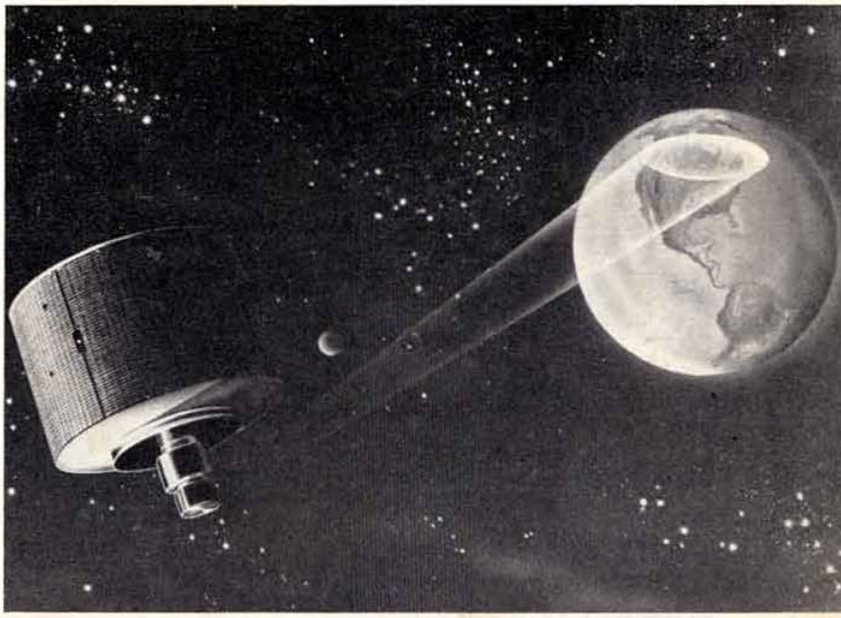
radio communication

June 1971

Journal of the Radio Society of Great Britain

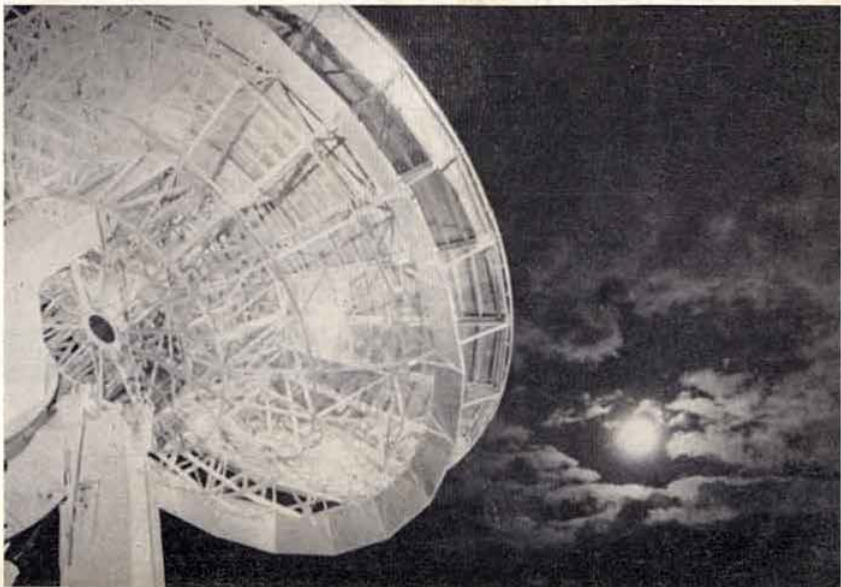
World Administrative Radio Conference for Space Telecommunications

Geneva 1971



Canadian telecom satellite project

Northern Electric Company, Ottawa



NASA earth station near Tananarive

June 1971

radio communication

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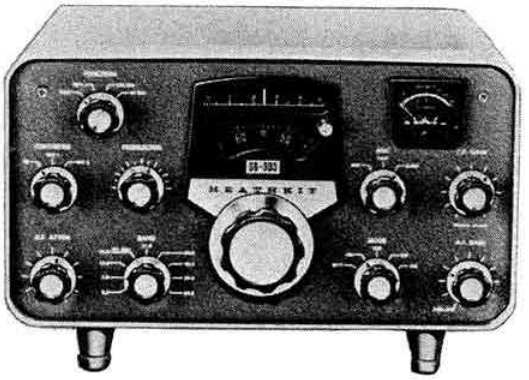

