dx operating. That good conditions are predictable from weather portents is known to almost everyone whose dx ambitions extend beyond his backyard. What is less well known is the effect of variations in the broad and immediately apparent weather pattern, and in this context a good deal of quiet work and observation is going on all the time in places where vhf amateur radio is taken seriously.

Last November this page carried some comments on the one-way stretch effect reported by GI8AYZ and commonly experienced by most of us who use the metre-waves: a station is persistently called for hours without success, and when eventually raised blithely says: "I've been persistently calling you for hours without success."

How is he missed? There are several factors in the equation, of which beam heading at each end is one, local interference on the channel another and rate of tuning probably a third; all this in respect of the shorter-haul contacts. But when considering longer haul contacts is weather a fourth term in the equation? At GI8AYZ, to whom all QSOs across the water are dx, plotting the 2m gotaways on a 1:100,000 map shows co-relation with weather. Blank periods of calls-with-no-comebacks frequently occurred when a "high" was developing or approaching from Iceland. GI8AYZ says:

"All blanks were terminated by a short duct-like opening to the Birmingham-Nottingham axis, with Notts being the

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

favourite and the first to appear. These openings were of very restricted radius, sometimes as little as a 10km separation at the distant end producing no contact, even 'piggy-back.'

"After about 30min to the Midlands the path to Lancs-Cheshire became normal, the Midlands dropped out, and then more remote stations in the Oxfordshire-Bucks area were heard.

"The reverse situation held good on the occasions when the band seemed active, but no contacts resulted. First contacts were invariably in the Stoke region, moving north as conditions changed. On all these occasions, either 'no-go' or 'no-return' circuits, the most northerly stations were the last to be heard, or the first to go out."

Believing that the one-way stretch phenomenon could do with further investigation, GI8AYZ/P will carry out a fairly consistent programme this year, probably every Monday night from May to September with the 2m and 70cm contests as an added extra. He would appreciate anyone sending him reports if they hear him calling, apparently without reply. Frequency will be 145·89 for /P, and the site usually XO11A in Co Antrim.

* * *

Readers of this column and of Ron Ham's writings elsewhere will know that a lot of devoted work has been going on for some years at the Sussex retreat of BRS15744 in studying solar activity on 136MHz with a home-built radio telescope, and relating over a long term the effect of weather conditions on metre-wave characteristics. In the course of working up a major *opus* on his findings, Ron Ham prepared a brief summary for *FMD* which, even though we have had to abbreviate it still further, will be of great interest to all who delve into the endlessly fascinating subject of "wx" and "dx".

As the daily chartings at Storrington of solar atmospheric and weather events were accumulated it became apparent that a new factor was emerging from the systematic records. It was seen that a relationship existed between certain types of solar activity and severe weather conditions. Ron Ham decided to classify the daily solar and weather observations into two states, *Active* or *Inactive*, and make a comparative table for the daily results.

During the two-hour period of solar observation made daily at Storrington on 136MHz, 5ft of recording chart are used on which it is possible to differentiate between isolated solar bursts and continuous noise storms. No increase above the receiver noise level would classify the solar observation as *Inactive*, but some form of solar activity on the recording chart would classify the sun as *Active*.

Similarly, analysis of the weather log classified the daily reports into *Inactive* (cloud, overcast, fog, frost, mist) and *Active* (wind, rain, gale, showers, snow, blizzard, thunder).

The sun/weather log now classified as *Active* or *Inactive*, kept from 1 June 1968 to 28 February 1971, produced the following set of figures:

Observation period: 1,003 days.
Sun *Active*: 574 days.
Weather *Active*: 374 days.
Both sun and weather *Active* coincidentally: 238 days.

Says BRS15744: "Taking a general view of this 1,003-day period, one can see that the coincidence of the sun and weather being *Active* on the same day is 238 out of 374, which is 63·5 per cent. This, in a limited area, is enough evidence to say that there is a general connection between the *Active* sun and the earth's *Active* weather."

Examining the records more closely, Ron Ham studied the solar condition which coincided with major weather upheavals and observed that solar noise storms lasting several days coincided very frequently with rough weather, *eg*;

February 1970: Following an *Inactive* weather period a mixture of rain, wind and gale prevailed from the 17th to the 22nd. This changed to *Active* weather coinciding with a solar noise storm which started on the 16th and ended on the 21st.

March 1970: Quiet weather and high pressure of late February changed on 1 March to wind, snow flurries on the 2nd and 3rd, a blizzard on the 4th and back to snow flurries on the 6th. An intense period of solar activity started on 1 March with many large isolated bursts and a slight noise storm which developed into a full-scale noise storm on the 4th, coincident with the blizzard, finishing on the 5th.

August 1970: The first 15 days of the month were hot and fine with little solar or weather activity. However, on the 16th an overnight gale heralded a period of heavy and showery rain and thunder lasting until the 23rd. After this the weather for the rest of the month was fine. Once again the *Active* weather coincided with a solar noise storm from the 16th to the 23rd.

September 1970: Gale, wind and rain on the 8th, 9th and 10th was *Active* weather that coincided with a solar noise storm recorded on the 5th, 6th and 7th.

November 1970: The radio telescope during the first five days recorded many small bursts and a few large ones lasting several minutes, while the weather on the 2nd, 3rd and 4th gave wind and rain. For the next six days both the sun and the weather were intermittently *Active* until the 12th, when a severe solar noise storm started and carried on until the 21st. The local weather from the 12th to the 19th was heavy rain and wind. NB—This solar storm period coincided with the severe flooding in East Pakistan.

December 1970: On the 17th a solar noise storm developed and lasted until the 23rd, and on the 17th the weather went *Active*. Wind and rain developed into the famous white Christmas with its snow, blizzards and extreme cold.

January 1971: The cold weather from December was carried into the New Year. The end of the cold weather came on 6–7th and a few days of wind and rain prevailed. The thaw coincided with the start of a solar noise storm which lasted until the 13th. Around the peak of this solar storm news services reported freak mild weather on the 10th throughout the UK, with record January temperatures. The sun and the weather were unsettled for the five days which followed the solar storm, and on the 19th another solar noise storm started and continued until the 25th. During this solar storm the weather provided heavy rain and wind, severe gales, a whirlwind in south-east England, and on the 21st the atmospheric pressure recorded at BRS15744 was down to 973mb. A further solar noise storm broke on the 28th and ended on the 31st. With it came very *Active* weather. A windy day on the 28th preceded a calm 29th; but on the 30th, wind, rain and snow prevailed throughout England and Wales. The news services reported floods in Poland; severe floods in Mozambique; Australia had 9in of rain in one day, and the River Thames was in risk of flooding from severe gales in the North Sea.

* * *

From this carefully documented mass of data a definite relationship between radio outpourings from the sun and wild weather on the earth seems to emerge. What of the

effect on long-haul propagation on the metre wavelengths? From the type of weather outlined above, conditions would be deduced to be "rock bottom". But were they? Operators who have maintained records of anomalous propagation over the above twelve-month stretch will be curious to compare them with the actual dates of the phenomena quoted from the Ron Ham records.

A taste of T-E

Historically, the first intimations of transequatorial propagation began to glimmer in the quite early days of hf bands dx. The path between the UK and South Africa became noted as long as four decades ago for the ease with which 10m contacts could be sustained when to all intents and purposes the band was dead to the rest of the world.

Rather later came what were then sensational reports of the reception of the Alexandra Palace television station (17kW on 7m) in ZS-land. Some of the more recent history in the breaking down of the TE path was charted by G3TWG in his masterly article here a couple of months back.

Now comes news that 9H1BL in Malta locked a picture from the 50MHz television transmitter at Salisbury, Rhodesia, at such a level that a women's fashion show and advertisements with box numbers could be easily followed. This was at 1700gmt on 17 March. Next day the picture was locked again, although the sound was missing. The station was identified over several subsequent days, with the peculiarity that if the picture was there the sound was not, and vice-versa.

All reception was on a normal domestic television set fed initially with a "ZL-Special" aerial cut for Channel 2, and later a two-element beam, both above the roof of the 9H1BL flat at 70ft.

Transequatorial reception thus early in the year augurs well for a good dx season on the middle VHFS and means that there is a distant chance that 70MHz signals from the UK might well be heard in Malta. But this may be a last opportunity for a while: 9H1BL leaves the island in July.

Now on his way to Malta for a two weeks' stay is G3VPS from Sussex. He will visit 9H1BL to monitor 4m in his company, and especially asks UK operators to turn beams south-east with plenty of cw. No QSOs will be possible: there is no 4m licence in Malta. Adds G3VPS: "I shall be taking along a 2m converter just to keep an eye on that band. You never know."

VK Oscar is tested

Towards the end of March the prototype of the next Australian Oscar took its first ride in inner space. Flown in a balloon at 100,000ft with an up frequency in the 2m band and a down frequency on 70cm, it produced a contact between VK3 and VK7, which is something like a 500-mile path. Eventually this sixth Oscar (Orbital Satellite Carrying Amateur Radio), which is the Australians' second, and is presently known as Australis Oscar B, will become AMSAT Oscar 6 upon launch.

AMSAT is the Radio Amateur Satellite Corporation, a non-profit-making society based in Washington, DC, which co-ordinates amateur satellite activities on an international basis, and through liaison with NASA helps get the devices into orbit. In February NASA formally acknowledged the AMSAT request to put the next Australis Oscar into orbit, subject to the usual reliability and non-interference requirements—absolutely vital when a complicated package like an Oscar designed to receive on "Two" and re-radiate on 70cm is cheek by jowl with a mass of professional equipment in the confined capacity of a space shot.

For the Australis repeater, four fm paired channels on "Two" and four down links on "Seventy" have been suggested by AMSAT. In addition, a German repeater which is on the stocks will have one uplink on 432·15 and a downlink into the 2m band at 145·95MHz. Yet a third device on which work is being done is the "Two-Ten Repeater", which has a 145·95MHz uplink with re-radiation on 29·5MHz.

Space-coms document

Regularly into the Department of Education and Science flow reports from the UK Scientific Mission in North America on a huge variety of technological subjects. When it comes to electronics the name at the head of the reports more likely than not will read "H. K. Bourne", widely known and respected by the older generation of UK radio amateurs, for it conceals the identity of G2AH, in his time a leading dx man and superb radio telegraphist.

Last November HKB wrote a report called "Radio Amateurs and Space Communication", summing up in lucid language the state of the art as it stood at that date, as the following opening paragraphs will show:

"The first Amateur Radio Space Communications Conference was held at Boston, Mass, on 25 to 27 September 1970, during the American Radio Relay League Annual Convention.

"There are now some 280,000 radio amateurs in the USA, and about 500,000 in the world as a whole. Their important contribution to hf and vhf communication in the past is well-known, amateurs being the first to demonstrate the feasibility of world-wide communication on these frequencies. The role of radio amateurs in emergency communications and for providing a skilled pool of technical people in national emergencies is recognized by all governments. In spite of the sophistication of space communications, and the high cost, radio amateurs can play a useful part in this field, and it is only natural that they should expect to participate usefully in this new era in the future."

Many readers of *FMD* who have technical libraries at their places of work may have seen the Bourne Report already. Others who would like a copy (free) should write to the Department of Education and Science, quoting UKSM (North America) Report No 70/58. The address is Curzon St, London W1Y 8AA.

Thank you, Martin Evans, GW3UCJ, for this information.

"Four" and "Two" from Dublin Bay

Writing from Dun Laoghaire, Albert Latham, EI6AS, enlarges on his observations of the auroral openings earlier this year. On 28 January between 1825 and 1930gmt he worked GM3UAG, GM2DRD and GM3EOJ; on 26 February GM3ZBE, G3JYP and GI5AJ were worked between 1821–1836gmt; on 12 March at 1744gmt once again GM3EOJ; and on 4 April at 1720 yet again GM3EOJ, all very Tone A and at S7 at best. No second auroral phase was detected on any of the above occasions. The best opening was that of 26 February when three SM, one PA and one DL were heard all via the auroral curtain. On Good Friday another Ar yielded contacts with G3COJ and G3UDA, with SM7AKE heard.

All this on "Two". But "Four" is not being neglected in view of its propensity to throw up auroral-assisted anomalous propagation. To this end EI6AS and G3XMG have added Wednesday Activity Night to their sked-list. Listen for them on 70·208MHz from 1915gmt onwards. Their other sked-times are Sundays 2230gmt on "Four" and 1930gmt on 145·41MHz.

Albert Latham offers the further additional information that the Dublin VHF Group has been given permission to use a 560ft site on Howth Head to the north of Dublin Bay. From here 4m will be activated on Wednesday Activity Nights.

From one waterfront to another, still in a 4m context, over now to . . .

"Four" in the far south

Malcolm Roper of Cowes in the Isle of Wight is BRS32036. He listens solely on 70MHz and, as might be expected, has come to one or two conclusions about the band. Although he is, as he says, ". . . a newcomer to the band" his observations are well worth heeding.

All of us have heard operators who CQ on and on and on until the waiting listener's patience is exhausted. On "Four", though, the CQs just are not long enough, in the experience of '32036, and many a weak and fading signal has escaped identification through the sheer brevity of its appearance. And as for the calling frequency of 70·26MHz, a bit more calling would be no bad thing, he thinks.

"Only the other night," he says, "I spent a happy hour listening to one station listening to another station listening, if you see what I mean! They both announced that they were 'Listening point two six' within five minutes of one another. Then utter silence for the rest of the evening."

Under most conditions BRS32036 can haul in stations up to the 200-mile mark such as G3RLE and G3OHH with his 4-element beam and a G3HBW converter with a GMO290 pre-amp ahead of it. He will willingly keep a listening watch for any 4m operators who are interested to have reports over an extended period of time. Write to him at 11 Wroxall Close, Northwood, Cowes, IOW.

Expeditionaries

Another foray to EI-land is planned by Bob Cliffe, G8BRT, whose last-year licence EI2VBD has been reallocated to him for his visit to Co Wicklow over the two weeks starting 26 June. He will be beaming east nightly from 8pm to 10.30pm. Last year on "Two" he logged 80 contacts from EI in 19 counties and three countries. Every QSO was QSLd, many of them direct on request—*yet the return was a total of 18 cards*. Looks as if Bob will be minded in future to QSL only after the receipt of the other's card and via the QSL Bureau.

* * *

Look out for GM8AGU/P and GM3JFG/P who are doing a joint expedition over 17 Scottish counties, leaving Argyll on 18 May and ending in Banffshire on 4 June. They will use plenty of power on 145·4 ssb and 145·5 for A3 and A1 between 8pm and midnight, and 7.30 to 8.30am Monday to Friday mornings. Modes: ssb first quarter of each hour 145·4 transceive; telegraphy 145·5 second quarter of each hour, split frequency, listening in the cw end of the band; A3 second half of each hour split frequency, tuning entire band; 2245–2300gmt *only*, looking for co-channel vfo contacts: stations should call within 20kHz of 145·5. For schedules write with sae to Paul Widger, GM8AGU, 87 Findhorn Bay Caravan Site, Forres, Morayshire.

* * *

As 'AGU/JFG move north out of Argyll, GM5UM/P will be moving in, operating 8pm onwards nightly 21–26 May, 145·8MHz phone and cw.

* * *

During the TT Motor Cycle Race Week on the Isle of Man, GD8BZY/P will operate from that popular Snaefell site, with beam eastwards. Look for him 10.30am to 5.30pm on 7, 9, 11, 13 and 14 June. Denis Mott adds that a special QSL will be available.

South-westabout

"Yes, do please turn beams south-westerly more often" says G4CG of North Devon upon reading the request printed here from G3PBV of South Devon that people should do precisely this. He adds: "I think a lot of operators would be surprised that they were being heard at fair distances. I hear a lot of S1 signals coming from the east."

Along with G4CG (who, we seem to recall, has almost a quarter of a century's vhf experience behind him) in and around Barnstaple are G3BO, G2CVY and G8AVP, all in-zone towards the low end of "Two". Their locals are the South Wales stations 30 miles away across the Bristol Channel. Schedules will be welcomed by all the Devonians.

On both "Two" and "Four" G4CG has 50W and well-sited gainy aerials. But attempts to raise any of the contestants in April's 70MHz Open proved to be abortive: not enough of them beamed south-west.

Further to the April contest . . .

April "Open"

It was not only beams that needed precise adjustment during the 70MHz Open to winkle out the weak ones: it was BFOS as well. What was very evident during this event was the number of gotaways that occurred simply because telephony operators failed to identify telegraphy calls addressed to them on a band where A1 and A3 are on equal footings. The same may be said of sideband. Sheffield's G3RKL using ssb during the contest called a dozen or more A3 stations: only four latched on to him.

The remedy is so obvious that we hesitate to state it: it is simply that if when tuning with bfo off a seemingly unintelligible carrier is heard pulsing on and off, switch bfo in. Someone may be calling on telegraphy or ssb.

Although conditions petered down to normal during the Sunday morning session of this all-night contest, some of the portables were returning serial numbers in the seventies by breakfast time. And that represents quite a lot of occupancy on "Four". A stir was caused by the appearance of The Voice of Cleckheaton (our description, not his!) as GM3RLE/P way up on the Scottish moors in Lanarkshire. Six of his contacts were well beyond the 500km mark. Not quite so rare—he is a regular "Four Meteorite"—was GD2HDZ, much in demand, being dx to most, and a nice 14-pointer (or more). Farther south, G3RDQ in Bucks did well with a 2W transmitter—much of the time on the key.

In spite of what we say above about passing over telegraphy signals, many operators did not hesitate to use the key to raise the long haulers; which brings us to. . . .

Where to key

Noises rich and strange emerging from some of the rigs to be heard in operation during the 70MHz Open suggested that users were keying them in the modulator-on condition. As keys were depressed, A3 sounds were superimposed on what were intended to be A1 emissions.

This cannot have done modulator output stages much good, as their pa loads were slapped on and off by the keying. It all rather suggested that although operators are becoming increasingly aware of the importance of having A1 facilities incorporated in transmitters if real dx is to be worked, they are in various minds as to how the job should be done.

Methods adopted include switching off the modulator heaters in the case of valve devices or the 12V dc line in transistor audio systems, or simply lifting the screen supply to push-pull audio outputs (this does not always remove audio from an A1 signal). Keying methods range from crudely breaking the cathode of the pa (and a lot of milliamps) to the more refined technique of breaking the screen of the pa and far fewer milliamps. In the latter condition the key will carry pa ht volts; a keying relay in the screen supply removes the lethal potentiality.

Keying of earlier stages necessitates providing protective bias for the pa valve against removal of drive. And in any rig using a power supply common to all stages, as in portable transmitters, the ht line value will tend to rise under key-up conditions, the crystal oscillator stage will win a dozen or two extra volts, and a chirp will result. A simple remedy here is to connect a small stabilizer between CO screen and earth, adjusting the value of the screen feed resistor so that the stabilizer continues to glow under key-up conditions.

All this is simple stuff. More elaborate keying systems involving valve and even ic keyers are in use, some of them compact enough to take out on portable expeditions. Whatever method is adopted the objective should be a T9 note that will remain steady within the crystal filter of a distant receiver. The extension of metre-wave range thus made possible will surprise operators who have not yet taken A1 seriously.

On "Six" from Shetland

Formal application has been made to the licensing authority for permission to establish a 50MHz beacon at the Lerwick Observatory in Shetland to be used to complement the beacon near Montreal for investigation into extra-long-range vhf propagation phenomena.

Obviously, operation would need to be outside UK television hours; the frequency is in the middle of our television Band 1. In spite of this handicap it is anticipated that GB3LER, which is probably what the new beacon will be called, will produce a great deal of useful information for scientific study. The old beacon in Shetland, GB3LER on "Two", proved that the band was open for long haul dx working more often than many people imagined.

More about this project later on when it gets off the ground.

The video picture

Wearing his other hat labelled G6RZD/T, Ern Hoare of Southwick in Sussex, better known perhaps as G8BDJ, is now regularly transmitting television on 436·05MHz with 15W of peak white 405 lines positive modulation. Excellent pictures have been resolved by G8DHE in West Worthing eight miles away and by a number of video BRS viewers nearer in.

As there are other "Stroke T" licensees in the area, 'RZD/BDJ wonders if they would be interested to form a video net similar to those which have been set up so successfully in other parts of the country, eg The Fenland Net and that of the Dunstable Downs Radio Club.

Here and there

"Have only been on 2m since September 1970, so quite a new boy! I am cw only . . . always down at the cw end of the band. I get pretty lonely down there. Where do all the cw boys go when there isn't an opening or a contest?"—G3DAO on Selsey Bill, Sussex.