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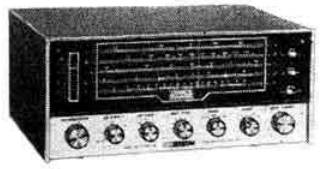

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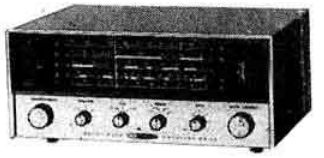

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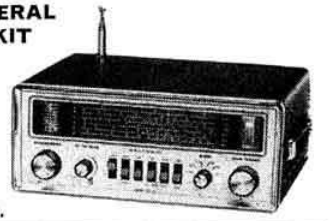

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QTC

AMATEUR RADIO NEWS

Space Conference

This conference, the full title of which is *World Administrative Radio Conference for Space Telecommunications*, will open in Geneva on 7 June, continuing for a maximum of six weeks. The conference will be attended by the majority of the members of the International Telecommunication Union which now comprises 140 nations. The last space conference was held in 1963 and obviously there have been many new developments which demand internationally agreed control. The UK delegation includes G2BVN, who will act as an adviser in matters concerning the amateur service. It is a measure of the co-operation between the Ministry of Posts and Telecommunications and the RSGB that this facility should have been offered.

The conference will have regulatory powers over the entire spectrum, but it seems likely from the documents and proposals already circulated that the main area of attention will be the vhf-uhf-shf regions. It is a fact that the availability of satellites capable of carrying up to 5,000 simultaneous telephone conversations has been one of the factors easing the pressure on the amateur hf allocations. However, the frequencies above 30MHz are in greater danger than previously due to the ever-increasing facilities demanded by many nations.

The proposals before the conference will seek to enlarge the present limits in some areas of the amateur service. In an endeavour to ensure that the proposals will be accepted, the regional organizations and headquarters of the IARU have been circulating information and encouraging all member societies to obtain the support of their telecoms authorities for the proposals. It may be noted that not all the nations of Western Europe support the proposals concerning amateur allocations. In addition to the UK and USA, there is a great deal of support from Commonwealth countries. As with all ITU conferences, each nation, whatever its size, has one vote.

The IARU is one of the international organizations which may participate without cost in the conferences of the ITU. There will be representatives from IARU headquarters and Regions 1 and 3. Tom Clarkson, ZL2AZ, will make the long journey from down under, while PA0DD and SM5ZD of the Region 1 Executive Committee will be at Geneva. Bob Denniston, W0DX, President of the IARU, will represent headquarters. In addition there will be amateurs on national delegations. A get-together during a recent meeting at Geneva attracted 30 amateurs who were also national representatives.

As one of the services named in the Radio Regulations, it is essential that the amateur service should be represented and vocal at international conferences of the importance of the space WARC. Your contribution to this major effort can be the support of the national society which made the representation possible.

RSGB Dinner Club

The next meeting of the RSGB Dinner Club will be at the Kingsley Hotel, Bloomsbury Way, London WC1, on Friday 18 June 1971 at 7.30 for 8pm. The Kingsley Hotel is a few minutes' walk from Holborn tube station and there is ample car parking space in the vicinity. The cost of the dinner is £1·30 (26s) and bookings accompanied by a remittance may be sent to Miss Sheila Sims at RSGB headquarters. Please note that bookings must close 24 hours before the dinner.

All RSGB members are welcome to this informal occasion and a particular invitation is extended to overseas amateurs who may be visiting London.

Woburn Mobile Rally

All enquiries regarding trade stalls at this rally should be addressed to: Norman Miller, G3MVV, QTHR, tel: Brentwood 5563 (business), Basildon 21069 (home).

Licence figures

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

Class A	13,777
Class B	2,656
Class A/M	2,616
Class B/M	389
Television	195
Model Control	19,427

Reciprocal licensing, Brazil

A reciprocal amateur licensing agreement between the UK and Brazil has now been concluded.

The "Classic"

The author of this article, which was published in the April issue, Mr C. F. Atkins, advises that the smoothing capacitors C14a, b, c, shown as electrolytic in Fig 1 are, in fact, not polarized.

RAOTA

The annual meeting of the Radio Amateurs' Old Timers Association was held at the Bonnington Hotel, London, on 8 May; some 70 members and guests attending. In contrast to previous reunions there was no formal dinner; instead a buffet supper was served.