* * *

"Re G3GVL's comments about telegraphy on 2m, cw is *not* better without a bfo. G8BQX is quite right: cw *can* be read at greater distances only because of 'go' 'no go' encoding coupled with a memory bank. Amplitude modulated phone is *heard* just as far: it just can't be decoded, that's all"—G8CBZ, Brixham.

* * *

"Hope to be active during the May contest from Co Tyrone WO24C for a short period . . . I guess a night out with radio equipment would be risking either IRA or Army intervention. Isn't amateur radio fun and modern now we even have to decide Stroke P sites on political grounds."—G8CEA (temporarily GI8CEA/P).

* * *

"Would like to see the full rules for the FMD Operating Awards published in *Radio Communication*"—G3WHK, Morden, Surrey. **Note.**—They would take up rather a chunk of precious space. Copy may be had from G5UM if sae is sent.

* * *

hate news. Alan Papworth, G3WUW, of Cambridge, reports Learing several Continental stations via ARTOB (Amateur Radio Translator on Balloon) at 1825gmt on 10 April, all on or near the ssb channel, 145·41MHz. They were not speaking English and evidently did not expect to be heard in the UK—though there was a high pressure "lift" on at the time. Among the stronger stations identified at G3WUW were DC6TV, DJ7HY and OE2OML.

25 YEARS BACK

". . . the intense ionization produced may be sufficient to refract waves down to about 5m which normally are not returned earthwards. The prospects of dx on 5m are therefore good, particularly during the period 1947-1949. It must be remembered that prior to 1939 many good signals were reported over long distances on 56Mc/s. With improved apparatus at the transmitting and receiving ends, and a greater number of stations in operation, and higher power in use, we can regard the prospects with optimism."—Dr E. H. P. Young: "DX and the present sunspot cycle", *RSGB Bulletin*, May 1946.

MICROWAVES–1,000MHz and up

by Dr D. S. EVANS, G3RPE*

A diode mixer for 3cm

Two of the functions of diodes on the microwave bands are as rf detectors and as mixers. They differ electrically in that, while in the case of detectors only a dc output proportional to rf input is required, with mixers signals at an intermediate frequency also have to be extracted. Thus while a mixer may be used as a detector, the reverse does not apply. A case may therefore be made for making all diode mounts as mixers, accepting the slight complication involved as the price to be paid for increased flexibility in future application.

G3HWR has given details of the mixers used at G5FK. In general form it is similar to the Gunn diode oscillator described last month, an important difference being the mounting of the diode. To better match the relatively high impedance of the mixer diode (of the order 100Ω) to the waveguide, the diode simply is offset: in the case of the Gunn diode, which has an impedance of a few ohms, a matching wedge was used.

The construction procedure recommended by G3HWR is as follows:

(*a*) Drill a 7/64in hole through the ¾ by ¾ by 1¼in choke block, and one through the top face only of the No 16 waveguide at the appropriate positions. Drill and tap 6BA holes for the matching screws.

(*b*) Jig the choke block during soldering by inserting the 7/64in drill through it and the hole in the waveguide, and locate the 6BA bearing nuts with chrome-plated screws. The end plate may be held in position manually during soldering if not previously brazed.

(*c*) Using the hole in the choke as a guide, drill a 7/64in hole through the lower face of the waveguide.

(*d*) Using the existing hole as a pilot hole, open out the hole in the choke block to 3/8in.

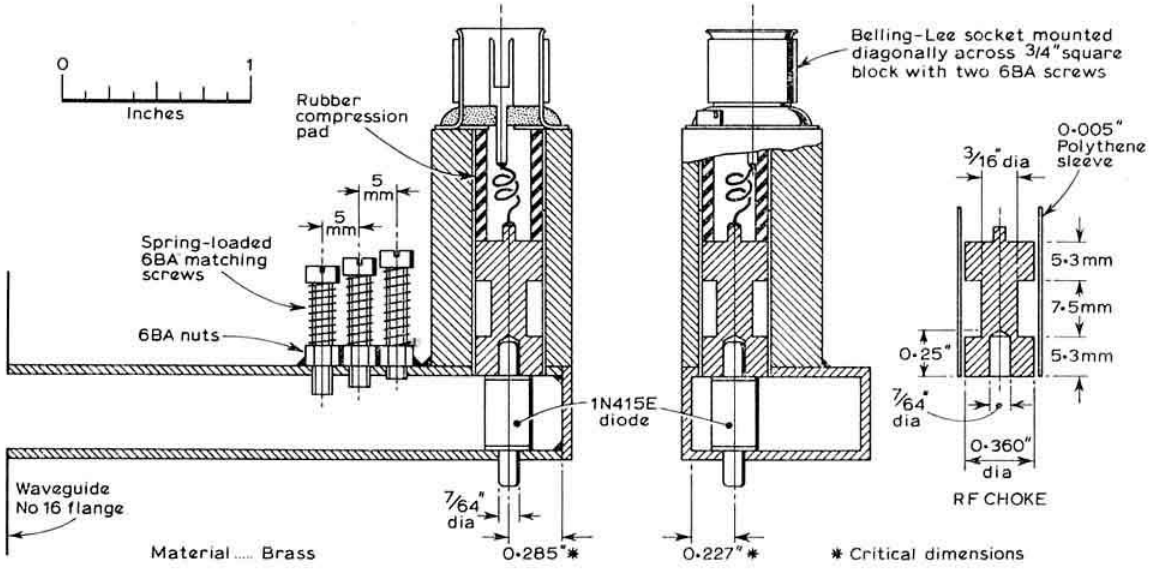
By using such techniques, surprisingly high accuracies can be achieved with the simplest of tools.

The rf choke is obviously best turned on a lathe, but could also be fabricated in a single piece using hand tools, since the dimensions are not critical to within 10 per cent. Alternatively it could be fabricated from three separate pieces which are subsequently soldered together.

The IN415E diode has pins at both ends which simplifies construction. If a diode of the IN21 type is used, the choke assembly remains the same but the hole in the lower face of the waveguide must be enlarged up to ¼in to make the diode a push fit. A spacing plate must also be fitted to ensure the correct position of the diode, as well as a pressure arm to hold the diode in place.

In setting up the device, the one or two "active" matching screws are adjusted, using minimum penetration, for either the best signal/noise ratio when the device is used as a mixer, or for maximum current if used as a detector: these adjustments do not necessarily coincide.

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



THE MONTH ON THE AIR

A monthly feature by John Allaway, G3FKM*

IT seems to be a common occurrence these days for rumours of pending disastrous cuts to our frequency allocation to arise on the bands. The true purpose of these is difficult to see, but they may possibly originate with those who wish to cause embarrassment to the Society by accusing it of doing nothing. The latest rumour concerns the alleged demise of all or parts of the 1·8 and 3·5MHz bands. The writer is in the happy position of being able to say that the Society, which maintains close and cordial contact with the MPT at all times, has no knowledge of any such propositions.

Attacks on the Society (particularly by non-members who do nothing to help but "free-load" the benefits won for them by much hard work through the years) would be more welcome if the persons concerned accompanied their ideas with useful suggestions and details of how the complainant is willing *to give his own time and effort* to righting affairs.

Will anyone who knows where Peter Hobbs (ex-VP8GQ/G3LET) may be contacted please inform G3FKM?

Euradio

Stephen Cole, A6148, has asked for publicity to be given to the fact that correspondence directed to this organization's HQ and to the treasurer has remained unanswered since December last, and that he has been unable to contact the people concerned, one of whom is rumoured to be about to emigrate. Stephen has withdrawn all contact with Euradio and asks for members not to send enquiries to him as he can no longer help.

Top Band news

FCC has moved the frequencies on 160m available to West Coast amateurs to the lower half of the band in order to accommodate Loran changes.

The *29 DX Club Newsletter* No 6, kindly supplied by VK6PG, says that no more European stations have been heard on the band. DFJ, who is usually considered to be an indication of openings in that direction, has been heard on two occasions but was not accompanied by any amateur signals.

Transequatorial tests will be held daily during June from 0000 to 0030. European stations should transmit between 1,825 and 1,835kHz and stations in the southern hemisphere between 1,800 and 1,810kHz, keeping near to the low end whenever possible. Europeans transmit during the first and then alternate five-minute periods, the southern stations using the second and alternate five-minute periods. Activity on this basis may extend into July. Tests carried out last year resulted in contacts between PY and ZP and the UK, DL, EI, OK and ZD9. This information has been received from Rolf Rasp (PO Box 51-ZC-00, Rio de Janeiro, Brazil) who asks everyone who takes part (including listeners) to kindly let him have all available information before 31 August. QSLs for Aldo, PY1MGF, should be sent via Rolf. PY1MGF and PY2BJH are now running 1kW input as compared with last year when they used 400 and 200W respectively.

Ray Spreadbury, G3XLG, reports that his call is being pirated on 160m, mainly on cw. The pirate gives an assortment of names including Bill, Alan, Fred and Bob. G3XLG is at present only on the hf bands on ssb.

PA0PN has worked W9UCW/HK0 (at 0700) and also had the first European QSO with PJ2VD (who is ex-PA0VDV).

Coastal radio services on Top Band

Readers' attention is drawn to the fact that amateur radio is only permitted on 160m on condition that no interference is caused to other services. It should be noted that the following frequencies should be avoided at all times: 1,827, 1,834, 1,841, 1,848, 1,855, 1,856, 1,869 and 1,883kHz. These are frequencies used by British coastal radio stations, and it is always wise to listen on any other frequency before using it—remember "fish phone" has priority.

News from overseas

From BRS17567 comes a request from Willy Wilson, CP6FG (ex-G3NUF), for UK amateurs to look out for his signals at the following times and frequencies: 1100–1200 on 21,310/21,350kHz (LP), 1730–1830 (same QRGs SP) and 2100–2300 on 14,170/14,190kHz. Willy deplores the scarcity of UK stations on the 14 and 21MHz bands compared with other Europeans, especially DLs.

"Greg" Gregory, G3XHE/MP4BGX etc, writes from Luanda, Angola, where he is unfortunately not likely to be able to obtain a CR6 licence. These are apparently only issued to Portugese subjects, and even they have to be fortunate to obtain one. Greg wishes to send his sincere regards to all those he now misses talking to on the hf bands—he hopes to be in a country where he can get a licence in two or three years' time, but there may be some G3XHE activity during leave in the UK which will take place every six months. He may be reached at the address in *QTH Corner*.

G3XUE is now in Botswana, and has the callsign A2CAX. He is currently working in the bush and has no permanent equipment, but he has been on ssb from Gaborone and Lobatse. The only portable equipment he has is an old a.m. transmitter which covers 40 and 80m, but he hopes to be on 40 and 20m ssb soon. Aid in acquiring some miniature quartz crystals (0·5cm pin spacing) in the frequency ranges 17 050–17,090 and 24,800–25,000kHz would be greatly appreciated; so would anyone who can help please write to Kim at the address in *QTH Corner*?

*10 Knightlow Road, Birmingham B17 8QB

Les, VR2FT, will be leaving Fiji in June and returning to his home in Redditch. He offers to arrange skeds with VR5DK (WA6FSC) up to the end of May for those who would like a contact with Tonga. Please write to Les Hickingbotham, PO Box 3722, Samabula, Fiji. VR5DK will then be leaving for the USA, visiting 5W1 en route.

Dick, G3RWL, who was on the air from Antigua as VP2AGA during January, has now moved to Barbados and is active on all bands on cw using his 8P6DR call. He had some 500 QSOs from Antigua. QSLs for either call should be sent via G3JUL (see *QTH Corner*).

In a letter to G2MI, G4KG gave news of special activity on St Lucia by VP2LDD on 1 and 2 May. This station may be QSLd via Box 322, St Lucia, BWI. VP2LY, formerly G3AAU, has started a radio club on the island (VP2LRC) and at the technical college (VP2LTC). He requests the help of any readers who have old copies of *Radio Communication* or *Short Wave Magazine* and would like them sent to him to help stimulate interest at the college and club.

G3PDM/W1, Peter Martin, says that he is active on 20m cw in the vicinity of 14,020kHz several evenings a week between 0000 and 0200, and around 14,340kHz from 2000 to 2200 on ssb at weekends. No 160m activity is anticipated because of shortage of room for a suitable aerial.

Iain Morris, ZC4IM, says that the news on the licensing front in Cyprus is distinctly more hopeful. Friendly meetings with the Ministries of Telecommunications and Interior and Police have been held and it seems likely that 5B4s may be back on the air soon. The ZC4s are licensed by the Sovereign Base Area administration which is not the Republic of Cyprus (?—basis for separate country status similar to KG4).

Lou Wilson, G5ANX, returned to the USA on 2 April and will soon be at Tinker AFB, Oklahoma. QSLs for all his British activities may be obtained from his home address (WA2MEQ—see *QTH Corner*). Your scribe would like to extend thanks to Lou for all the help he provided during the postal strike and for his work with CHC.

DX news

The call ZM7AG has been issued to James Sheedy, who is a schoolteacher on the island of Atafu in the Tokelau group. His equipment has been supplied by INDXA and should have arrived by now. It consists of a Heath HW-101 transceiver with dc and ac power packs, prepared aerials and various other essential items. *Long Skip* (the news sheet of the Canadian DX Association) says that CDXA has come to an arrangement with INDXA to supply aerials and rotators to dx stations as chosen by the latter organization. Beams have already been sent to ZK1CD and 5VZWT. Both INDXA and CDXA are to be congratulated on their generosity.

HW6KAW was the call used by the Radio Club d'Ivry, 9 rue St Just, Tour F, 94 Ivry sur Seine, France. The operator was F6KAW. PP, PV, PW and PX prefixes were used by Brazilian stations during the CQ WPX contest and another special prefix was used by YS2CEN as HU0A during the same event.

The recent activity from Heard Is by F2JD, using the VK0HM call, ended on 8 March. There still seems to be some doubt about the legality of the use of the VK0HM callsign. VK0TM is now on the air from Macquarie Is and is to be heard on 14MHz ssb around 0700. ZK1BM often joins the Pacific DX Net on 14,265kHz on Tuesdays and Fridays around 0630. QSLs go via W7PHO, as do those for ZK1CE for contacts after 23/2/1971. ZK2AG was due to leave Niue on 10 May and will become ZL3TV. C21GB will close down on 4 May and is coming back to Britain, he will not be calling in Fiji on his way home. Another Niue station is C21DC, who has been worked on 14MHz ssb.

Lindsay Barker, ZL4OL/A, of Campbell Is

CR8AI, Torres, returned to Portugal last September and has a Trio receiver and Eico 723 transmitter. He is expected to move to Sao Tome (CR5) in April.

Those hearing KC0KC on the air between 1 and 5 July will be mistaken if they think this station is in the Pacific. The call has been issued to the Independent County Hunter's Convention being held in Kansas City, Mo. They will use 14,336kHz as well as other frequencies.

Gus Browning, W4BPD, collects dx information on Thursdays and Fridays at 0030 in the 14,230/14,250kHz area.

OH0MA (formerly OJ0MA) who is resident on Market Reef has been told that the OJ0 prefix has been discontinued. He is crystal controlled on 80, 40 and 15m. Rumours concerning the pending deletion of this country from the countries list have been discredited by Bob White. OG2A was a special call used during the CQ WPX contest as part of the celebrations connected with SRAL's 50th anniversary. QSLs go via OH2BAD. OI1VR was used by OH1VR.

A new station is active from Portuguese Guinea; this is Alberto, CR3VV, who has been heard on 21MHz. QSL via airmail to Box 306, Bissau.

JY9AA and JY9AB were Mary, WA3HUP, and her husband Charlie respectively, operating from Jordan. It seems a great pity that there are not more enlightened people in important places who, like HM King Hussein, do so much to help the amateur radio cause.

According to the *West Coast DX Bulletin*, the situation concerning QSLs from DJ3QT/CT3, TY0ABC, TY0ABD, XT2AB, XT2AC, ZD3N and ZD3P, is as follows: QSLs sent with two IRCs will be answered via the bureaux, those with one irc "will be put aside for late handling—this may be a considerable time". If more than one card is sent per envelope they will be answered at a rate of two IRCs per card (via the bureaux) any left over will be set aside "for future contemplation". Cards submitted with no IRCs will be put aside for "future, future, contemplation". Cards accompanied

by $1 or more are expedited but only sent by air-mail if two IRCs are sent as well! Your scribe feels that this savours of extortion. It is quite fair to offer contributors a rapid reply, but to threaten non-contributors with *deliberately* delayed cards and to demand $1 plus postage for an airmail reply is not a very pleasant practice.

Those who heard KD2UMP on 1 April were not hearing one of the usual "funnies" on the air for that particular day. This was a properly licensed station operated by the Buffalo AR Repeater Association from Squaw Is located in the Niagara river. QSL via W2RSJ.

The Khymer Republic is the new name which has been given to the old state of Cambodia.

VP8LK moved from Stonington Is to Adelaide Is in March. He is very busy and although he has power continuously available he is mostly confined to the 2100 period every evening for amateur radio. His equipment consists of a KW2000B and the base's cage aerial. QSL via VP8LE, who is also active from Adelaide Is.

Awards

The ZLA Award

Awards Manager, NZART, ZL2GX, 152 Lytton Rd, Gisborne, New Zealand.

Requires confirmed contacts with Auckland City (ZL1), Wellington City (ZL2), Christchurch City (ZL3), Dunedin City (ZL4), Antarctica (ZL5), Campbell Island, Chatham Is and Kermadec Is (a total of eight). Send a certified list that cards have been sighted plus three IRCs.

The Gisborne Award

Requires certified details of contacts with two stations in Gisborne since 1 January 1969. Apply to ZL2GX (as above) with three IRCs.

Worked Argentina Award

Class 1 = 200 QSLs (from different LU stations including 26 counties and two Antarctic bases). Class 2 = 100 QSLs (including 17 countries and one base).

Argentine CW Award

For cw contacts with 100 LU stations (1st Class). Class 2 = 50, and Class 3 = 25 QSLs.

Argentina 579 CW Award

For contacts with RST579 (or better) reports. 1st Class = 30 QSLs, 2nd Class = 20 QSLs, 3rd Class = 10 QSLs.

Buenos Aires City Award

For 200 QSLs from different Buenos Aires stations (1st Class). 2nd Class requires 100.

Buenos Aires County Award

For 50 QSLs from different stations in Buenos Aires county (*not* city) for 1st Class. 2nd Class = 25 QSLs, 3rd Class = 15 QSLs.

Buenos Aires County Cities Award

For contacts with 25 cities in Buenos Aires county (1st Class). Second and third class are 18 and 12 cities respectively.

Argentine Capitals Award

For QSLs from 20 provincial capital cities (1st Class). 2nd Class = 15, and 3rd Class = 10.

For each of these Argentinian awards send a certified list of QSLs (by radio club or two licensed amateurs) plus 10 IRCs to: LU9ACZ, Sanabria 1513, Buenos Aires, Bs.As., Argentina.

Contests

The Bermuda Contest

0001 15 May to 0200 16 May (phone)
0001 19 June to 0200 20 June (cw)

UK stations work USA, Canadian and Bermudan stations only and each QSO counts three points. Exchanges should consist of RS/RST and QTH—state for USA, province for Canadian, county for UK, and parish for Bermudan participants. Total QSO points are multiplied by the sum of the number of Bermudan parishes worked on each band (a maximum of nine on each band 3·5 to 28MHz = 45). No duplicate contacts should be claimed and logs should be accompanied by a statement that all rules and regulations have been observed. Logs go to Radio Society of Bermuda, PO Box 275, Hamilton, Bermuda, no later than 31 July. A trophy will be presented to the winner of each section, phone and cw in North America and the UK. A certificate signed by the Governor of Bermuda will be given to the highest scoring station in each call area and UK country. The trophies will be presented to the winners at the Radio Society of Bermuda's Annual Banquet to be held on 21 October. Transportation and one week's accommodation will be provided at one of the island's leading hotels. Trophy winners are ineligible for the same award for a period of two years. Parish abbreviations are: DEV, HAM, PAG, PEM, SAN, SMI, SOU, GEO and WAR.

The World Telecomm Contest

0000 to 2400 May 15 (cw)
0000 to 2400 May 22 (phone)

This contest is sponsored by the Brazilian Ministry of Communications. Operation is limited to single-operator stations, fixed or /MM, all band 1·8 to 28MHz. Exchanges consist of RS/T plus ITU zone (27 for UK entrants). QSO points are awarded as follows:

	28/21/14MHz	7MHz	3·5/1·8MHz
With own country	0	0	0
Other countries in same zone	1	1	2
Other zones same continent	2	3	4
Other continents	3	5	6

Final score is QSO points multiplied by different ITU zones worked (each counts once only). Diplomas will be awarded to the three top scorers in each country, and gold, silver and bronze medals to the three top scorers in the world in each section. Separate logs are required for each contest and a summary sheet and the usual signed declaration should be sent to: DENTEL, PO Box 1219, ZC00, Rio de Janeiro, GB, Brazil, before 30 June.

The rules of the **1971 21/28MHz RSGB Contest** will be found elsewhere in this issue of *Radio Communication*. It will be noted that 21MHz has once again been included in the event as it seems possible that if only 28MHz were included a spell of poor propagation on that band could spoil the contest. However, it should be noticed that very considerable encouragement is being given to entrants to

work on 28MHz as much as possible—total points on that band are to be multiplied by a factor of five.

In the **1970 WPX SSB Contest, GC3UML** came world third in the single-operator multi-band category with 1,628,556 points. Likewise, **G3NLY** was world third on 7MHz with 156,212 points, and **GD3TXF** and **G3WYX** fifth and sixth respectively in the multi-operator single transmitter class. Other UK scores were as follows (certificate winners in bold type):

Single-operator

		points			points
G3NMH	**(All band)**	**793,197**	G4JZ	**(14MHz)**	**130,025**
GW3POD	**,,**	**449,982**	GM3SDZ	**,,**	**128,422**
G3XBY	,,	147,056	**G3NLY**	**(7MHz)**	**156,212**
GM3RFR	**,,**	**120,400**	**GM3VTB**	**(3·8MHz)**	**34,960**
G3YBH	,,	92,036	GM3WXR	,,	15,004
G2AJB	,,	61,650	**GM3YCB**	**(1·8MHz)**	**840**
GW3VBX	,,	55,998			

Multi-operator single transmitter

GD3TXF	**1,974,732**	**points**	G3FVA/A	222,861	points
G3WYX	**1,768,925**	**,,**	G3EED	128,760	,,
G3SSO	1,380,925	,,	G3PY	43,860	,,
G3NRS	575,720	,,			

Congratulations to the winners, and better luck next time to the others!

Expeditions

G3s IKR, VPE, XIP and ZXO will be on the air from the Isle of Skye using the callsign GB3SKY between 19 and 22 June. Frequencies to be used are: 1,820–1,840, 3,520, 14,020, 21,020, 28,060kHz and 144·080MHz (cw), and 1,860, 3,790, 14,260, 21,360, 28,420, 28,700kHz and 145·420MHz (ssb). They will also transmit on a.m. between 1,900 and 1,990kHz and on 145·740MHz (all QRGs ±5kHz). Operating times are likely to be as follows: dx bands mostly but 80m ssb 1200–1400 on 19th and 20th, 160m cw 2000–2100 on 21st, 160m ssb 2200–0000 on 22nd. Two-metre operation will be tried from 1500–1700 on the 19th and 1030–1200 and 2000–2100 on the 20th. Some 160m and 20m operation will take place from Roxburghshire on 15–16 June, Perthshire on the 17th and another rare county on the 23rd and 24th. Callsigns will be GM3VPE and GM3ZXO when not on Skye, and it is hoped to operate from all sites on 4m cw only, using GB3SKY or GM3IKR as appropriate. Skeds will be welcome on 2m only. Please send sae to G3XIP (QTHR). Special QSLs will be sent on receipt, either direct or via RSGB.

G3OLA is QSL manager for G3XAR (Land's End operation) and VP2GAM. His address is in *QTH Corner*.

Dxpeditions

KA5EE was unable to make his projected trip to the Ogasawara Is during the WPX Contest, but hopes to visit the island before June. His callsign will be KA1E.

PY7AKW is reported to have been heard discussing the possibility of a visit to the St Peter and Paul Rocks (PY0) in late November or early December.

Late news from W4BPD is that he has postponed his trip to the Himalayan area indefinitely as the unrest in Pakistan and on the northern borders of India is not conducive to amateur radio. He has other ideas in mind and will publish details later.

QTH Corner

A2CAX	Kim Beesley, Geological Survey, Private Bag 14, Lobatse, Botswana.
C2IDC	c/o Radio Station, Nauru Is.
EP2TB	via W1YRC, 30 Rocky Crest Rd, Cumberland, RI, 02864, USA.
EP2TW	via GI3HXV, 45 Erinvale Av, Finaghy, Belfast, N.Ireland.
FM7WF **FM7WQ**	now via DOTM, Box 7388, Newark, NJ, 07107, USA.
FY0BB	via PZ1DF, Yves Ho A Chin, Wonglaan 30, Paramaribo, Surinam.
GB3BSP	via G2CUZ, 34 Sandbrook Road, Ainsdale, Southport, Lancs.
GC5ANX	via Lou Wilson, WA2MEQ, 125 S.Lenola Road, Moorestown NJ, 08057, USA.
HK1BVL/HK0	Box 219, San Andres Is, Colombia.
KC0KC	via WA0WOB, K. McDonald, RFD 1, Carthage, Mo, 64836, USA.
KC6RK	WA5BON, 8838 Sandringham, Houston, Texas, USA.
KG6SW	via W7YBX, 5632 47th SW, Seattle, Wash, 98116, USA.
KW6HA	via WB6ZZX.
KX6IP	P.O.Box 1474, APO, San Francisco, Calif, 96555, USA.
JY1 **JY1/B** **JY2**	via WA3HUP, Mary Crider, 105 June Drive, Camp Hill, Pa, 17011, USA.
ex-MP4BGX	R. E. Gregory, Cabinda Gulf Oil Co, CP40, Cabinda, Angola.
TT8AC	via DJ1LP, Werner Pentalsky, Im Suedfeld 4, 4812 Brackwede, Germany.
TU2DD	via K2QHT, Arthur Freud, Glamore Court, Smithtown, NY, 11787, USA.
VK9NP	via INDXA (see ZM7AK).
VK0TM	via INDXA (see ZM7AK).
VP2AGA	see 8P6DR.
VP2EQ	via WB2ZMK, F. A. Scolaro Jr., 333 Crestwood Av, Yonkers, NY, 10707, USA.
VP2GAM	via G3OKA, J. A. Shore, 219 Prenton Dell Rd, Prenton, Birkenhead, Cheshire.
VP2LDD	Box 322, St Lucia, BWI.
VP2LY	via G3AAU.
G3PDM/W1	48A Montague St, Arlington, Mass, 02174, USA.
ZK1BM **ZK1CE** **ZK2AH**	via W7PHO, 18549 Normandy Terrace SW, Seattle,Wash, 98166, USA.
ZM7AK	via INDXA, K3RLY, B. D. Kellam, 35 Allview Drive, Ellicott City, Md , USA.
5W1AH	via VE7BWG, 488 E.4th St, North Vancouver, BC, Canada.
8P6DR	via G3JUL, 56 Marlborough Rd, Ashford, Middlesex.
9M8OEA **9M8SPD**	Box 795, Kuching, Sarawak, E. Malaysia.

RSGB QSL Bureau: G2MI, Bromley, Kent, BR2 7NH.

ZL1AJI has been heard saying that he will be going to New Hebrides (YJ8) in mid-May. He operated from the same location four years ago as YJ8XX.

The date for the ZA2RPS expedition by DL7FT and friends to Albania has been brought forward to cover the period 24 May to 7 June. At present it is expected that there will be four operators.

A visit to Mellish Reef and Willis Island was rumoured to be about to take place in late April or early May. Larry, K2IXP, who has been active from Norfolk Is recently with his VK9NP call is said to be the operator. This may be of historical interest only, but in the event of delay could be on the air now.

ZK1AJ is expected to open up from Manihiki Is after mid-April, depending on transport being available.

K4ZA hopes to be on the air from Melilla (EA9) during late April and early May. He is also interested in a castle in Rome owned by the Knights of Malta!

QSL via W2CTN . . .

Readers will be sorry to learn that Jack Cummings, who has performed outstanding service to amateur radio by acting as the perfect QSL manager for up to 100 dx stations (at one time), has found it necessary to give up his services for all stations. It is doubtful whether any other person will be found to take over the whole of Jack's task and he will be greatly missed for his efficiency, helpfulness and scrupulous fairness.

1971 Countries Table

	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total
G8VG	1	16	29	25	44	20	135
G3YHB	—	4	5	46	59	15	129
G3YWX	—	12	10	43	10	—	75

Band reports

Conditions seem to have been very variable during the past month. 3·5MHz is still producing very good signals from ZL and VE in the early morning period, together with other good dx from time to time. 7MHz seems to be very good (as is usual at this time of year). 14MHz is now opening early and good Pacific dx is being worked—VK9NP was S9+ over the South Pole once, too! 21 and 28MHz seem to have been rather off colour but stations may often be raised on the latter band by calling "CQ". Many thanks to the following for items used in producing this section and others: G2FYT, G2HKU, G3s GVV, LPS, NOM, UKH, UOL, UYM, WPO, YHB and YWX, G5JL, G6GH, G8VG, BRS17567, BRS30231, A7056, A7218 and A7437. Stations listed in italics were cw, the rest ssb.

1·8MHz. 1100 *PA0INA*. **2300** *DJ6TK, OKs*.

3·5MHz. 0000 PZ1CU. **0100** EP2TW, HB0XSV, OD5BA, MP4BIJ. **0200** PJ7JC. **0300** *8P6DR*. **0400** *VP9BK, ZC4CB*. **0600** W9IGW/CE0, HC2CH, *HV3SJ* (QSL to DL1CU), *KL7CZ*, VP1ST, ZLs, ZL4OL/A. **2000** OY2R. **2100** ZC4IK. **2200** EA6BN, *VK6HD*, 6W8DY. **2300** VEs.

7MHz. 0100 AP2MR, *FG7TG, MP4TDY*, YVs. **0600** CP1BWS, CX1AA, LU7AAC, *W7JLU, YN1CW*. **0800** *W7LK*, many VKs, *8P6DR*. **2000** *PY0AD*, **2300** PJ2VD, *VP8LK*. **2400** JA4UV/MM (off Bombay).

14MHz. 0600 VK9NP. **0700** FO8BS, KJ6CF, KS6DX, VK0TM, ZK1CD, ZL5AX, 5W1AR, *9X5Y*. **0800** 5W1AH. **0900** *KL7GNP. XW8DK* (QSL to WA6NFC). **1100** KC4USV. **1400** *VK9LV*, YB0AAO. **1500** *HS1ADX* (QSL to W4VFP). **1700** *HV3SJ*, KC6RK. **1800** CR9AK. *3B8CR, 4S7DA*. **1900** CR4AY, 9G1GSS. **2000** FP8CT (QSL to VE5NW), VP2GCF (QSL to I1ADH), 5VZWT, 5Z4MO (he does work dx!). **2100** *TA6JB*. **2200** CE6EZ. **2300** W9IGW/CE0.

21MHz. 0800 *CR9AK, TA3W, 5U7AR*. **0900** *UA0YT* (Zone 23), VS9MB. **1000** *3B8CR*. **1100** KX6IP, *VK9SS*, 9N1MM. **1200** ST2SA, TT8AD, *TY1ABE, 5B4ES* (legit.), **1300** VKs, *VS6BL*. **1400** *HH2MC, HS1ACS, 9G1CO*. **1500** 9M2VQ. **1600** JY9AA, YB0AAO, *ZD5F*. **1800** VU2HLV, 7P8AB.

28MHz. 0700 VS6AI, VU2IRA. **0800** CR9AK, KR6s. **0900** VK4/5/6, *3B8CR*, 9G1BF. **1000** *MP4BIO*. **1100** CR6TP, MP4TDT. **1200** FL8LM, VP5JA, VU2BEO. **1300** DU1AK, SV0WBB (Crete, QSL to POB 1134, APO, NY, 09291), YB0AAG, 9E3USA. **1400** FR7ZW, TJ1AW, VP8KD, ZD8H. **1600** CR4BS, W6/7, 5H3MM. **1700** W6/7, 9Q5WV (QSL to ON5WV). **1800** W6/7. CP1GS. **1900** FG7TI/FS7.

Acknowledgements and sincere thanks to all correspondents and to the following for items extracted from their publications: **QUAX** (*G3DME*), the **DX'ers Magazine** (*W4BPD*), **NARS Newsletter** (*5N2ABG*). **Long Skip** (*VE3DID*), the **West Coast DX Bulletin** (*WA6AUD*), the **Ex-G Radio Club Bulletin** (*W3HQO*), **DX'press** (*PA0TO*), **DX News Sheet** (*Geoff Watts*) and the **29 DX Club Newsletter** (*VK6PG*). Please send all items for **June** MOTA **to reach G3FKM no later than 8 May,** for **July** issue by **5 June** and for **August** issue by **9 July.** Please note that **all these dates are abnormally early.**

Propagation Predictions

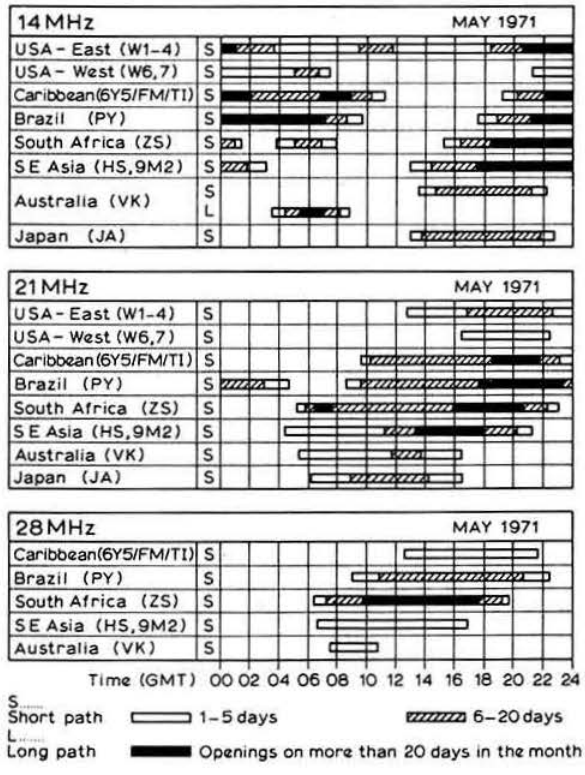
Conditions in the ionosphere classify May as a typical summer month. This indicates falling F2 MUFs in the northern hemisphere. On **28MHz** this will be most noticeable in communication with North America and Japan, which will be virtually impossible during the summer months. Some contact might be possible with Africa and parts of South America. A small compensation for poor dx conditions on this band will be sporadic short skip conditions for distances up to about 500–2,000km. These short skip conditions are possible on relatively high frequencies because of a Sporadic-E layer.

These summer conditions will also lead to a further deterioration of dx conditions on **21MHz.** The band will stay open longer in the evenings as the days lengthen, but communication with western North America will only be occasional; the peak time being late afternoon and early evening.

14MHz will remain open all night, especially for communication with South America and parts of Central and North America. The short skip conditions, mainly in the afternoon and evening, will lead to a rise of QRM on this band. DX communication free from interference will be possible during night-time and early morning. Under especially good conditions communication with western North America and Japan will be possible via the long path. Australia should be workable via the long path in the morning.

Conditions on **7** and **3·5MHz** will worsen because of shorter nights, atmospheric disturbances and QRM. Basically, dx conditions will only be possible when the path lies in darkness; this applies especially to 3·5MHz. There will be good opportunities for local traffic without disturbance by the dead zone.

The provisional sunspot number for March from the Swiss Federal Observatory was 58·2 with activity evenly distributed throughout the month. It is noted that the level of sunspot activity is now showing a marked decrease as the present cycle proceeds towards the minimum. None of the daily numbers rose above 90 during March. The predicted smoothed sunspot numbers for July, August and September are 64, 61 and 59 respectively.



SOCIETY AFFAIRS

A brief report of the Council meeting held at Society HQ on 12 March 1971

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

Apologies for absence were received from Messrs A. W. Smith and B. Armstrong.

Correspondence
A letter dated 26 February 1971 from the Lord Chamberlain was read to the meeting. It was agreed that the names of the President, Mr F. C. Ward, and the Executive Vice-President, Mr R. J. Hughes, be submitted to the Lord Chamberlain for consideration for invitation to a Royal Garden Party to be held in July 1971. It was understood that Mrs Ward and Mrs Hughes would also be invited.

Membership
Council resolved to elect 34 corporate members and 19 associates.

Space Conference
Copies of a notice that had been received from the ITU in connection with a proposal submitted by Argentina were circulated. Argentina proposed that at frequencies above 50MHz or with non-conventional techniques, the morse code requirements be waived. It was agreed that this matter be discussed further by the MPT Liaison Committee.

American licensing conditions
Mr Stevens explained the proposed expansion of the USA phone bands and novice allocations as contained in FCC "Notice of Proposed Rule Making" Docket 19162.

It was agreed that the general manager should send a protest to the FCC regarding these allocations and, in particular; (*a*) the proposed alterations to the 14MHz band allocations would be detrimental to European operation on this band, and (*b*) the proposed alterations to the 28MHz band allocations would jeopardize the use of parts of this band for world-wide beacon operation in connection with scientific studies.

"RSGB Amateur Radio Call Book"
It was agreed that in the 1972 edition of the *RSGB Amateur Radio Call Book*, the callsigns should be set in alpha-numeric sequence by country. It was also agreed that advertising matter be excluded and any available space be used for operating notes or similar text.

Computerization of subscription records
It was agreed that the computerization of subscription records be referred to the Finance and Staff Committee for consideration at its next meeting.

Articles of Association
It was agreed that the Finance and Staff Committee be instructed to consider the revised draft and submit a recommendation to Council.

Society publicity
Mr Jessop stressed the need for greater publicity to be given to the activities of the Society. It was agreed that the cost of advertising and inserts in magazines be ascertained and that the matter should be put to the Membership and Representation Committee for consideration.

"Wireless World" 60th birthday
It was agreed that the President would send a congratulatory telegram to the management of *Wireless World*.

Reciprocal licensing
Mr Stevens explained that the IARU booklet setting out details of reciprocal licensing agreements was up-to-date insofar as it contained all information that had been notified to him.

Minutes of committee meetings
Council approved the minutes of the Mobile Committee (24.9.70 and 29.10.70), Education Committee (23.1.71), HF Contests Committee (28.1.71), Technical Committee (2.2.71), VHF Contests Committee (3.2.71), Exhibition Committee (12.2.71) and Education Committee (6.3.71).

OBITUARIES

Mr W. Badman, G2ZG
Will Badman died on 19 February 1971 at the age of 91. Britain's oldest active amateur, he was operating on the 160 and 80m bands right up to his death. He was an early pioneer of radio, and at the age of 18, while working in his father's electrical business in Weston-super-Mare, he charged the batteries used by Marconi in 1897 when his successful Bristol Channel spark transmission tests were carried out. In 1920, Will was issued with a GPO licence authorizing him to build an Eiffel Tower receiver to receive time signals from Paris. In 1922 he obtained G2ZG for fixed station operations and G2KQ as a portable call for experimental broadcasts. On 11 April 1922 he transmitted a service from Sunnyside Church, Weston-super-Mare, on 160m, and a month later, using 1,000m, he transmitted a programme from the local town hall.

Mr W. Barraclough, G2IV
Bill Barraclough died on 24 July aged 72. Active on the air until two weeks before his death, his particular interest was in transistorized transmitters. He passed on his interest in the hobby to his sons G3VQS and G3VSK.

Mr K. Byers, FCMC, G8DSF
Kenneth Byers died in West Cumberland early this year. Although he passed the RAE several years ago, he was licensed only last year and was working for the morse test.

Mr J. R. Clark, GM3XXP
John Clark died in retirement at Glasgow on 19 March. Originally from Coatbridge, he was well known on the WAB Net which he worked daily.

Mr N. Pride, G8BSC
Norman Pride, who died in March, was a member of Spen Valley ARS for 22 years and its secretary for 20 of those years. The full, varied and interesting programmes of lectures and visits he arranged was a tribute to his abilities.

Mr J. Rae, GW3KUA, ex G3KUA, ex GM3KUA
The death has occurred of Mr J. Rae, GW3KUA. A native of Aberdeen, he took great interest in the Cardiff RSGB Group, but in recent years his radio activity had declined in consequence of other interests.

We have also been advised of the deaths of:

Mr Frank McHarg, GM3EHC, of Cupar, Fife, on 11 March;

Mr J. E. B. Warn, ZL1FM, of Katikati, New Zealand.

44th Annual General Meeting

Minutes of the 44th Annual General Meeting of the Radio Society of Great Britain held at the Royal Society of Arts, John Adam Street, Adelphi, London WC2, on Friday 4 December 1970 at 6.30pm.