In the course of a short business meeting the following officers were elected: president, Kenneth Alford, G2DX; vice-president, Eric Russell, G5WP; treasurer, Ernie Dedman, G2NH; secretary, Miss May Gadsden; committee: Jimmy Mathews, G6LL; Basil Quentin, G6OX, and Bill Corsham, G2UV.

Among the guests welcomed by G5WP (acting as chairman in the absence of G2DX) were Mr Hugh Pocock, a former editor of *Wireless World*; its present editor, Mr H. W. Barnard; and Doug Findlay, G3BZG, RSGB general manager.

AFFILIATED SOCIETIES

Call Book entries

Will secretaries of all RSGB affiliated societies please advise Mr A. W. Hutchinson, editor, at RSGB headquarters of any omissions from, or any amendments to, the list of affiliated societies in the current edition of the *RSGB Amateur Radio Call Book* for inclusion in the 1972 edition which is now in course of preparation.

Invitation to a another sale

The Racal Radio Club, G3RAC, has access to equipment and components surplus from development and production, and these are to be offered at nominal prices to members of local radio clubs at another sale to be held on 12 June. It will include oscilloscopes, 100kHz i.f. filter coils, tuning and other capacitors, resistors, relays, potentiometers, connectors, cables, cabinets and much other metalwork (much of it new and unused).

The sale will be held at the 4th Bracknell Scouts HQ, Meadoway, Bracknell, which is approached from Stoney Road off the A329 opposite the Racal development building. It will commence at 1400 and will continue until 1700 or until sold out, whichever is earlier. An entrance fee of 5p towards Scouts' funds will be charged and a cafeteria will be available. G3RAC will be operating a hf station at the venue.

URE Convention

The Spanish radio amateurs' organization URE will hold a convention in Bilbao from 22 to 25 September 1971. The organizer is EA2CX, who would be pleased to hear from any intending visitors; and Mr J. C. Bain, GM3KAI, QTHR, who has attended these conventions in the past, would be pleased to give any other information.

An ideal QTH

Douglas Byrne, G3KPO, area representative for Peterborough and honorary secretary of the Peterborough Amateur Radio and Electronics Society for the past 10 years, is retiring to live in the Isle of Wight, where he has found an ideal QTH in an old manor house at Shanklin. It is high on the cliff top 250ft above the sea with clear take-off for vhf, and there are two acres of grounds to erect an aerial farm!

G3KPO believes he is the only amateur to concurrently hold three British callsigns, for as well as his own he has G3DQW on behalf of the Peterborough Radio Society, and G3PTC for the Peterborough Technical College where he has taken the RAE classes for the last decade.

International Music-Hams Club, IMHC

OZ5LZ and K2PLT invite all professional musicians who are also radio amateurs to join the International Music-Hams Club, IMHC. Activities include a weekly net, an attractive award for working club members, and a monthly newsletter. Write to Jan Williams, K2PLT, 63 Anderson Place, Buffalo, NY 14222; outside USA write to Torben Elmoe, OZ5LZ, Franksrigade 27 I, 2300 Copenhagen S, Denmark.

Presentation to RAIBC

An FT DX400 transceiver and ancillary equipment belonging to the now disbanded Terendak Amateur Radio Club was recently presented to the Radio Amateur Invalid and Bedfast Club, and the photograph showsWO2 Jack London explaining the finer points of this wonderful gift to RAIBC representative Harry Hartwell, G3HYZ. Looking on is Major Bob Salisbury, G3SRH. The RAIBC takes this opportunity of recording its sincere gratitude to the Army authorities and members of Terendak ARC for this generous gift. *Photo: Oxford Mail & Times*

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 D. J. Belasco, 259 Hamstel Road, Southend on Sea, at Southend on Sea Magistrates' Court on 1 February 1971. He was fined £20 on each of four charges, plus £12·10 costs.

Mr L. Platts, 110 Shiel Road, Liverpool 6, at Dale Street Liverpool Magistrates' Court on 18 January 1971. He was fined £50 on each of two charges, plus £10 costs and forfeiture of equipment.

Mr J. C. Gosling, 658 Kings Road, Birmingham B22A, at Birmingham Magistrates' Court on 4 March 1971. He was fined £3 on each of three charges, plus £25 costs and forfeiture of equipment.

Mr T. H. Matthews, 127 Lansbury Avenue, Cefn Hengoed, Glamorgan, at Bargoed Glam Magistrates' Court on 5 March 1971. He was fined £25, plus £10 costs and forfeiture of equipment.