Present: *The Executive Vice-President (Mr B. D. A. Armstrong) in the Chair, the Immediate Past-President (Mr J. W. Swinnerton), Mr A. C. Morris (Honorary Treasurer), Dr E. J. Allaway, Messrs R. J. Hughes, L. E. Newnham, W. A. Scarr, R. F. Stevens, G. M. C. Stone, E. W. Yeomanson, F. C. Ward (members of the Council), Mr R. G. B. Vaughan (secretary), Mr A. W. Hutchinson (editor), and 61 corporate members.*

Apologies for absence were received from Dr J. A. Saxton (President), who was abroad on business and who sent his regrets for being unable to take the Chair at the meeting.

Notice convening the meeting

The secretary read the notice convening the meeting.

Minutes

Mr E. N. Hurle and Mr R. Broadbent seconded and it was resolved that the minutes of the 43rd Annual General Meeting as published in the May 1970 issue of *Radio Communication* be taken as read, confirmed and signed as a correct record.

Mr R. Walker moved and Mr P. Simpson seconded and it was resolved that the minutes of the Extraordinary General Meeting, held on 19 August 1970, distributed as a loose insert with the November issue of *Radio Communication*, be taken as read, confirmed and signed as a correct record, subject to the incorporation of an amendment referring to Mr Norman Guy's remarks, so that the minute reads: "to give a blank cheque for £50,000 to Council".

Annual report

The chairman moved and, no questions being asked, it was resolved that the Annual Report of the Council as published in the November 1970 issue of *Radio Communication* be received and adopted.

Supplementary report

The secretary read a supplementary report of the Council covering the period from 1 July 1970 to early December 1970.

Report of the Honorary Treasurer and audited accounts for the year ending 30 June 1970

Mr A. C. Morris presented his report and the audited accounts for the year ending 30 June 1970, and gave additional information. He explained that the figures for the first quarter of the year under review had been disappointing, but that he was glad to report a substantial improvement later in the financial year.

It has been customary in the past to include the editor's salary in the general salary bill, but with the appointment of a full-time editor it was thought wise to allocate the whole cost to *Radio Communication*. The high cost of agency fees and advertising for staff again reflected the difficulty of obtaining staff in London. Unfortunately, Society headquarters was not in a preferred area for employment, and as a result staff turnover tended to be high.

A provision for bad debts had been included at the request of the auditors, although the position in regard to outstanding monies was considerably improved compared with the previous year.

An appreciable increase in the cost of *Radio Communication* could be attributed to the inclusion of the editor's salary in this item for the first time together with continually rising printing and preparation costs. Every effort was being made to keep costs down, but the situation in the printing industry was such that further increases could be expected.

Some economies in costs of meetings had been possible as a result of the availability of 35 Doughty Street.

A Triennial Regional Representatives' Conference had been held during October 1969. The cost of this was comparatively high in view of the need to bring representatives from outlying regions to London.

Mr Morris remarked that the salvation of the Society had again been the sale of publications, and a deficit of some £15,000 would have existed without this source of income. Clearly it was unwise to continue to rely on this income as a long-term policy, and the subscription increase already announced should cover the deficit in future years.

An overall deficit of £1,466 existed for the year under review.

Mr Morris proposed and Mr W. Corsham seconded that the report of the Honorary Treasurer and audited accounts of the Society for the year ended 30 June 1970 be approved and adopted. The Chairman then asked for questions on the accounts.

Mr A. W. Rix asked whether the Society were satisfied with the receipts from advertising in *Radio Communication*.

Mr Morris replied that steps had been taken to increase the Society's advertising rates, with effect from 1 September 1970. The position regarding advertising rates was constantly under review.

Mr A. O. Milne noted with regret the continuing difficulty with staff at Society headquarters. He hoped that Council would regard 35 Doughty Street as an investment of a temporary nature, and that they would examine the possibility of transferring headquarters to a more favourable location in the future. He thought it possible that a substantial profit would result. Mr Milne also felt that the Zonal Council member arrangement was utterly undemocratic.

At this stage the Chairman interjected to point out to Mr Milne that he felt both these matters were best considered during the informal discussion following the meeting. Mr Milne said he felt that both items reflected on the Society's finances.

Mr Morris remarked that he had carefully examined the cost of maintaining the Society's headquarters at 35 Doughty Street, and had found it to be relatively cheap compared with the usually accepted standards of costs in London. It was, however, true to say that considerable staff difficulty existed, and that the cost of obtaining and advertising for staff was continually increasing. For this reason Council had thought it prudent to authorize the setting up of a sub-committee to consider the long-term location of Society headquarters. Many approaches had been received from persons interested in purchasing the interest in 35 Doughty Street, but clearly great care would be needed before making any future change in location.

Mr Corsham remarked that he hoped Council would not authorize the despatch of *Radio Communication* by first-class mail, as had been suggested. He felt the expense involved was totally unwarranted.

Mr Morris explained that Council had considered first-class despatch in order to reduce complaints received concerning late arrival. The further increase in postal costs had now made it unlikely that Council would proceed with the original suggestion.

Mr D. Kay asked whether Council had considered an approach to the life members, who had paid a comparatively small sum many years ago. He felt that such persons should be prepared to make some form of donation to the Society's finances in view of the present financial difficulties. Mr Morris said that he had not given consideration to this point, but he was under the impression that the number of life members was comparatively small.

Mr Corsham remarked that he did not see why members who had made a life membership payment in good faith should be penalized by having to make further payments. He enquired whether Council considered the age of the applicants when considering election to life membership. For persons of his age group, life membership at the present rate of £45 was, at best, uneconomic.

Mr Morris said that Council could consider this point at an early opportunity.

Mr R. Walker asked whether life membership subscriptions were treated as subscriptions income or invested.

Mr Morris explained that life membership subscriptions were not treated as revenue, but were credited to a reserve fund which was drawn on from year to year on a percentage basis.

Mr Hawker commented on a reduction in profits on RSGB publications.

Mr Morris stated that this was largely due to a tailing off in demand for the *Radio Communication Handbook*. The Society could hardly have expected demand for this publication to continue at the extraordinarily high rate which had prevailed in the first year after publication. However, sales were continuing at a steady level, particularly to America. Some 25,000 copies had now been sold, and it was natural to expect some reduction in future sales due to saturation.

The Chairman then put the resolution to the meeting and it was carried unanimously.

Election of Council for 1971

The Chairman announced that it gave him pleasure to report that in accordance with Article 10 of the Articles of Association, the Council had appointed Mr F. C. Ward to the office of President for 1971. The Chairman reported the result of the ballot to fill the three vacancies which would occur among ordinary members of Council on 31 December 1970.

This was as follows:

B. D. A. ARMSTRONG, G3EDD	—	1,539 votes
E. G. INGRAM, GM6IZ	—	1,245 votes
Rev J. L. MARSHALL, G3RKH	—	970 votes
R. F. STEVENS, G2BVN	—	1,615 votes

He then formally declared Messrs Armstrong, Ingram and Stevens elected and thanked the unsuccessful candidate for taking part in the election.

The Chairman announced that the result of the ballot to fill the vacancy that would occur on 31 December 1970 for a Council member elected on a zonal basis for Zone G was as follows:

A. F. Hunter, GM3LTW	—	43 votes
A. J. Mitchell, GM3UDL	—	35 votes
A. W. Smith, GM3AEL	—	51 votes

He then formally declared Mr A. W. Smith elected and thanked the unsuccessful candidates for taking part in the election.

The Chairman announced that the vacancy arising on 31 December 1970 for a Council member elected on a zonal basis for Zone E was to be filled by Mr C. H. Parsons, GW8NP, who had been returned unopposed. He then formally declared Mr C. H. Parsons elected.

The Chairman also announced that the vacancy arising by the resignation of Mr McNally on 7 August 1970 for a Council member elected on a zonal basis for Zone F was to be filled by Mr W. F. McGonigle, GI3GXP, who had been returned unopposed. He then formally declared Mr McGonigle elected.

The Chairman announced that no valid nomination was received to fill the vacancy for a Council member elected on a zonal basis for Zone A. He anticipated that Council would make an appointment under Article 28.

The Chairman announced that the following members of the 1970 Council were not required to stand for election in their respective offices:

Dr J. A. Saxton (Retiring President), Mr A. C. Morris, G3SWT (Honorary Treasurer), Dr E. J. Allaway, G3FKM, Messrs R. J. Hughes, G3GVV, G. R. Jessop, G6JP, L. E. Newnham, G6NZ, W. A. Scarr, G2WS, G. M. C. Stone, G3FZL, F. C. Ward, G2CVV, E. W. Yeomanson, G3IIR.

In conclusion, the Chairman thanked the scrutineers who had been responsible for the work carried out in connection with the Council election.

Auditors

Mr Morris proposed and Mr R. A. Fitton seconded, and it was resolved that Edward Moore & Sons be re-appointed auditors for the year to 30 June 1971 at a fee of £275.

OTHER BUSINESS

Panel of scrutineers

The Chairman announced that in accordance with Article 58 it was necessary to appoint a panel of 10 corporate members from whom three scrutineers for the 1971 ballot for Council would be drawn. The following submitted their names:

H. A. Bailey, BRS30664, J. W. Bluff, G3SJE, R. J. C. Broadbent, G3AAJ, W. E. F. Corsham, G2UV, G. S. Fitton, G3RAA, A. J. Gould, G3JKY, E. N. Hurle, G3RZN, M. A. C. MacBrayne, G3KGU, H. W. Rees, G3HWR, R. Walker, G6QI.

The formal business of the Annual General Meeting terminated at 7.45pm.

INFORMAL DISCUSSION

The Chairman then opened the meeting for an informal discussion on any matters that members wished to bring up.

Mr Bluff, G3SJE, expressed concern about the Exhibition, and felt that the letters published in the December 1970 edition of *Radio Communication* revealed that a serious fault existed in the present conception of the Exhibition.

The Chairman asked Mr E. W. Yeomanson (Chairman, Exhibition Committee) to reply to Mr Bluff.

Mr Yeomanson said that all letters received by RSGB Headquarters had been published in *Radio Communication*, together with a committee comment, in an attempt to generate correspondence on this topic. A number of letters were involved, and most of them were critical of one or more aspects of the exhibitions—however, it was noticeable that none of the authors had offered any constructive help at previous exhibitions. It was unfortunate that Mr Thorogood was not present at the meeting, as he would no doubt have held strong views on this matter. Most of the letters had referred to a shortage of home-constructed equipment, but the committee had arranged for a good deal of pre-exhibition publicity, with little result.

While the present conditions of acceptance for the Exhibition Competition were restrictive, it had been found necessary to impose such restrictions in order to improve the standard of equipment exhibited. Considerable comment had been made on the lack of professional exhibitors—but it was a sad fact that little could be done to remedy this situation, as participation in our exhibition was clearly not profitable to large professional companies. Unfortunately, most professional companies were not interested in the amateur market for small quantity trading.

Many correspondents had suggested some form of convention in place of the existing exhibition, but every convention organized by the Society in recent years had resulted in a financial loss.

Mr Yeomanson terminated his remarks by hoping that the 1971 Exhibition Committee would have the benefit of constructive criticism and help from the membership.

Mr Blair, G3LTF, noted that the VHF Convention always made a profit.

Mr Yeomanson said that any convention run for the benefit of a specialist group always appeared to be a financial success, but a general purpose event, such as the exhibition, did not necessarily have a "guaranteed attendance".

Mr Corsham, G2UV, made a strong plea for more home-constructed equipment and information on this topic at the exhibition, as he felt that the hobby would be poorer if the present trend continued.

Mr Milne, G2MI, remarked that he had been to all the RSGB conventions and exhibitions held in the last 40 years, and that clearly a change of interest had occurred. More cars were to be seen at any mobile rally in modern times than at a convention, and he felt strongly that such events were the new meeting ground for the radio amateur. We should encourage formal meetings in parallel with mobile rallies, and the exhibition might well be combined with such a rally in the future.

Mr Yeomanson agreed with Mr Corsham that interest in home-construction appeared to be declining, and that NFD entries were fewer, probably for the same reasons. He felt that the suggestion of a mobile rally/convention was impracticable, due to the risk of bad weather, etc. In his view no such rally could take the place of the exhibition. It was essential to obtain participation of commercial enterprise, to make the event a success.

Mr Rees, G3HWR, felt that the rule concerning home-constructed equipment display was unnecessarily restrictive—the Committee had refused to accept his entry for two years running.

Mr Yeomanson expressed great surprise at this, as he had no knowledge of any entry from Mr Rees, and the Exhibition Committee Secretary confirmed that he was also not aware of any entry from Mr Rees. He would investigate the matter.

Dr Evans, G3RPE, felt that the professional standard of exhibits frightened off other members.

Mr Yeomanson commented that he did not see why this was so, but agreed that a problem existed in ensuring that the standard of entries was suitable for a national exhibition involving a Society which wished to maintain a reputation for high technical standards.

Mr Priestley, G3JGO, was concerned that "plug-in appliance operators" were regarded as the villains of the piece, and thought this was hardly in accord with the desirable objectives of a hobby society. He was concerned that the slogan "guards the interests of radio amateurs" had replaced a previous slogan in *Radio Communication*. The slogan implied that the Society was taking a defensive attitude in regard to our interests, whereas he felt that an "attacking" philosophy should be employed.

Mr Stevens, G2BVN, commented on Mr Priestley's remarks, and was surprised to hear that any slogan appeared in *Radio Communication*. Although he was a member of the Editorial Panel, he was not aware of such a slogan, and a careful search of the journal had failed to reveal any trace.

(NOTE: The slogan referred to is used as part of the postal frank on mail despatched from headquarters.)

Mr Hawker, G3VA, remarked that many different points of view were freely expressed in *Radio Communication*, both by contributors and by means of letters to the editor. However, he felt that little was reported of the views and policies of Council and committees on matters concerning the future of amateur radio. He felt that more should be published in the journal concerning the Society's official attitude to the future of the hobby. He was worried that the introduction of the Class B licence facility for 144MHz

operation was rapidly upsetting the balance of interests of members. At the present rate, it seemed likely that the largest amount of operation in the country would be phone only on the vhf bands, and this represented a tremendous change in amateur radio. He felt that the Society should make its opinion on this subject known, and that more should be done to stimulate activity on the hf bands.

Mr Hawker also expressed the view that the RSGB should have, in common with many societies of a similar nature, a "future developments committee". This committee could be responsible for looking at trends and ideas, together with possible future activities, and reporting on them to Council.

Mr Milne, G2MI, felt that the standard of licensees generally was falling with the introduction of the Class B licence.

Mr Stone, G3FZL, disagreed, saying that he was greatly impressed with the technical standards exhibited by many Class B licensees he had met. He felt that problems did exist with some Class B licensees, but that these problems were no more than those which had previously been present among the newer generation of Class A licensees prior to the introduction of the Class B licence. Naturally, many new young licensees had availed themselves of the Class B facility, particularly where thay had no interest in cw or low-frequency operation.

Mr Milne asked about the future of the dx operator in the light of Mr Stone's remarks.

Mr Stone commented that he felt that this was in the hands of the dx operators themselves.

Mr Rees, G3HWR, said that in his view the activities of the RAEN and Contests Committees were well-known, but other Society committees did not receive the same publicity.

Mr Blanchard, G3JKV, had written a letter to *Radio Communication* on the subject of the future of amateur radio. He felt that the present preoccupation with ssb operation was ruining amateur radio from the point of view of the newcomer. In his view, a.m. operation should be preserved in a small segment of the amateur radio bands as an aid to training newcomers. In his view, it was now relatively difficult for a newcomer to obtain an introduction to amateur radio via normal or domestic receiving equipment as had previously been possible.

Mr Broadbent, G3AAJ, felt that Mr Blanchard's remarks were incorrect. In his experience many newcomers to amateur radio had successfully overcome the difficulty to which Mr Blanchard referred, and he did not feel this to be a serious problem.

Mr Bluff, G3SJE, replied to previous remarks, and expressed his disappointment that the Society felt there was a virtue in publishing critical letters. He felt that the letters published did contain an element of constructive criticism, and he disliked the implication that certain members were attempting to criticise the Society without cause.

Mr Godfrey, G3GC, felt that the Exhibition must have an air of success, and that this had been lacking at recent shows.

Mr Stevens, G2BVN, replied to previous remarks from Mr Hawker, and commented that in the Region 1 of IARU, only the German society in addition to RSGB had any committees at all. The RSGB committee system was the envy of Region 1. No doubt Council would bear Mr Hawker's views concerning a new committee in mind.

Mr Priestley remarked that he still felt the Society was not adopting a sufficiently aggressive attitude in connection with frequency allocations etc.

Mr Stevens, in replying, pointed out that a member of Council was attending the next ITU Conference as an official with the UK delegation, and suggested that this fact alone demonstrated the Society's determination for adequate representation. The fact that such representation was possible demonstrated that the Society and IARU were held in high regard by the UK authorities.

TROPHIES

At the close of the informal session, presentation of the Society's trophies was made by Mr Armstrong.

MOBILE RALLY NEWS

Cardiff Mobile Picnic, 16 May
This annual event will open at 11am at Porthkerry Park, Barry, Glamorgan. Talk-in stations on top band and 2m, probable frequencies 1,980kHz and 144·350MHz. DF hunt at 3pm. Further information will be included in the GB2RS broadcast on 9 May.

Medway Mobile Rally, 16 May
This rally is taking place in conjunction with the Medway Steam Fair at the Great Lines, Gillingham, Kent. Talk-in stations on 160, 4 and 2m, callsign GB3MSF. Attractions for all the family will include a fun-fair. Lots of parking space. Further information from M. Rye, 38 Woodside, Wigmore, Gillingham, Kent.

Northern Mobile Rally, 16 May
Organized by the Northern Amateur Radio Mobile Society, this will be held from 12 noon at Moor Grange Secondary School, West Park, Leeds 16. Talk-in stations will operate on 160, 4 and 2m, and there will be the usual trade stands plus attractions for XYLs and junior ops. The school is situated on the A6120 ring road, half mile from the Bradford side of its junction with the A660. Further details from D. Binns, G3MGI, 80 Gipton Wood Road, Leeds 8.

Maidstone YMCA ARS Mobile Rally, 30 May
This will take place at the 'Y' Sports Centre, Maidstone, Kent. Talk-in stations from 9am on 160, 80 and 2m using the call GB3YSC. Trade show will open at 11am, and there will be bring and buy facilities. Free film-shows for the children and entertainment for all the family. Everything is under cover. There will be lots of parking space, and caravans can be accommodated overnight if prior notice is given. How-to-get-there maps available from Maidstone YMCA ARS, 'Y' Sports Centre, Maidstone, Kent. (Sae please).

Pembroke & DARC's 'Bucket and Spade Party', 13 June
This annual event will take place at the Regency Hall, Saundersfoot, Pembs, starting at 11am. Talk-in stations on 1,875kHz and 144·35MHz plus a "Find the station on 144" contest for those mobiles on this frequency. Those proposing to attend are asked to notify J. Hogg, GW8DMD, 2 Pembroke Road, Pembroke Dock, Pembs, so that catering arrangements may be made. Lunch can be booked with GW3TUD, Coles Café, Saundersfoot.

The Anglian Mobile Rally, 27 June
To be held at the Suffolk Show Ground, Bucklesham Road Entrance. Talk-in stations will be operating on 160, 80 and 2m, and there will be the usual attractions. Refreshments will be available all day and there are overnight parking facilities. Enquiries to D. W. Thomas, G3ZLN, 9 Burlington Road, Ipswich, Suffolk, IP1 2EU. Tel 55200.

Longleat Mobile Rally, 27 June
Organized by the City & County of Bristol RSGB Group, this annual event takes place at Longleat Park, near Warminster, Wiltshire. From 10am there will be talk-in stations: G6YB/P on 1,942kHz; G3TAD/P on 144·350; G3JMY/P on 70·425, as well as a trade show, grand raffle, RSGB bookstall, junk sale and refreshments. Details from G3PQE/G8AGT/G3ULD. If you wish to camp or caravan overnight, please book ahead.

Mobile Rallies Calendar

16 May	Northern ARS, Leeds.
16 May	Medway, in connection with Steam Fair.
16 May	Cardiff Mobile Picnic.
30 May	Maidstone YMCA.
13 June	GW2OP's Bucket and Spade Party.
13 June	Elvaston Castle, Derby.
27 June	Echelford. Hanworth Airpark.
27 June	Anglian, Suffolk Show Ground.
27 June	Longleat Safari. Longleat House, Nr Warminster.
11 July	Worcester. Upton on Severn.
8 August	Woburn Abbey.
15 August	Derby.
22 August	Swindon. Wroughton Aerodrome.
29 August	Stratford-on-Avon.

RADIO AMATEURS' EMERGENCY NETWORK

by S. W. LAW, G3PAZ*

The bulk transport of liquids of all types is not confined to the sea lanes, and the road haulage aspect is likely to cause a Raynet call-out due to the highly lethal loads carried by many tanker lorries these days. An accident which involves one of these vehicles is almost certain to require the attendance of all of our user services and we should consider the possibilities carefully.

To date we have heard of only one exercise based on such an incident, namely "Exercise Scorpio" at New Ferry, Cheshire, last October. Unfortunately the user services involved did not call for additional communications from us on that occasion although the local group were on standby. It is well to consider the possible hazards which might be a part of a similar call-out and controllers should make it quite clear to their group members that any instructions from the user services must be followed implicitly. Our job is to carry messages promptly and accurately and not to take foolish risks which might lead to damage to members or equipment.

Norfolk

Since the next *Call Book* will not be around until October, Doug Willies, G3HRK, would like it known that things are well under control from his new QTH at 6 Wilkinson Way, North Walsham. We hardly need to say that Norfolk is as active as ever under his able leadership.

Words or pictures?

Someone said somewhere that one picture is worth a hundred words. In these times members may think twice before opening the shutter as the price of film escalates. However, for those who would genuinely like to produce a photographic record of their Raynet activity, there is now a generous offer from G3GJW (QTHR) who will donate film to any group who will undertake to produce a photographic record of exercise or incident. Please let him have full details of your equipment when you contact him, and give him a run-down on your ideas. And do not forget that the Raynet Committee is still in need of good photos and slide transparencies for lectures and exhibitions.

Just in case

Naturally, a call-out will cause you to make a dash for the car. It is in good order, starts well, runs well, all lights work (including the interior) and you are on your way to the map reference given.

Where was the map? Was it with the pencils, message forms, spare paper, electric torch (with good cells) or magnifying map-reader, arm-band, list of all-night petrol stations, telephone numbers of members and user services in your area? What else have you, and were things all to hand? Perhaps in the family car, assuming that there is normally a place for all that you might need. Or perhaps you have a special case in which all Raynet material is kept always available?

Think on these things, my friend, for in such an hour as ye think not . . .!

The annual reminder

Do please let your controller know when you go on holiday. Time is of the essence when that call-out comes. And leave a phone number if you can; you might be needed urgently. It has been known.

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

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

* 130 Alexandra Road, Croydon, Surrey CRO 6EW

YOUR OPINION

The Editor
Radio Communication

Sir—It was with great concern that I read of the proposals for the extension of the American amateur phone frequencies.

From the outset, I wish to make it quite clear that I have no objections to the bulk of the proposals put forward by the FCC, but oppose the proposed lowering of the 20m phone band to 14·150MHz. I would be obliged if you could kindly give space in *Radio Communication* to air these views in the hope that other amateurs will respond with their comments and, I hope, their support.

The segment between 14·150 and 14·200MHz is at present occupied by dx stations and the rest of the world wishing to work amateurs **other then Americans.** If they wish to have QSOs with Ws then they move above 14·200MHz. If the proposals come to fruition, these stations will be obliged to move down and operate between 14·100 and 14·150MHz, a sector which is at present predominantly occupied by non-English-speaking amateurs. Imagine the difficulty of English-speaking amateurs trying to induce our foreign-speaking counterparts to QSY! The only alternative to this is for the average amateur (running about 200W to a dipole or perhaps a three-element beam) to compete with a kilowatt and/or a six-element beam or four-element quad. Hardly fair competition is it?

But spare a thought for those worse off, especially those with a QTH nearer the USA (eg Canada, West Indies etc.) If these proposals go through, it will probably be some time before you hear your next VE owing to States-side QRM. If the FCC feels that the phone segments of their bands are too cramped, why permit phone patch traffic on an amateur band? This is nothing less than using the band for commercial purposes and it would seem logical and equitable to get rid of this type of operation and restore the band to a true amateur status.

The Americans contend that a larger phone segment will induce their General Licence holders to strive for a higher grade of licence. No greater inducement is apparently necessary, as an analysis of the various classes of licence in operation last year revealed that the total number holding Advanced or Extra Licences in the autumn was 66,235, an increase of 3,589 since the spring of that year.

If the American proposals go through, one can assume that there will be more than 66,235 extra amateurs licensed to operate phone between 14·150 and 14·200MHz, who already enjoy the privilege of higher power limits and larger frequency allocations.

Yours faithfully,
Findlay Baxter, GM3VEY

The FCC has said that it will accept individual comment without requiring the usual 14 copies. The address is: Secretary of the Federal Communications Commission, Washington DC 20554, USA. —Editor.

The Editor
Radio Communication

Sir—There have been several defences raised recently on behalf of those who operate "plug-in appliances". These usually plead domestic commitments, long working hours or lack of workshop facilities. For many of us, however, the reason is much simpler. It is difficult to get suitable components. In pre-war days it was easy. Components were cheap and plentiful and every town had its back-street junk shops. Now, one can spend a considerable time searching without success for even basic requirements, such as a mains transformer for a transmitter. There are mail order houses, but postal services are still working at only half efficiency and my own experience of buying components "blind" has been far from encouraging.

Why then should we blame the man whose prime interest is communication for buying a ready made "box" which satisfies his needs? Those concerned with propagation or aerial experiments could not care less what is in the box and their time is better spent in operating than in searching for bits. After all, we do not expect an accountant to service the adding machine.

The cw fraternity deserve a special mention. They, poor fellows, cannot even buy a "box" without paying for expensive and superfluous modulation equipment. There is not even a kit suitable for the job.

Yours faithfully,
Frank Spencer, G4AH

CONTEST NEWS

70MHz Fixed Station Contest—Results

The entry of 24 stations for this contest, held on 7 February, was good considering the need for contestants to delay posting the logs until after the postal strike. It seems that a contest always encourages people to shake the dust out of their 4m rigs. What a pity that this desirable piece of frequency real estate is so neglected at other times.

Conditions for the contest were generally agreed to be somewhat better than average though as usual there were a few pessimists who could find nothing good to say about propagation.

The top of the table looks like a 70MHz "Who's Who", with G3OHH, G3VPK, G3RLE and G3IAR all in the first five. They are joined by a newcomer to 4m, in the person of G3ZYC, who is still better known as G8AUE. Obviously the new callsign is to be as well used on the lower frequencies as the old one was on uhf.

At least three EI stations appear in the logs, but they seem to have had a hard time, being unable to penetrate far enough to beat the longest distance QSO of 328km between G3RLE and G3GVM.

Posn	Callsign	Score	QSOs	County	Power	Best dx (km)
1	G3OHH	359	56	SD	50	295
2	G3VPK	252	45	EX	50	305
3	G3ZYC	249	48	DY	30	315
4	G3RLE	226	36	YS	50	328
5	G3IAR	181	48	KT	15	G2AMV
	G3YFM	181	42	BE	25	—
7	G2AMV	176	40	CH	25	G3IAR
8	G3FDW	152	28	NM	50	280
	G6HD	152	46	KT	32	288
10	G3GVM	147	33	HE	50	328
11	GD2HDZ	140	16	IM	40	G3MOT
12	G3EKP	114	31	LE	20	370
13	G3TDM	101	39	LD	15	213
14	G3HBG	100	30	SY	30	290
15	G3FZL	94	19	LD	25	G3VNQ
16	G3ZMD	89	31	BD	12	G3VPF/P
17	G3TDR	87	40	MX	45	G3OHH
18	G3REP	83	16	GR	30	G3RLE
19	G3VNQ	70	23	LE	50	317
20	G3WWF	65	18	YS	25	264
21	G5UM	64	17	LR	24	270
22	G3WOR	56	20	SX	40	—
23	G3WJG	51	36	MX	15	G3GVM
24	G3VEB	23	17	CH	12	75

Check log from G2WS/P acknowledged with thanks.

144 MHz CW Contest—Results

The resumption of postal services revealed the winner of this year's 144MHz CW Contest as GW3UCB/P, the club station of UCNW* Bangor, with a comfortable 67-point lead over G3NNG who as runner-up preserves his record of success in this contest. Both stations will receive certificates of merit.

Only two groups cared to brave the cold and high winds on this occasion: GW3UCB/P, justly rewarded for its efforts; and GW3VKL /P which, having climbed to 2,900ft asl, was forced to close down at 1235gmt when its tent collapsed. Under such circumstances the kindest word which anyone could find to describe conditions was "average", and several logs show contacts conducted at signal levels where cw is the only effective mode. G3NNG made the longest QSO of the contest with PA0CSL, from whom he also received the lowest signal report: RST 419!

A number of stations commented on the frequent use of VFOs for co-channel working, and only one voice was raised against this practice. Most entrants' equipment was quite conventional, QQVO6-40A PAs and either fet or nuvistor converters being the rule, but transistor transmitters were in use at G3NNG, GW3VKL/P and G6HD.

Comments

G3TIR: Timing and duration found ideal.

GW3VKL/P: Wind speeds made standing upright difficult . . . thoroughly enjoyed . . . another go next year.

G3FYX: Not much activity heard from the north.

G3JYP (Westmorland): Heard lots of stations for brief periods, including PA0PCD, but on the whole conditions were terrible.

G3LCH: Over 50 per cent of my contacts were on my own frequency.

G3FZL: Whole cw band in use up to 144·15MHz . . . many stations using net frequency operation.

G6HD: First appearance on 2m for 19 years . . . don't think I have ever been quite at the bottom of the list before.

Posn	Callsign	Score	QSOs	County	Power	Best dx
1	GW3UCB/P	348	53	DB	80	G3DAH
2	G3NNG	281	50	BE	25*	PA0CSL
3	G3FZL	230	49	LD	150	G2SU/A
4	GW3MFY	209	33	GN	90	G3DAH
5	G2SU/A	190	26	YS	30	G3DAH
6	G3TIR	179	38	SX	80	G2AMV
7	G3IAR	171	45	KT	30	PA0CSL
8	G3POI	170	48	LD	40*	PA0CSL
9	G2AMV	169	31	CH	25	G3TIR
10	G3WSN	164	35	EX	75	GW3UCB/P
11	G5UM	149	33	LR	21	EI6AS
12	G2WS	148	31	ST	84	G3DAH
13	G3FYX	143	30	GR	80	G3DAH
14	G5DF	130	40	BE	100	GW3UCB/P
15	G3AKF	128	39	OX	80	G3DAH
16	G3NYY	117	39	LD	50	GW3UCB/P
17	G3XFA	115	42	MX	100	GW3UCB/P
18	GW3VKL/P	112	21	BR	12	G3USB
19	G3OHH	101	25	SD	90	G3TIR
20	G3THY	94	28	EX	140	GW3UCB/P
21	G3JYP	93	13	WD	100	G6GN
22	G3NNK	87	26	EX	100	GW3UCB/P
23	G2HH	45	13	WE	10	G3IAR
24	G3OTK/A	26	10	GR	5	G3DAH
25	G3LCH	19	15	LD	15	G3IMV
26	G6HD	15	9	KT	0·18	G3JVL

*output

Late entry: G3YCT (claimed score 68 points)

RSGB 21-28MHz Telephony Receiving Contest—9-10 October 1971

The attention of participants is drawn to new rule 7.

1. Eligible entrants. The contest is open to short-wave listeners throughout the world. All entrants agree to be bound by these rules. Only the entrant may operate his receiving station for the duration of the event. Holders of amateur transmitting licences are not eligible to take part.

2. Duration. The contes will start 0700gmt on Saturday 9 October and end at 1900gmt on Sunday 10 October 1971. The RSGB 21-28MHz Telephony Contest for transmitting amateurs will take place during the same period.

3. Entries. (*a*) To count for points, logs must show, in columns: (i) Date/time gmt: (ii) Callsign of station heard; (iii) Report and serial number sent by station heard; (iv) Callsign of the station being worked; (v) Bonus points claimed; (vi) Total points claimed.

(*b*) Entries should be set out on *one side only* of foolscap or International A4 size paper, must be postmarked not later than 25 October 1971 and must be addressed to RSGB HF Contests Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey, England. The name of the contest must be shown clearly at the top left hand corner of the envelope. Log sheets are available from RSGB headquarters.

(*c*) All entries must contain the following declaration:

"I declare that this receiving station was operated strictly in accordance with the rules and 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 an amateur transmitting licence."

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

4. Scoring. British Isles entrants may only log overseas stations working UK stations in 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 purposes of scoring. CQ or test calls will not count for points.

British Isles entrants. Each complete log entry will score five points. In addition a bonus of 50 points may be claimed for the first station logged in each new country. For the purposes of scoring, the RSGB countries list will be used, with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries. The final score on 28MHz only is to be multiplied by five.

*UCNW—University College of North Wales.

Overseas entrants. Each complete log entry relating to a British Isles station heard will score five points. In addition, a bonus of 50 points may be claimed for the first station heard in each British Isles country-numeral prefix, ie G2, G3, GM4, etc, as listed in Rule 5 for the transmitting contest. The final score on 28MHz only is to be multiplied by five.

5. Awards. The Metcalfe Trophy and a certificate will be awarded to the leading British Isles entrant. In addition, certificates will be awarded to the British Isles runners-up and to the 1st, 2nd and 3rd overseas entry.

6. The Council of the RSGB reserves the right, on the recommendation of the Contests Committee, to reject any entry that is consistently inaccurate.

7. The practice of logging a long series of contacts made by one station is deprecated. Therefore, the same G home callsign shall not appear more than 20 times on each band in British Isles logs. Neither shall the same overseas station appear more than 20 times on each band in logs from overseas entrants.

RSGB 21-28MHz Telephony Contest—9-10 October 1971

Radio amateurs throughout the world are again invited to take part in the 21-28MHz Contest for single-operator stations. Due to the likely deterioration in the sunspot cycle, 21MHz has been reintroduced. However, in order to maintain maximum interest and activity on 28MHz the final score obtained on 28MHz only will be multiplied by five. See Rule 5.

1. The **General Rules** for RSGB HF Contests, published in the January 1971 issue of *Radio Communication*, will apply.

2. When. 0700gmt on Saturday 9 October to 1900gmt on Sunday 10 October 1971.

3. Eligible entrants.

Home section. RSGB members resident in the British Isles.

Overseas section. Licensed amateurs in all parts of the world except the British Isles.

4. Contacts may be made using any telephony system for which the entrant is licensed, on the 21 and 28MHz bands.

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).

British Isles stations. Each completed contact on both bands will score five points. In addition, a bonus of 50 points may be claimed 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 a separate country. The final total on 28MHz only is to be multiplied by five.

Overseas stations. Each completed contact with a British Isles station will score five points. In addition, a bonus of 50 points may be claimed 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 score five points only. The final total on 28MHz only is to be multiplied by five.

6. Entries must be addressed to the RSGB HF Contest Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey, England.

7. Trophy. The Whitworth Trophy will be awarded to the leading home section entrant.

DF Qualifying Round—South Manchester

Date: 13 June 1971.
Map: OS Sheet 101 (Manchester)
Assembly: 1300bst for start at 1320bst.
Location: NGR 808848 Disused road (formerly a part of A538) near "The Romper" public house. Frequencies and callsigns will be announced at the start.

The event is being organized by the South Manchester Radio Club, and intending competitors are asked to notify Mr D.C. Holland, G3WFT, 7 Alcester Road, Sale, Cheshire M33 3GW, of the numbers in their parties requiring tea. Please advise him as soon as possible, and in any case not later than 1 June. Due to recent road developments near the start, competitors may find a large scale map useful in locating the assembly point, and this will be provided by the organizers without charge upon receipt of a stamped addressed envelope.

The DF Final will be held on 19 September. Details will be announced later.

July 1971 144MHz Open Contest

1800gmt 3 July to 1800gmt 4 July

All entries and checklogs must be sent to the adjudicator addressed to : VHF Contests Committee, c/o G3SEK, 89 Arthur Road, Wimbledon, London SW19.

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

July 1971 432MHz Open Contest

0900gmt to 1700gmt 18 July

All entries and checklogs must be sent to the adjudicator addressed to: VHF Contests Committee, c/o G3VIR, 14a Roman Way, Hale Road, Farnham, Surrey.

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

Contests calendar

16 May—Second DF Qualifying Round—Rugby (Rules in April issue)
21-23 May—YL ISSB QSO Party
22-23 May—432MHz Open (Rules in March issue)
5-6 June—NFD (Rules in February issue)
5-7 June—CHC/FHC (phone and cw)
13 June—DF Qualifying Round—South Manchester (Rules in this issue)
19-20 June—Bermuda CW
20 June—WAB VHF Phone Contest
20 June—Microwave (Rules in April issue)
27 June—70MHz Portable (Rules in April issue)
3-4 July—Summer 1·8MHz
3-4 July—144MHz Open (Rules in this issue)
3-4 July—144MHz Listeners Contest
10-11 July—HP FD (Rules in March issue)
18 July—432MHz Open (Rules in this issue)
18 July—432MHz Listeners Contest
7-8 August—WAE CW
9 August—144MHz SSB
14-15 August—70MHz CW
28-29 August—All-Asian CW
4-5 September—VHF NFD (Rules in March issue)
11-12 September—WAE phone
12 September—80m FD
19 September—DF Contest Final
2-3 October—UHF NFD
2-3 October—VK/ZL/Oceania phone
9 Oct-30 Dec—70MHz Cumulative
9-10 October—21-28MHz Telephony (Rules in this issue)
9-10 October—VK/ZL Oceania CW
23-24 October—7MHz (cw)
30-31 October—432MHz Fixed
30-31 October—CQ WW DX'phone
6-7 November—144/432MHz CW
6-7 November—7MHz (phone)
6-8 November—CHC/FHC (phone and cw)
7 November—OK Contest
13-14 November—2nd 1·8MHz
27-28 November—CQ WW DX CW
5 December—144MHz Fixed

Looking ahead

7 May—RAOTA Reunion.
9 May—NRSA Convention.
17 May—World Telecommunication Day.
25-27 June—IARC Convention, Geneva.

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.
1971 Belle Vue Convention 9 May. Talk-in stations on 2, 4 and 160m. Exhibition station GB2BVC on hf bands. All contacts QSLd. The RSGB President will present the G8AYD Trophy.

Merseyside Luncheon Club—First Monday in each month, 12.30 for 12.45pm on HMS *Landfall*. Please advise G3VQT or G2AMV if you wish to attend.
Ainsdale (ARC)—12, 26 May, 9 June, 8pm, The Morris Dancers, Scarisbrick.
Allerton (Liverpool) Scout ARS—Thursdays, 8pm, 1st Allerton Group HQ, Aigburth Vale, Liverpool 17. All Scouts interested in amateur radio are welcome.
Blackburn (East Lancs ARC)—First Thursday in each month, 7.30pm, Edinburgh House, Shearbank Road, Blackburn. Further details from G4JS.
Blackpool (B & FARS)—Mondays, 8pm, Pontins Holiday Camp, Squires Gate. Morse tuition 7.30pm,
Bolton (B & DARS)—5, 19 May, 2 June, The Clarence Hotel, 176 Bradshawgate, Bolton. Secretary, C. R. Marflow, 243 Gidlow Lane, Wigan.
Bury (B & RRS)—Second Tuesday in each month, 8pm, George Hotel (private room), Market Street, Bury. Secretary, G3VVQ, 411 Holcombe Road, Greenmount, Bury. An interesting talk on Trio equipment was given by G3LLL of "Holdings Blackburn" at the March meeting and members were invited to operate the gear. The next meeting was to have been a talk on central heating by Stan Parker; however, he is taking the RAE on that date, good luck to him and all others taking the exam this year. The secretary is being pressed to give a talk on cabinet construction.
Carlisle (C & DARS)—Mondays, 7.40pm, Currock House, Lediard Avenue, Currock. Secretary A. Harper, 23 Roman Way, Carlisle.
Cheshire (Mid-Cheshire ARC)—Wednesdays, 7pm, Technical Activities Centre, Winsford Verdin Grammar School, Grange Lane, Winsford. All meetings begin with a morse class; main feature at 8pm.
Chester (C & DARS)—Meetings on Tuesdays except for the first Tuesday in each month which is net night, 8pm, YMCA Chester. Further details from G8AYN, QTHR.
Crewe—Local members continue to meet at the QTH of R. Owen, 10 Circle Avenue, Willaston, Nantwich, from whom further details may be obtained.
Douglas (D & DARS)—Second and fourth Wednesdays in each month, 7pm, Douglas Holiday Camp, Victoria Road, Douglas, IOM. Secretary, J. Parnell, Upper Cronkbane Farm, Quines Hill, Port Soderick, Braddan, Isle of Man.
Eccles (E & DRC)—Tuesdays, 8pm, Bridgewater School, Worsley, Lancs. Thursdays, club top band net, 2030gmt.
Leyland Hundred Amateur Radio Group—Net nights: Thursdays, 2000 gmt, 1,915kHz; Saturdays, 1900gmt, 145·8MHz.
Liverpool (L & DARS)—Tuesdays, 8 pm, Conservative Association Rooms, Church Road, Wavertree. Secretary, G3WCS, Ken Wood, 90 Childwall Valley Road, Liverpool 16.
Liverpool (NLRC)—7, 21 May, 4 June, 8pm, Labour Party Headquarters, 13 Crosby Road South, Liverpool 22. Secretary M. Graham, G3XMG, 14 Albert Road, Waterloo, Liverpool 22.
Manchester (M & DRS)—Wednesdays, 7.30pm, 203 Droylesden Road, Newton Heath, Manchester 10.
Manchester (SMRC)—7 May (DF practice), 8 May (South Manchester DF Contest. New members are welcome to this event if they wish to practice for future RSGB contests. Starts at NGR 808.848, Map 101, 2pm for 2.20 start (bst). Tea not provided). 14 May (Club AGM), 21 May ("Vhf talk", by G3FNM.) 28 May (Activity night). All the above meetings except 28 May will be at 8pm, 449 Palatine Road, Northenden, Manchester 22. These premises are being sold by the present owners. From 28 May the club will meet at Sale Moor Community Association Centre, Norris Road, Sale, Cheshire. The vhf section of the club meets on Mondays, 8pm, "Greeba", Shady Lane, Manchester 23. Secretary, G3WFT.
Preston (PARS)—13, 27 May, 7.30pm, Windsor Castle (private room), St Paul's Square. Secretary, G. Windsor, 26 St Gregory's Road, Preston.
Salford (Dial House Radio Society)—A society of GPO engineers who meet on Wednesdays at 6pm, 8th floor (river end), Dial House, Chapel Street, Salford 3. Further details from the secretary at that address.
Stockport (SRS)—Second Wednesday in each month is a discussion night; fourth Wednesday is a lecture night. Club intends to be active in most vhf contests and also in HF NFD. 8pm, The Blossoms Hotel, Buxton Road, Stockport. Secretary, G8BCG.
Thornton Cleveleys (TCARS)—First and third Wednesdays in each month, 8pm, St John Ambulance Brigade Hall, Fleetwood Road North, Thornton, Blackpool. Secretary, G3YWH; ASR, G3ZBO.
Warrington (Culcheth ARC)—Fridays, 7.30pm, Chat Moss Hotel, Glazebury. All visitors are welcome. Secretary, K. Bulgess, 32 Hendon Street, Leigh.
Westmorland—Fridays, 7.30pm, 24 Park Road, Milnthorpe. All visitors are welcome. Secretary, J. Forrester, 44 New Street, Carnforth.
Windscale (Cumberland) (WAR & ES)—Fridays, 7pm, c/o Falcon Club, Falcon Field, Egremont. Further details from N. Ramsden, G3RHE.
Wirral (WARS)—First and third Wednesdays in each month, 7.45pm, Boy Scouts HQ, Harding House, Park Road West, Claughton, Birkenhead. Secretary, G3WSD, 34 Glenmore Road, Oxton, Birkenhead.
Wirral (Wirral DX Association)—Last Thursday in each month at members' homes. Further details from the secretary, G3OKA.

REGION 2 — RR K. Sketheway, BRS20185

Special event
The Yorkshire Television Amateur Radio & Television Society (G3YTV) is holding a social meeting on 15 May. It will commence at 1930 and end at 2030 and will be held on licensed premises. There will be no talk-in station and no gear on show. It will be just a chance to take out the YL or XYL for a visual QSO over an "807". Contact A. Peter Flood, G8DCT, QTHR.

Barnsley (B & DARC)—14 May (Visit to Air Traffic Control at RAF Lindholme), 28 May ("High power tx valves", by G8DHD), 7.30pm, King George Hotel, Peel Street, Barnsley. *G3LRP.*
Billingham (B & DARC)—A new club has been formed and it is to have a six-month "running-in" period with an AGM in September. It is planned to put an exhibition station on the air at Billingham Fete in early June and also at Billingham Show in late August. The club meets at the Community Centre, Billingham. Chairman is C. Todd, and the secretary is L. Crooks, 4 Victoria Grove, Fairfield, Stockton, Teesside, from whom further details can be obtained. *H. L. Wardill.*

Bradford (BRS)—4 May ("Aerials", by A. E. Ashby, G3HCW), 18 May (Sotherby's night—a chance to sell your purchase of 20 October), 1 June (Briefing for NFD), 7.30pm, 10 Southbrook Terrace, Great Horton Road, Bradford 7.
Durham (DCARS)—6 May (NFD preliminaries, component colour codes explained), 20 May ("Digital instrumentation", by Ted Nice), 7pm. Room 146, Durham University's Elvet Riverside Block, New Elvet, Durham City.
Fulford (York) (FARS)—Tuesdays, 7.30pm, Scout HQ, 31 George Street, York. *G5KC.*
Halifax (NHARS)—5 May ("SSB", by G3ADQ—provisional), 12 May (Discussion on vhf sponsored by G8AFV and G8BCL), 19 May (Discussion on NFD and /A stations), 26 May (Morse practice and ragchew), 2 June ("Economics of the shack", by G8BMI), 7.45pm, Peat Pitts Inn, Ogden, Nr Halifax.
Hartlepool (HARC)—Meetings are held every Monday, 7.30pm, Middlegate Room, Borough Buildings, Northgate, Hartlepool. At the recent AGM the following officers were elected: chairman, J. Thompson, G3KQU; secretary, J. W. Thompson, G3NWU. Visitors are always welcome. *S. Clements, BRS7323.*
Hull (H & DARS)—7 May (Your questions answered—general forum), 14 May (Swl night), 21 May ("Top band transmitter", by G3RDM), 29 May (Bash it, bend it and drill it), 7.45pm, 592 Hessle Road, Hull. On 1 January the club moved into a new room at the same address. This is larger and has four soundproof studios. A visit is arranged for members to the local radio station "Radio Humberside" on the 5 and 12 May. Two Wednesdays have been given for this on account of limited numbers. *H. E. Longson.*
Leeds (SSWC)—The Star Short Wave Club is now active every Wednesday at 8pm. Transmissions are on 2m and 160m cw, club station callsign is G3ZWA. Club meets on the last Wednesday in each month, Star & Garter Hotel, Bramley Town Street, Leeds 13. All visitors and new members welcome. *G8EEM.*
North Riding (NRARG)—Group meets on alternate Tuesdays and Thursdays fortnightly, in the back room of the Ship Inn, Falsgrave, Scarborough. Further details from the secretary, Jeff Jones, G3VLM, Bingley Private Hotel, Albermarle Hotel, Albermarle Crescent, Scarborough. *G3VLM.*
Scarborough (SARS)—Thursdays, 7.30pm, c/o RAF Association, Fulbeck House, 3 Westover Road, Scarborough.
South Shields (SS & SARC)—Fridays, 8pm, Trinity House Social Centre, Laygate, South Shields.
Sheffield (SARC)—Meetings held on the third Monday in each month, 8pm, Sheaf House Hotel, Bramall Lane, Sheffield. Secretary G3JMV. *G8NN.*
Spen Valley (SVARS)—6 May ("Vhf antennas", by A. E. Ashby, G3HCW), 13 May ("Lasers", by S. E. Warren at Bradford University), 20 May ("420MHz", J. P. Billingham, G8AAC), 7.30pm, The Grammar School, High Street, Heckmondwike.
Sunderland (SARS)—Meetings on the first and third Tuesday in each month, 7pm, Sunderland Polytechnic. *G3XID.*

REGION 3 — RR R. W. Fisher, G3PWJ

Special events
Midland VHF Assembly and Dinner—19 June, Oldbury, Nr Birmingham. For further details contact Mr G. Badger, G3OHC.
Mobile Rally—Upton Mobile Rally organized by Worcester and District ARC—11 July, Hill County Secondary School, Upton upon Severn. *G3WUI.*

Birmingham (MARS)—18 May ("55 years of amateur radio", by Mr N. Strong), 8pm, Midland Institute, Margaret Street, Birmingham 3.
(South)—5 May "Cases and chassis for electronics", by Mr R. Parish), 2 June (Sale of surplus equipment and discussion on NFD 1971), 8pm, Hampstead House (HQ), Fairfax Road, West Heath, Birmingham.
Cannock (CCARS)—Club meets on the first Thursday in each month, but there is a natter night every Thursday, 8pm, Bridgtown Social Club, Walsall Road, Bridgtown.
Coventry (CARS)—7 May (Night on the air), 14 May (Lecture on rtty), 21 May (Night on the air), 28 May (Lecture on vhf tv), 8pm, City of Coventry Scout HQ, 121 St Nicholas Street, Radford.
Dudley (DARC)—11, 25 May, 8pm, Central Library, St James' Road. *G3PWJ.*
Hereford (HARS)—7, 14 May, Defence HQ, Gaol Street, Hereford.
Leamington (MWAE & RS)—3 May (Visit to PO Radio Station, Bearley), 10 May "Simple resistance and capacitance measuring", by G3HCM), 17 May (Open meeting), 24 May ("Transistors", by G8CSS), 31 May (No meeting), 8pm, 28 Hamilton Terrace, Leamington. *G3ZCG.*
Lichfield (LARS)—First Monday and third Tuesday of each month The Swan Hotel, Lichfield. *G8CNB.*
Rugby (R & DAR & EC)—Every Tuesday, 8pm, 10 Drury Lane. 25 May (AGM), Small Lecture Room, The Percival Guildhouse, Rugby.
Solihull (SARS)—18 May (Talk by GPO on Birmingham Radio Station), 1 June (Informal meeting at the Malt Shovel, 9pm), Club meets 7.30pm, The Manor House, High Street, Solihull.
Stourbridge (S & DARS)—First Tuesday of each month, Longlands School, Stourbridge. For further details of meetings contact the secretary, Mr D. Robins, 3 Wolverley Avenue, Wollaston.
Sutton Coldfield (SCRS)—10 May ("Telecontrol and telemetry", by Mr Thom), 24 May (Natter nite), Clubhouse, Sutton Town Football Club, Coles Lane, G8CZM.
Telford (WARS)—Every Wednesday evening, 8pm, Ketley Bank Youth Club, Main Road, Ketley Bank, Telford. *G3UKV.*
Worcester (W & DARC)—15 May ("Computers", by G3SIC and G3RMF), 7.30pm, Crown Hotel, Broad Street, Worcester. Visitors are most welcome. *G3WUI.*

REGION 4 — RR T. Darn, G3FGY

Chesterfield (CADRS)—The next meeting of the society will be held at the Zion Methodist Church, Chatsworth Road, Chesterfield, where the society have acquired a meeting room. It is hoped this new venue will be permanent and will permit the club to meet continuously throughout the year. The club will have exclusive use of the room which will be available every Wednesday evening from 7 to 10pm. The room requires renovating and the club is anxious to get on with this project. Volunteers are required to contact the secretary or the president Mr J. Tweedy. *R. Nelson.*
Derby (DADARS)—5 May (Surplus sale), 12 May (Meters and their uses), 19 May (Df practice run), 26 May (Listening for dx and contest operating). All meetings are held at the clubroom, 119 Green Lane, Derby, commencing at 7.30pm. At the AGM in February the officials of the society were re-elected for yet another year of office. There are five new members on the committee and the club's membership and finances are still on the increase. The Diamond Jubilee Exhibition held during April was an outstanding success and the club is now preparing for the 14th Annual Derby Mobile Radio Rally to be held on Sunday 15 August.
Derby (NHCAARG)—Meetings every Friday. 7 May ("Homebrew equipment review"—bring yours), 14 May (Df practice run), 21 May (Surplus sale), 28 May ("More fun with logic", by G8BDO), 7.30pm, Room 7, Nunsfield House, Boulton Lane, Alvaston, Derby. *G3WFU.*
Grimsby (GARS)—13 May (Df hunt), 27 May (NFD organisation). *G8DEN.*
Heanor (SEDARS)—4 May (Slow morse), 11 May ("Listening for dx", by G3FGY), 18 May (Sale of surplus items), 25 May ("Forum" questions and answers), 7.30pm, South East Derbyshire College of Further Education, Ilkeston Road, Heanor, Derbys. *W. Clarke.*
Leicester (LRS)—The new secretary of the society is Trevor Adcock, 38 Wykes Road, Leicester, who will be pleased to forward information to any intending members or visitors to this old established society.
Lincoln (LSWC)—Club meets every Tuesday. Club net every Sunday morning at 11am on 3·7MHz. 4 May (Club visit to the Telephone Exchange), 11 May (Operating night), 18 May (Treasure hunt), 25 May (Open night), No 2 Guardroom, Sabraon Barracks, Breedon Drive, off Burton Road, Lincoln.
Mansfield (MRS)—First Friday in each month, 7.30pm, New Inn, Wesgate, Mansfield. Everyone welcome. *G8HZ.*
Melton Mowbray (MMARS)—The meeting for May will be a visit to the shack of L. Fisher, G4MK, on Friday 21 May. *R. Winters.*
Newark (NARC)—The club meets on the first Friday in each month, 7.30pm, Newark Technical College. Informal club meetings are also held there every Tuesday at 7pm. The new secretary is Peter Scragg, G3YCT, 38 Norwood Gardens, Southwell, Notts, telephone Southwell 2377.
Nottingham (ARCON)—Club meets every Thursday at the Sherwood Community Centre, Mansfield Road, Nottingham. Preparations are being made for NFD and the 1971 Festival of Nottingham. All enquiries to M. R. Harris, G3VUI. *G3YOT.*

REGION 5 — RR S. J. Granfield, G5BQ

Bedford (B & DARC)—6 May ("Transistorized amateur band rx", by G3XDU), 13 May (NFD planning, G3UQR), 20 May (Junk sale, G3XKB), 27 May (Converters, transverters, and complete rig, G8ALQ, G8CXM, G3SOA). The hon secretary is John Bennett G3FWA, 47 Ibbett Close, Kempston, Bedford. *G3VKP.*

G3RAC sale

There was an attendance of 208 at the Racal ARC "surplus" sale on 13 March at Bracknell, and most of the attractive items changed hands. G3RAC portable station was in operation and six Racal receivers were available for operation by the visitors. Incredibly, very few were interested in either the station activity or in trying the professional receivers. Even a synthesizer-locked RA117 and the RA1220 (with digital read-out to ± 1Hz, frequency lock on selected frequency or 100Hz steps), attracted little or no attention. This surprised the members of the Racal Club at first, but after a bit of thought it was obvious that the electronic goodies lying around for sale plus the competition from a hundred or more other purchasers effectively diverted attention.

Two views of the sale in progress

Cambridge (C & DARC)—7 May (Informal), 14 May (NFD planning), 21 May (Informal), 28 May (Equipment sale), 4 June (NFD preparation). At the AGM the following officers were elected: president, Mervyn Lay; treasurer, Ray Bell, G3NIE. The Granfield Cup was awarded to Peter Simpson, G3GGK. The hon secretary is Dennis Unwin, G8CKU, 11 Carlton Rise, Melbourn, Royston, Herts.
Shefford (S & DRS)—6 May ("Skipping the layers", by Bill, G3TDW), 13 May (Club equipment—discussion), 20 May (Df hunt—Walt, G2AUA), 27 May (Old versus new—Arthur, G2DGF). The hon secretary is A. Sullivan, G2DGF, 12 Glebe Road, Letchworth, Herts.
Stevenage (S & DARS)—Meetings held on the first and third Thursdays in each month. New members would be most welcome. Full details from the hon secretary, F. Collett, G3OVT, 8 Silam Road, Stevenage, Herts.

REGION 6 — RR L. W. Lewis, G8ML

Cheltenham (RSGB Group)—First Thursday in each month, 8pm, "Royal Crescent", Clarence Street, Cheltenham. *G2FWA.*
Gloucester (GRS)—First three Thursdays in each month, the Old Drill Hall, Chequers Road, Gloucester. Fourth Thursday at RAFA Club, Spa Road, Gloucester. After this month no meeting until September. *G3MA.*
South Bucks VHF Club—1 June (Sales demonstration of vhf equipment), 8pm, Bassetsbury Manor, High Wycombe.

REGION 7 — RR P. A. Thorogood, G4KD

Thanks for all your reports; sorry I could not fill in some in time for last month. Late news for GB2RS broadcasts should reach RSGB HQ by each Thursday.

Acton, Brentford & Chiswick (ABCRC)—18 May (General discussion), 7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick.
Addiscombe (AARC)—Second and fourth Tuesdays, 7.30pm, Prince George Hotel, High Street, Thornton Heath.
Ashford, Echelford (ARS)—Second Monday and last Thursday of month. 10 May ("Principles of PAL colour television", by Mr Blatt from RCA Training Department), 27 May (Mr J. R. Turner of the Post Office Telecommunications Office will be discussing radio interference in general and the detection of unlicensed transmitters, etc), 7.30pm, St Martin's Court, Kingston Crescent, Ashford, Middx.
Barking (BR & ES)—Tuesdays and Thursdays, 7.30pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking.
Bexleyheath (NKRS)—Second and fourth Thursdays. 13 May (AGM), 7.30pm, Congregational Church Hall, Chapel Road, Bexleyheath.
Cheshunt (CDRC)—First Friday in each month, 7.30pm, Methodist Church Hall, opp Theobalds Station, Cheshunt. At the last AGM the following officers were elected: chairman, G. L. Childs, G3XEW; treasurer, T. P. Edwards, G8ASE; committee, K. Arnold, G3XNP, R. Ludwell, G3ZZQ. The secretary is A. F. Webb, G8AHG, 3 Roseneath Walk, Enfield, Middlesex.
Chingford (RSGB Group)—Fridays, telephone 01-524 0308.
Chingford (SRC)—Fridays, 7.30pm, Friday Hill House, Simmons Lane, Chingford E4.
Croydon (SRCC)—Third Tuesdays, 7.30pm, "Swan & Sugarloaf", South Croydon.
Crystal Palace (CP & DRC)—15 May (to be announced via GB2RS), 8pm, Emmanuel Church Hall, Barry Road, SE22.
Dorking (DR & DRS)—Second and fourth Tuesdays, "Wheatsheaf", Dorking.
Ealing (E & DARS)—Tuesdays, 7.30pm, Northfields Community Centre, Northcroft Road, W13.
East London—May (Listen to GB2RS for latest news), 2.30 for 3pm, Wanstead House, The Green, E11.
Edgware & Hendon (E & DRS)—Second and fourth Mondays in each month, 8pm, St George's Hall, 51 Flower Lane, Mill Hill, NW7.
Farnham, Bucks (Burnham Beeches RC)—Fortnightly on Mondays. 6 May (Brains trust), 20 May (NFD discussion), 7.45pm, Buffaloes Hall, "Victoria" public house, Victoria Road, Farnham Common, Bucks.
Gravesend (GRS)—Every Thursday, 8pm, Northfleet Recreation Centre, Springfield Road, Northfleet, Gravesend.
Greenford (GARS)—14, 28 May, 7.30pm, Greenford Community Centre, Oldfield Lane, Greenford. *G3OHX*, telephone Uxbridge 33861.
Guildford (G & DRS)—Second and fourth Fridays, Guildford Engineering Society, Stoke Park.
Hampton Court (TVARTS)—First Wednesday in each month, 8pm, "The Three Pigeons", Portsmouth Road, Surbiton.
Harlow (DRS)—Tuesdays (General and cw practice); Fridays (Junior), 7.30pm, Mark Hall Barn, First Avenue.
Harrow (RSH)—Every Friday, 8pm, Harrow County School for Boys, Sheepcote Road.
Havering (H & DARC)—Fortnightly, 8pm, British Legion House, Western Road, Romford.
Hemel Hempstead (HH & DARS)—First and third Fridays, 7.30pm, "Addmult" Sports Club, Hemel Hempstead.

Holloway (GRS)—Mondays (RAE), 7pm; Wednesdays (Morse), 7.30pm; Fridays (Club), 7.30pm, Archway School Annexe, Whittington School, Highgate Hill, N19.
Ilford—Every Thursday, 8pm, 50 Mortlake Road, (off Ilford Lane), Ilford.
Kingston (K & DARS)—Second Wednesday in each month, 12 May ("Introduction to ICs", by R. S. Babbs, G3GVU), 8pm, Penguin Lounge, 37 Brighton Road, Surbiton.
London (UHF Group)—First Thursday in each month. Telephone 959 3528, or on the day, 405 5122.
Loughton—Fortnightly on Fridays, Loughton Hall, Rectory Lane, (nr Debden station).
New Cross (CARS)—Wednesdays and Fridays, 8pm, 225 New Cross Road, SE14.
Paddington (P & DARS)—Thursdays, 7.30pm, Beauchamp Lodge, 2 Warwick Crescent, W2. At the recent AGM the following officers were elected: president, W. Bailin, G3NOZ; chairman, A. Copperwaite, G8AQO; vice-chairman, P. Kerry, G8ARO; hon secretary, M. Pawley; treasurer, T. Collins. Club net is being revived on Sundays at 8pm on 2m.
Purley (P & DRS)—First and third Fridays, 8pm, Railwaymen's Hall, (side entrance), 58 Whytecliffe Road, Purley.
Reigate (RATS)—First Wednesday in each month, 7.45pm, "George and Dragon", Cromwell Road, Redhill.
Romford (R & DRS)—Tuesdays, 8.15pm, RAFTA House, 18 Carlton Road.
Scouts (ARS)—Third Thursday in each month. 20 May (Specia meeting to assist finances), 7.30pm, Baden Powell House, Queensgate, South Kensington, S7.
Sidcup (CVRS)—6 May ("The RSGB and Region 7", by P. A. Thorogood, G4KD), 20 May (Natter night), 3 June ("Transarctic expedition", by D. J. Collins, G2FLB), Eltham Congregational Church Hall, 1 Court Road, SE9.
Southgate (SRC)—Second Thursday in each month, 7.30pm, Civil Defence Hut, Bowes Road, N11.
St Albans (Verulam ARC)—27 May (G2MI—talk and film show on his visit to Bermuda), 8pm, Town Hall, St Peter's Street, St Albans.
Sutton & Cheam (SCRS)—Third Tuesday in each month. 18 May (NFD 1971-discussion), 8pm, The Harrow Inn, High Street, Cheam. At the last meeting 18 members and visitors enjoyed a talk given by Tim Hughes, G3GVV. Latest news of Les Cooper, G5LC, is that he is likely to be home in June.
Welwyn (Mid-Herts ARS)—Second Thursday in each month, 8pm, Welwyn Civic Centre, Welwyn.
Wimbledon (W & DRS)—Second and last Fridays in each month. 14 May (Talk and demonstration by G3EPU on cw. Come and test your cw, also a simulated GPO morse test, etc), 28 May (Junk sale) 29, 30 May (Proposed camp at Tadworth). The club now has a new secretary, Mr F. W. Hill, G3WDO, QTHR. Assistant secretary is Mr K. M. Bailey, G3EPU. Club callsign is G3WIM.
Wembley (GECARS)—Thursdays, 7pm, Sports Club, St Augustine Avenue, North Wembley. (This club is open to non-GEC employees by invitation. Telephone Dain Evans, G3RPE, 904 1262, for details.

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

Brighton (BTCRC)—3 May (Ragchew and G3TCB on the air), 17 May ("Speech processing", by G3VFO).
Canterbury (EKRS)—20 May (Film show), 24 June ("SSB", by G3MDO), 22 July ("Electronic clock", by G3WAW), 19 August (Phase lock oscillators).
Crawley (CARC)—7 May (Annual dinner and dance, to be held at the Airport Hotel, Crawley, 7 for 7.30pm. Details and tickets from G3FRV, QTHR), 26 May ("Contest and dx operating", by Hal Perkins, G3NMH), 7.45pm, Trinity Congregational Church Hall, Ifield, Crawley.
Dover (SEKYMCAARC)—Meetings held every Thursday, 7.30pm, YMCA Leybourne Road, Dover.
Eastbourne (SARS)—Meetings held on the first Monday in each month, Victoria Hotel, Latimer Road, Eastbourne.
Maidstone (MYMCAARS)—30 May (Mobile rally). Meetings held every Friday, 'Y' Sports Centre, Melrose Close, Loose, Maidstone. All enquiries for the mobile rally, to be held at 'Y' Sports Centre, to G3WXL, QTHR.
Medway Club—Meetings every Friday, Aurora Hotel, Gillingham. Preparations are now underway for a mobile rally to be held in May. Further details—see Mobile Rally News.
Mid-Sussex (MSARS)—20 May (Constructional contest and film show,) 17 June (Sale of surplus equipment), 24 June (Mobile evening at Jack and Jill Windmills).
Worthing (W & DARC)—Meetings held every Tuesday at "Rose Wilmot Youth Centre", Littlehampton, Worthing. Details from G6KFH/T.

REGION 9 — RR J. Thorn, G3PQE

Book the date of Sunday 19 September for a visit to Weston-Super-Mare for the Regional Meeting and Convention at the new Weston-Super-Mare Technical College on the sea front.

Appeal to any members and young keen types known in the Bude, North Devon area to contact G4CG with a possibility of forming a new club there.

Bristol, City & County (BARC)—Tuesdays and Thursdays at the club HQ, 41 Ducie Road, Barton Hill, Bristol 5. *G3RKH.*
Bristol RSGB Group (RSGB)—Monday 24 May ("World-wide reminiscences", by Sir Evan Nepean, G5YV), 7pm, Becket Hall, St Thomas Street, Bristol 1. At the AGM in February the following officers were elected: Chairman, K. Otway, G8AGT; secretary, B. Croker, G3ULJ. NFD will be organized by E. Halliday, G3JMY, Longleat will once again be held on 27 June on the usual site. *G3ULJ.*
Shirehampton Club—Every Friday, 7.30pm, Twyford House. An RAE course is in progress, also morse tuition under M. Wilkins. *G3SXY.*
University of Bristol—Every Saturday afternoon, Dept of Physics, Royal Fort, Tyndall Park Road, Bristol. *G8ADP.*
North Devon (NDRC)—12 May (Technical topics), 26 May (Chinwag), 7pm RAE, "Grinnis", High wall, Sticklepath, Barnstaple. *G4CG.*
Plymouth (PRC)—First and third Tuesdays in each month. 4 May (AGM), 18 May (Open meeting), 1 June (Talk), Virginia House, Batter Street, Bretonsidd, Plymouth. *G3SPI.*
Torbay (TARS)—29 May (NFD discussion and final gen). Club meets every Tuesday and Friday at club HQ, rear of 94 Belgrave Road, Torquay. A warm welcome to summer visitors. *G3NQD.*
Weston-Super-Mare (WSMRS)—7 May (Lecture on "facsimile", by K. Otway, G8AGT), 4 June (Lecture), 7.30pm, Ground Floor Lecture Theatre, New Technical College. A lecture by G. Twist, G3LWH, on his "quad construction", and another on "amateur television", by R. Robson, G8AGI, were very much appreciated by an interested gathering recently. *G3GNS.*
Yeovil (YARC)—Every Thursday. 6 May ("Amateur radio in South Africa", by H. J. Carstens, ZS1KZ), 7.30pm, Youth Centre, Park Lodge, Yeovil. *G3NOF.*

Active clubs and societies are also being run in the following places but no information about them has been received to publicise their meetings: Bath, G8DUQ; Burnham-on-Sea, G3GIW; Cornish, G3UCQ; Exeter, G3TXG; Saltash, G3XWA; South Dorset, G3EAT.

REGION 10 — RR D. M. Thomas, GW3RWX

Blackwood (ARC)—Fridays, 7pm, Blanche Cottage, off High Street, Blackwood, Mon. *G6BK.*
Barry College of Further Education (ARS)—Thursdays, 7pm, Barry College of Further Education, Colcot Road, Barry, Glam. See separate notice for Marconi Commemoration of Bristol Channel Tests 1897. *GW3VKL.*
Cardiff (RSGB Group)—Monday 10 May, 7.30pm, TA Centre, Park Street, Cardiff. See separate entry for details of mobile picnic at Porthkerry Park, Barry, on Sunday 16 May. *GW3GHC.*
Glamorgan Raynet Group—Full details of meetings and exercises from GW3ZFG, telephone Cardiff 62411.
Haverfordwest (ARS)—Tuesdays, 7.30pm, HQ Rosemary Lane, Haverfordwest, Pembs. Club callsign is GW3XCT. *GW3YBB.*
Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, Nr Merthyr. The hon secretary is Mr F. E. Tribe.
Port Talbot (ARC)—Second Tuesday in each month, 7.30pm, Trefelin Club & Institute, Port Talbot, Glam. *GW5VX.*
The annual social will be held on Tuesday 11 May at the above meeting place. Refreshments will be provided, and invitations have been sent to all South and West Wales amateur centres. The social will commence at 7.30pm, and it is hoped to see all old and new friends, and to make the event its usual success. If you have not heard via other sources and you will be attending, please let the secretary know immediately.
Pontypool (ARC)—Tuesdays, 7pm, Educational Settlement, Rockhill Road, Pontypool, Mon. *GW3JBH.*
Pembroke (ARC)—Meetings held on the last Friday in each month 7.30pm, Defensible Barracks, Pembroke Dock, Pembs. Please see Mobile Rally News for Bucket & Spade Party on 13 June. *GW3LXI.*

Sully & District Shortwave Club—Tuesdays, 7pm, The Annexe, Sully Bowls & Social Club, 59 South Road, Sully, Glam. The hon secretary is Mr Glyn Maggs, 3 Thorley Close, Cyncoed, Cardiff.
Rhondda (ARS)—Club meets at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glam. *GW3PHH.*
Swansea Telephone Area (ARS)—Tuesdays, 7.30pm, Telephone Engineering Centre, Gors Road, Swansea. Club callsign is *GW3ZTK.* The hon secretary is Mr D. E. Connor, 7 Glanmon Road, Sketty, Swansea, Glam.
University College, Cardiff (ARS)—For details of meetings and future activities contact the secretary, Students Union, Dumfries Place, Cardiff. Club callsign is GW3UWC.
University College, Swansea (ARS)—Details of future meetings from the secretary, Students Union, University College, Singleton Park, Swansea, Glam.

REGION 11 **RR P. H. Hudson, GW3IEQ**

Bangor (UCNWARS)—Meetings alternate Thurdsays, 5.15pm, Small Lecture Theatre, Engineering Dept, Dean Street, Bangor. Anyone interested in radio, and coming to the University for an interview, is invited to get in touch with the secretary, G3UUT.
Conway Valley (CVARS)—20 May ("More about vhf and uhf", by Mr G. Barnes, G3OAS, the technical sales representative of GEC), 7.30 for 8pm, Parade Hotel, Llandudno.
Rhyl (R & DARS)—Meetings held on the second Tuesday in each month, 7.45pm, Mona Hotel, Market Street, Rhyl.
Bangor & District Radio Club (B & DRC)—This newly-formed club meets on alternate Thursdays, 7.30pm, Bangor Technical College, Fridoedd Road, Bangor. Anyone interested in radio is invited to contact B. V. Davies, GW8CGP, 15 Erw Faen, Tregarth, Bangor. The club is hoping to be able to operate a special activity station during August 1971 in connection with the Welsh National Eisteddfod being held in Bangor. A net is active every Sunday on 3,650kHz at 1300.

REGION 12 **RR G. M. Grant, GM3UKG**

Aberdeen (AARS)—Fridays, 7.45pm, 6 Blenheim Lane, Aberdeen. GM3HGA, telephone Aberdeen 33838.
Dundee (DARS)—Thursdays, 7.30pm, 3 Magdalen Place (off Roseangle), Dundee. *GM3KYI.*
Inverness (IRS)—Thursdays, 7.30pm, 4 Falcon Square (nr Railway Station), Inverness. *Mr Norris.*
Lerwick (LRC)—Tuesdays and Thursdays, 8pm, Annsbrae House, Lerwick. GM3XPQ, telephone Bixter 249.
Lhanbryde (MFARS)—Wednesdays, 7.45pm, St Andrew's School, Nr Lhanbryde, Elgin, Morayshire. GM3UKG, telephone Clochan 225.
Thurso (CARS)—Second Tuesday in each month, 7.30pm, Thurso Technical College. *GM3JUD.*

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

Berwick (BARS)—First Sunday in each month, 3pm, Tweed View Hotel (new venue). Further details from C. H. Crook, G3YOG, 19 Hatters Lane, Berwick on Tweed, or from G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick, Roxburghshire.
Lothians Radio Society (LRS)—13 May ("Tvi", by the GPO), 27 May (NFD briefing/construction competition), 7.30pm, 66 Hanover Street, Edinburgh 2.

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

Ayrshire (AAR)—3, 17, 21 May, 7.30pm, YMCA Howard Street, Kilmarnock.
Ayrshire (Ardeer Recreation ARC)—4, 6, 11, 13, 18, 20, 25, 27 May, 7.30pm, Ardeer Recreation Club, Amateur Radio Section, Stevenston. Details from J. F. McCreight, GM3DJS, 10 Auchenharvie Road, Stevenston, Ayrshire.
Falkirk & District RSGB Group—28 May, 7.30pm, Temperance Cafe, Lint Riggs, Falkirk.
Glasgow University (GURC)—14 May (Visitors night), 21 May, 7.30pm, George Service House, University Gardens, Glasgow W2.
Greenock & District (G & DARC)—7, 14, 21, 28 May, 7.30 pm, James Watt Library, Union Street, Greenock.
Mid-Lanark RSGB Group—21 May, 7.30pm, YMCA Brandon Street, Motherwell.
West Scotland (ARS)—7, 14, 21, 28 May, 7.30pm, Royal Signals Lowland HQ, 21 Jardine Street, Glasgow W2.

REGION 16 **RF W. J. Green, G3FBA**

Chelmsford (CARS)—First Tuesday in each month. 4 May (Rtty—G3BPT, G3PED), 1 June (Lasers), 7.30pm, Marconi College, Arbour Lane, Chelmsford, *G3VCF.*
Gt Yarmouth (GYRES)—Meetings temporarily suspended.
Haverhill (HDRS)—Meetings held on alternate Wednesdays, 7.30pm, Leiston Hall, Community Centre, Clements Estate, Haverhill. *G3WQF.*
Lowestoft (LDARC)—7 May (Free evening), 21 May ("Workshop practice", by G3GNK). Meetings now held at 8pm, New YMCA, Park Road, Lowestoft. *G3GNK.*
After the publication of this issue of *Radio Communication*, Mr W. J. Green's address will be 29 Oaklands, Old Buckenham, Attleborough, Norfolk. His telephone number at present is Brundall 3388. The number at Old Buckenham will be on the New Buckenham Exchange, and will be made known in due course.

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

Basingstoke (BARC)—Meetings on the first and third Saturdays in each month. 15 May ("Transistor transmitters", talk and demonstration by G8CKN). 7pm, Chineham House, Shakespeare Road, Popley, Basingstoke, Hants. Further details are available from G3CBU.
Farnborough (FDRS)—Meetings on the second and fourth Tuesdays in each month, 7.30pm, 310 Farnborough Road, Farnborough, Hants. The society has recently obtained the exclusive use of a room and members are busy converting this into a shack and workshop. Visitors and new members welcome. *G8BVM.*
Maidenhead (MDARC)—18 May (Junk sale), 17 June (Informal), 7.30pm, Victory Hall, Cox Green Lane, Maidenhead, Berks. *G3VMR.*
N Berks (AERE, Harwell, ARC)—Meetings on the third Tuesday in each month, also informal meetings and junk sales every Friday lunchtime. 18 May, 7.30pm, Social Club, AERE, Harwell, Didcot, Berks. *G3NNG.*

MEMBERS' ADS

These advertisements are accepted free of charge as a service to members of RSGB. They must be submitted on the Members' Ads order form printed on the penultimate page of each issue of *Radio Communication*, or on a postcard similarly laid out. Each **must** be accompanied by a **recent** *Radio Communication* wrapper addressed to the advertiser, as proof of membership.

The closing date for each issue is the 7th of the preceding month, but no guarantee of inclusion in a specific issue can be given. Valid advertisements not published in the issue following receipt will be held over until the next issue and should not be resubmitted.

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

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

No correspondence concerning this free service can be entered into.

See the current order form for further details.

FOR SALE

Comp station KW77, spkr, KW Vanguard 10-160, mic, atu, Wightrap aerial, worked/heard by arrngmnt, £90. Will deliv within 100 miles and will separate items if requ or exch Leica M2 or sim 35m camera. G3SAT, QTHR. Tel Bembridge 2696.

Marconi CR100 rx with S meter + noise limiter, £15. KW Vanguard tx, £25. G3RAD, 1 Approach Road, Broadstairs, Kent.

Rx AR88D and hndbk, £30. Valves new unboxed QQVO3-10, 30p or 4 for £1. Auto trnsfmr, brand new unused, primary 210V to 250V, secondary 100V to 115V, 300W, cost £6 new, sell at £2 + pp. G3WCY, 74 Lynmouth Drive, Ruislip, Middlesex. Tel Ruislip 32341.

TW2 convtr, i.f. 28/30MHz, £8. Variac 7·5 amps 230V, £5. Full sized 14MHz beam, 3 ele with cradle, £10. 30ft lattice tower, 4ft base, 9in top (steel), £10. Transistor power pack, 12/350V, £3. 813s 4-125A, £1.50. G6MN, QTHR. Tel 2190 3415.

Radio control xtals matched tx/rx for 460kHz i.f., £1 per pair. G3REP, 94 Canterbury Walk, Cheltenham.

KW2000 + ac psu, late model, new 6146B pa, exc cond, £130 ono. GM3WOJ, QTHR.

Property of late G3IKC: KW2000, ac psu as new in orig packing, £130. G8SM, QTHR. Tel 01-398 0716.

Solartron trigger scope, type CD568 time base, up to 1MHz, gd cond, £15 ono. G8BXM, 5 Warren Way, Digswell, Welwyn, Herts. Tel Welwyn 4950.

Going QRT. Bargains cheap: well-made Elizabethan 150W am rig, worked the world. Modulator psus control unit, lots other gear. Also CR91 (AR88) rx, almost new, manual, tools etc. Buyer coll. G3KIA, QTHR. Tel Tottington 2297.

Class D wavemeter with hndbk, works off mains, £5. HRO rx, gd cond, with 3 bandspread coils, psu, hndbk, £16. R1155 with psu and unworking R1155, £5. Graves, 2 Banchory Road, Blackheath, London SE3. Tel 01-858 7912.

Trio JR500SE rx with top band, Hamgear PM2, preselector 3-way aerial switch, spkr, gd cond, £60 ono. Rusby, 12 Park Meadow, Princes Risborough, Bucks. Tel Princes Risborough 4930.

G2DAF Mk 2 tx, Philpotts cabinet, worked 222 countries in one year, £45, matching psu, £15. BC221, built in stablized psu, charts, hndbk, phones, new QCC xtal, £23. G3KWK, QTHR. Tel Redditch 63817.

Valve bargain box contng one each 1616, OD3, EF50, 6AC7, ECC34, EF80, EF91, 10F1, ECL8D, 6F13, 6D2, ECC82, EB91, A1714, 6AK5, 6J4, £1.15. Post paid. Other types available, state needs with sae. Jeapes, 165 Cambridge Road, Great Shelford, Cambridge.

Codar AT5, £7. Mains psu, £3. Collins mech filt 455kHz 2·7MHz b/w, £7. Katsumi EK-9X keyer, £3. All carr extra. G3XMX, Zodiac House, Porthourne, Penzance, Cornwall.

Home-brew linear 4-6HF5s, built-in ant c/o and psu, £25. Pref buyer coll. G3UDA, QTHR. Tel Shrewsbury 51733.

Clearing shack: Dash mount Ranger tunable, rx, 2 switched tx channels mic, B44 Mk 2 comp, 12AVQ with radials. Wanted: R216 rx, R220 rx, R1392 rx, AR22 rotator, KW600 linear. GI3ZSC, "Tielsa", Portglenone Road, Randalstown, Co Antrim. Tel Randalstown 378.

Codar AT5 with home-built psu come c/o unit, £10 ono. Burns Electronics FL2 2m low pass filt, £2. Also Stella ST459 tape recorder, as new, £40. No offers. S. Freedman, Tel 01-590 0324.

R209 Mk 2 rx, as new, all conctrs, 3 boxes spare valves + vibrators, £140. Minimitter /M tx, 160-40MHz, a.m./cw, stabilized. Control box, mic and vibrator psu neg earth, all conctrs, £9. 12V 45a/h h/d batt in carry case with plug + socket. 22hrs duty, still under 2 yrs guarantee. G3KPP, QTHR. Tel Shrewsbury 3545.

KW Valiant with psu, 80-10m, £20. Wanted: GDO up to 200MHz, also aerial rotator for 2m beam. G8CZW, QTHR.

KW Vanguard tx, fb cond, £30. Will swop for gd small rx, EC10 or Trio JR500SE, why. G3ZDR, QTHR. Tel Gravesend 63284.

Redifon fm tx/rx,multi-channel, simplex/duplex hi-band mains, £45. Why. Vanguard tx, 160-10, built-in psu, gd cond, £32.50. F27 am base, comp with 6 cambridges and 4 westminster hi-band, offers. Donohue, 41 Garway, Woolton, Liverpool, L25 5LP. Tel 051-428 6851.

Heathkit RA1, gd cond, calibrator, £27.50. 2m convtr (3N140, 3N141), recent RSGB design, 28-30 i.f., £6. /M 2m tx, mini-halo, 5 ele yagi etc. G3ROG, QTHR. Tel Maidstone 26997.

Was your *RadCom* late this month? Please read Current Comment. This will not restore the missed bargain but will explain the difficulties faced in getting *RadCom* to you on time.

KW2000B + ac psu, perfect, £200 ono. G8IX, QTHR. Tel 0782 24941.

CT82 noise gen, as new, £7.50. B29 VLF rx, £5. Stabilized psu, 2·5kV at 15mA, offers. Wanted: Army C11 tx or C13 tx/rx for acf. Jackson, 38 Haslemere Road, Thornton Heath, Surrey. Tel 01-689 2727.

Xtal 12,177·5kHz for KW2000, A, B covers 21·200 to 21·400kHz, £1.95 plus post. Honda E300 generator, new only 2hrs use, £65. Wallis, 17 Meadowside, Walton on Thames, Surrey. Tel Walton on Thames 23228.

Comp G2DAF station comprising rx, Mk 2 tx, each fitted with Kokusai filt, power packs and ant c/o relay box. Fully operational all band 160-10m. Buyer coll, £95 the lot. G3XXJ, QTHR. Tel 021-351 2370.

KW2000A + ac psu, exc cond, new 6146s. Also KW swr bridge 75 Ω, Shure mic, offers. Buyer coll. G3ZUL, 14 Wynall Lane, Wollescote, Stourbridge, Worcs.

Honda E300 p/e gene. J-beam 2m omni-V c/w 9ft 1½in ali tubing and cashing, 20yds coax. G8BBA, Flat 4, Raven Oaks, Watermillock, Ullswater, Cumberland. Tel Pooley Bridge 303.

Sphinx ssb tx with Delta control unit, £40. HRO senior with bandspread coils and ac psu, £17. G3ZCF, 15 Dane Close, Stotfold, Hitchin, Herts. Tel Hitchin 730510.

Galaxy 5 trnscvr psu, spkr, £150. HQ170, £70. Linear amp 2x4-400 + pu, £75 home-brew. G3GEW, QTHR. Tel Kerry (Montg) 250.

Model TR-50M radio telephone/telegraph tx, freq range 1500-1200 f/cs, contract No WXss-LL-23312, serial No T167. Braithwaithe, 10 Caledonian Road, London N1. Tel 01-837 5995.

Codar /M rig AT5 tx, T28 rx, ac psu, 250/S dc psu, control unit. Halston /M ant, £39. Collins ART-13 aircraft tx, £12. All in wkg order. G3KCT, QTHR. Tel Melbourn (Cambs) 693.

CR100 with hndbk, fb cond, £10 ono. Buyer coll. G3UXH, 99 Bellis Lane, Hoo Street, Werburgh, Rochester, Kent.

Super 8, Canon 814, Auto-zoom cine camera, absltly mint, £125 or exch for trnscvr suitable for /M use. G3XVH, QTHR.

Brand new Sprague and other makes of ICs from 7½p ea. Also large reject computer boards 42½p ea. Sae for details. G8DLT, QTHR. Tel Medway 77405.

For hf/vhf linear: pair 4CX250Bs, bases, ceramic chimneys, air blower, 1800V trnsfmr, silicon rectifiers, electrolytics, etc, £28 coll'd. 12 brand new ECC85, 6BZ6, 6BA6 and other valves for G2DAF rx, £5 inc post. G3VAG, QTHR. Tel Wivenhoe 2243.

GEC BRT400E matching spkr, spare valves, immac, £95 ono. 2m tx, prof built QQVO6-40 final KT88 mod heavy duty pu comp in Imhoffs case per *Radio Communication* handbk, £30 ono.

Mains trnsfmr 2800V 1 amp. Also capacitors, silicon rectifiers, chokes, heater trnsfmrs, 813, and 8 811A valves, all items unused and suitable for QRO linear, £50. Buyer coll. G3YMP, QTHR.

Bound copies QST, mint cond, four volumes Aug 1935 to Jan 1937, March to Nov 1939, Jan 1940 to Feb 1941, July to Dec 1945, offers for lot. Webb, 42A Marina, St Leonards on Sea, Hastings 7159.

Photo equip Leica 3, Rolliflex tripod MPP enlarger, extra lenses, no reasonable offer refused. Details sae. G2DP, QTHR.

Gd quality 28·5MHz walkie talkies, will exch for aerial rotator 2m transistor convtr or £12. G3SPX, QTHR.

Heathkit Mohican, recently serviced, £20 carr extra. Six Sinclair Z50 amplifiers, as new, £3.75. Wanted: high speed 8-level paper tape reader. G3WJI, L.R.W. Electronics Ltd, Unit 10, Forgehammer Industrial Estate, Cwmbran, Monmouth. Tel 063-33 66498.

Electroniques GC166T IFA/1·6/ssb Mk 3 audio module and psu EQPS-3P with Eddystone 898 dial, £20, lot. Kokusai MF455-10K, £6. KW 75m 1pf, £2. Pye 4m tx 40W, £6.50. All items gd wkg cond. G3LEZ, 52 Waxwell Road, Hullbridge, Essex. Tel Hullbridge 489.

Eddystone 898 dial on cab with chassis, S meter, 3-gang 365pF variable, 2 other tuning capacitors, potentiometers etc, all as new, £7. Philips cassette tape deck with transistorized speed stabilizer, £4. Cowell, 35 Bare Avenue, Bare, Morecambe, Lancashire. Tel 2831.

BC221 af freq meters comp with correct charts, as new, £20 ea. Cossor 1049 double beam Mk 2 scope and hndbk, gd wkg order, £18. Hesketh, 4 Hill Farm Road, Chesham, Bucks. Tel Chesham 5557.

Yaesu FTDX400 (Sommerkamp FTDX500), gd cond little used, £140. G3TJP, QTHR.

KW77, £65. 13A scope, £15. Top band Command rx, £3.50. 2m positive earth /M trnscvr, £12. Geloso 2m drive unit with dial, £2.50. G3MOT, QTHR. Tel Shipton under Wychwood 640.

Ssb tx part built, similar G2DAF for rebuild only due to faulty component location, all valves no filt, 898 dial separate psu., £12. G3YYO, QTHR. Tel 01-942 6161.

Heathkit OS-1 scope, vry little used, £15. Heathkit balun coil set B-1U, £2. G3RUN, QTHR. Tel Deal 4276.

Codar CR70A with RQ10 Q mult, £15. Hamgear PM11 preselector, unused, £5. Mosley V3jr, £4.50. G3ZUD, 29 Marley Road, Welwyn Garden City, Herts.

Labgear LG300 tx and companion modulator/psu 80-10m 150W, exc cond, can be seen in operation. Giddings, 24 Park Avenue, Formby, Nr Liverpool, Lancs. Formby 71968.

Trio 9R59DE with voltage regulator valve and calib (no xtal), inc manual and in makers box, only one yr old, £38. Buyer coll. Bishop, 33 Hopes Lane, Ramsgate, Kent. Tel Thanet 54812.

Codar CR70A rx with Codar preselector, mint cond, property of late swl, £20. G3KGM, 52 Pinewood Avenue, Sidcup, Kent. Tel 01-300 0767.

DA1 electronic keyer, as new, few hrs use only, £10. G3FXB, QTHR. Tel Southwick 3382.

KW2000A /M psu, homemade, £20. Large quantity meters, xtals, relays, state requirement for quote. AVO 8 leather meter case, £2. AVO test leads, 25p pair. Pye highband fixed station for 2m, £17.50. G3IDW, 6 Church Way, Stratton St Margaret, Swindon. Tel Stratton St Margaret 2055.

Lafayette HA350 matching spkr and calibrator xtal, £40. Hansen swr 3, £2.50. G3HKW, QTHR. Tel Chandlers Ford 5566.

Heathkit Electronics keyer HD10, £14. US sig corp vibroplex, £2.50. Husky mains trnsfmr 300-0-300 200mA 6·3V 5a 5V 3a 70V .1a 20V .75a, £1.50. All plus pp. CRTs VCR97s and others, all at 60p. Buyer must coll. G5XB, QTHR. Tel 073-525 2195.

G4ZU minibeam 10/15m, buyer insp and coll, £5. G3REW, The Cottage, Goose Street, Beckington, Nr Bath, Somerset. Tel Beckington 485.

R1475 2-20MHz comp with psu, cables and plugs, £7. ¼hp single phase 240V ac motor,1440rpm, £2. LM13 freq meter with case and pu, recently calibrated similar BC221, £7. G3RUD, QTHR. Tel 0675 62222.

Solitron stabilized psu 300V 100mA 4 6·3V. AVO electronic test meter with dc volts, ext multiplier, instruction book. Model OAP test wavemeter oscillator, no charts. Offers. G3DFS, QTHR. Tel 021-354 7769.

Heathkit RA-1 + xtal calib, £30. Panadaptor RBW-2 465kHz i.f. sweep + books, new mint, £950. B44 Mk 3 mains psu modified, £5. 12V transistor psu 390V 150mA out, Shure M44-7, stereo cart, £5. Wanted: vhf gear 2m-70cm, etc. why. Hill, Parkfields, Pontshill, Ross on Wye, Hereford. Tel Lea 444.

Vespa 2, 6LQ6 alc, £100. EA12, £120. Both gd cond. G3YDX, QTHR. Tel Newquay 4623.

840C, £40. V-7AU with 309-CU probe, £15. Hunts cr bridge, £10. Colt Woodsman match target, £38. All above deliv free. GW3UCJ, QTHR. Tel Briton Ferry 2376.

EA12, £110. G6KQ, QTHR. Tel 01-985 5253.

Do you consider the subscription too high? If so, please read Current Comment and then find a better bargain for £4.

T28 rx, brand new, £11 ono. Mepham, 79 Woodland Drive, Hove 4, Sussex. Tel Brighton 504088.

Olivetti T2 teleprinter, control unit/psu, manuals, £18. Hudson AM112 25W hybrid boot mount, control box, mic etc, £17. 100yds approx 4 core 7/0076 cable, unused, £1.50. 53 tx, 2·4-13MHz, 3x807, £2. G3YLQ, QTHR. Tel Luton 25595.

Army cadet force sig platoon have 2 wkg B45 T/R (66-70MHz) to exch for 2 wkg unmod B47 T/R. Also a TR 1985 and a TR1988 for sale, wkg but without valves. Offers. Capt Buckley, 62 Ballards Way, South Croydon, CR2 7JN. Tel 01-657 4778.

HRO less psu gc coils for 160, 80, 40 and 20m, £12.50. Part re-built G5RV Elizabethan 150W 2x807 tvi proofed pa, £5.50. Trnsfmr PRI 210-250 50Hz sec 1430-0-1430V, 140mA 4V ct 7A 8V 4A, admiralty rated, £5. Valve keyer suit 5RV tx, comp, £1. Pse add extra for freight unless coll. G3JSV, Thaddeus House, East Street, Coggeshall, Essex. Tel Coggeshall 383.

EMSAC CN2 2m convtr i.f. 2-4MHz standby switch fitted, only 8 mths old, £13. G8DOB, QTHR.

Stick type xtal mic, new, £2. Base for 813, 75p. 32MHz wideband i.f. strip, instant heat soldering iron, £2. Wanted: coax c/o switch G3KH, 133 Station Road, Cropston, Leics. LE7 7HH.

Pye Cambridge for 70MHz, offers. Wanted: 8732·5kHz xtal. GM3ZXG, 31 Woodstock Road, Greenock, Renfrewshire, Scotland. Tel 041-27060 evenings.

Codar AT5, mains psu, as new cond, £20. Halsen /M whip with 160m coil, £5. Other items for callers only. Harding, 43 Wantage Crescent, Wing, Leighton Buzzard, Beds. Tel Wing 429 (evenings or weekends).

1155B df circuits comp, no psu, £8. Two 19 Sets A,B,C circs comp, £1.75 ea, £3 pair. 18 Set, 75p. RF24-RF27 + RF27 mod, 25p ea or £1 the lot. PU285 stab mt + eht + ht lt, £2. BC221 + charts, £12. PU 139 + carry case, 75p. Gough, 9 Boldmere Drive, Sutton Coldfield, Warks. Tel 021-373 1588.

2 scopes, CT316 CD 514 Solarton, both gd cond and wkg, £15 and £10 resp. G3MPS, 31 Woodlands Ave, Weybourne, Surrey. Tel Aldershot 26170.

KT320 rx 550kHz to 30MHz, £20 ono. RF24 unit 15m convtr + xtal, £2.50. Wanted: 160/80 /M rig, trnscvr or rx/tx. G3YHG, QTHR. Tel Salisbury (0722) 28457.

SX100. R46 spkr, 230/115V transfmr, spare valves, £45 ono. Labgear wbc unit, £1. Pair KT88, 75p. 832A, 25p. Post extra. Edginton, 92 Shurdington Road, Cheltenham. Tel Cheltenham 54773.

Tx 10 and 15m, phone/cw, internal psu, £7. Carr extra. G2ATD, QTHR.

Lafayette rx HE30, £19. HRO xtal filt unit, £2. Xtals: 7·75278, 9·48333, 10·839286, 11·3625, 12·1125 (2), 12·1625 (5), 12·72214, 12·93333, 14·3625, 40p ea. Bargain comp clearance for callers. Speedboat for sale or exch radio gear. G3VUT, QTHR. Tel 01-550 9300.

2m /P tx 8W 12V dc, £5. G2DAF type rx (mech filt), looks shabby but wks well, £25. Homebrew 50W ssb exciter, 160/10m, no 40m, all transistor except pa, £30. Buyer coll. G3WFM, QTHR. Tel 01-449 5544 extn 728.

HW17A exc cond only 6 mths old £50 with xtals. /P transistor radio ac/dc mw fm vhf am aircraft bands, £12.50. Electroniques hamband transistor coilpack HB166T, £12. 898 dial, £4. Houliman, c/o 33a Landsdowne Street, Hove, BN3 1FS, Sussex.

G2DAF tx psu, £5. 1500V psu, £5. 19in rack, 3ft by 9in tall, £1. Hallicrafters S27 fair cond, £10. FT241 xtals 25p ea. 8 CH313s, 8 CH315s, 5 CH35s, 1 CH36, 2 CH325s, 1 CH326, 3 CH327s, 1 CH328, 1 CH284, 1 CH324, 1 CH323, post extra. G3MNV, QTHR. Tel 021-353 3012.

BC221-M, new, £25. I-177B v/tester comp manuals etc. new, £15. Manuals for Hartley 13A, £2.50. CT54, vtvm, £2.50. AR88D, £1.50. Command rx, 3-6MHz, new, £8. All carr extra. Wanted: Hi band Cambridge TW2 tx. G3GUU, QTHR.

Rogers junior amp/preamp Collaro transcription turntable, offers. GEC metal cone spkr, octagonal cab, XO750, axiette autotrans, £25. Pref buyer coll. Harvey, 10 Hanover Gardens, Hainault, Ilford, Tel 01-500 4563.

Codar 80/160 /M rig, comp + 250/s mains psu. AT5 tx, T28 rx, 12R/C controller, 12/MS psu, mic CSE 2 ATMA ant, makers literature, £35. G3BGI, QTHR. Tel Bristol 658478.

BC221 wavemeter in gd wkg order with mains psu, ldspkr and xtal test unit, £10. Buyer coll. G3MEH, QTHR. Tel 01-600 6263.

FT241 xtals: 2 451·3, 2 453·3, new not exgovt, £4. J beam 2m 6/6 slot. new, £4.50. Hi band Ranger with mic and hndbk, no mods, £5, Scrap B44 Mk 3, 50p. Buyers coll if poss. Lucas, 2 Castle Drive, Reigate, Surrey.

KW2000B ac psu, 10 mths old mint cond in orig packing, a few spare valves, £192, carr paid. Wanted: Samson ETM-2 or gd cond vibroplex key. GW3TMP, QTHR.

HT40 20m and 40m, 75W cw, 40W a.m., £15. AR88D spkr, £1.50. 3-speed tape recorder, £12. Valve uhf tv tuner, £2. Re-entrant pa spkr, £1. G3ZNW, 341 Walton Road, West Molesey, Surrey. Tel 01-432 2343 (office).

Yaesu FTDX100 tx/rx spkr + mic, mains/12V, £160. 80A batt, £4.50. Charger, £3. All near mint. Lowther spkr list £150 for £60. Insp and coll. Wanted: Collins etc rx. G3ODT, Station Cottage, Bampton, Tiverton, Devon.

Swan trnscvr 120 with NCX psu and whip ant, £50. G5DV, 12 Milton Avenue, Weston Super Mare. Tel 29179.

Ssb filters PZT, 472kHz b/w 1·8kHz, few only, £4 with data. G3FMO, QTHR. Tel Chelmsford 71604.

Eddystone 888A, vgc, £45. Codar at 10, 160-80 tx with ac psu, vgc, £12. Harrop, 9 Ferndale Road, Coal Aston, Dronfield, Sheffield. Tel Dronfield 4415.

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Valve type YL1190. G8DAV, 57 Brooke House, Basildon, Essex. Tel Writtle 451 extn 128 (9am-5pm).

Sphinx or similar ssb tx for hard-up club. GW3ZIT, 3 Thorley Close, Cyncoed, Cardiff. Tel Cardiff 35332 (office hours).

BC-221 meter (modulated) with orig chart and psu (mains), also requ the uhf model to 1000MHz, will arrange collection UK. Must be in exc cond, phone or write details and price. Wilson, 23 Rathgar Road, Dublin 6. Tel Dublin 977879.

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G2DAF rx Mk 2 components, coils, switches, xtals, part built rx considered if in gd cond. Will inspect and coll if requ. G3VVU, QTHR. Tel 0602 23635.

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Copy 1969-70 Call Books DX listings, US Listings. Details and price pse. Thompson, 27 Lingamoor Leys, Thurnscoe, Nr Rotherham, Yorks.

T1154 R1155N df equip, mains psus connectors, orig RAF manuals, must be mint, unmod. Martin, 8 Beresford Place, Enniskillen, Co Fermanagh, NI.

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Buy or borrow Eddystone S640 manual and also info on improving rx. Phone after 6pm weekdays or any time at weekends. Sae pse. Cunningham, 91 Station Road, Carluke, Lanarkshire, Scotland. Tel Carluke 3251.

Buy or borrow circ diag of rx R206 Mk 2. Also service manual for advance signal gen D1/D. Newnes radio and television servicing 1963-70. G8BEU, QTHR.

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Television & SW World, Feb to April and Sept 1935, August 1936 to August 1937, 10p per copy offered. RSGB 1928 Annual Log book, 50p offered. 2nd class post paid. G3IDG, 96 George Street, Basingstoke, Hants.

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Wireless World July 1970 and February 1971. Any info on ex-RAF sig gen type 101 ref 10SB 6016. G8DPS, QTHR. Tel 01-337 2712.

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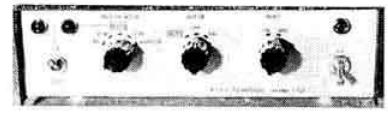

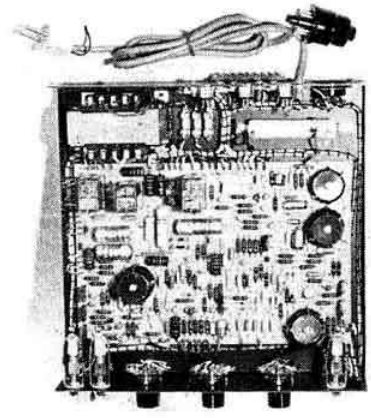

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FOUNDED 1913
INCORPORATED 1926

PATRON H.R.H. THE PRINCE PHILIP
DUKE OF EDINBURGH, KG

APPLICATION FOR CORPORATE* OR ASSOCIATE* MEMBERSHIP

RADIO SOCIETY OF GREAT BRITAIN,
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Giro A/C No 533 5256

* I hereby apply for election as a Corporate Member of the Society and enclose a remittance for £4, being the amount of my first annual subscription.

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