Mr R. E. Jones, 2 Pencwarel Road, Wyllie, Mon, at Bargoed Glam Magistrates' Court on 5 March 1971. He was fined £25, plus £15 costs and forfeiture of equipment.

Mr R. R. Roberts, 9 Mare Path, Cwmbran, Mon, at Cardiff Magistrates' Court on 15 March 1971. He was fined £10, plus £10 costs and forfeiture of equipment.

Mr S. J. Shaw, Fenay Court, Fenay Lane, Almonsbury, Huddersfield, at Huddersfield Magistrates' Court on 3 March 1971. He was fined £25, plus £5 costs.

Mr P. Barnet, 2 Avondale, Sherwood Hall Road, Mansfield, at Mansfield Magistrates' Court on 10 March 1971. He was fined £5 on each of two charges, plus £10 costs and forfeiture of equipment.

Mr E. W. Bowdery, 231 Lavender Hill, London, SW11, at South West London Magistrates' Court on 20 January 1971. He was fined £25 on each of two charges, plus £10 costs.

Mr J. Cheadle, 34 Beechdale Avenue, Birmingham B22A, at Birmingham Magistrates' Court on 4 March 1971. He was fined £3 on each of three charges, plus £15 costs and forfeiture of equipment.

An sic transceiver for ssb and a.m.

Two-band coverage with multiband potential incorporating flexible gain control system and 100kHz plus 10kHz calibration facilities

by F. L. WISEMAN, ARIC, GW3GRY*

CONSTRUCTION of this transceiver was undertaken without any intention of writing a descriptive article—in the author's opinion much of his constructional work is quite indescribable! In particular, and so far as circuitry is concerned, relays were employed for vfo bandswitching and for circuit path transmit-receive transfer because they were to hand and convenient, but it was intended to replace them in due course by reed and diode switches as appropriate once the basic design had been proved. However, despite the dubiety of employing them, particularly in the signal path, they have been trouble-free and are, as yet, unreplaced.

This article has been written primarily because of the large amount of correspondence which has been received from readers of the reference to the equipment in *Technical Topics*, May 1970, and from others who have heard it over the air. Because of numerous other commitments, many of these letters have remained unanswered, and apologies are due for these discourtesies. This article is offered in the hope that it will, at least partly, amend for such omissions.

The majority of correspondents have simply requested complete circuit details, but these have not been supplied because no such record of the work has been kept—nor is it warranted. Such an approach to the use of integrated circuits would be questionable, as they should be envisaged as discrete units needing only to be powered and matched to their neighbours to perform their circuit function.

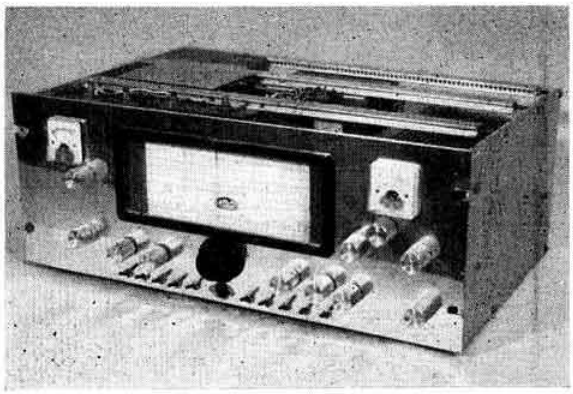


Photo 1. General view of the completed transceiver. The left-hand meter is the signal strength display (the μL914 amplifier and range setting potentiometers are visible behind it) and the right-hand meter displays pa anode current. Upper knob controls: (l to r) receiver rf and mixer tune, pa tune, pa bandchange and pa load. Lower knob controls (l to r) receiver rf and mixer bandchange, rf gain, i.f. gain, af gain, transmitter rf drive gain, tune and bandchange. The switch controls are (l to r): rf gain manual/automatic, i.f. gain manual/automatic, agc threshold on/off, receive A3j/A3, vfo bandchange, carrier insert, 100kHz calibration, 10kHz calibration, receiver on/off, valve heaters on/off. The small piece of Veroboard accommodating the calibrator circuit is visible at top centre

*17 Wynn Avenue, Old Colwyn, Denbighshire.

General considerations

The transceiver uses the Plessey SL600 series of SICs designed specially for ssb use and described in *Radio Communication* of March 1970. Since the main reason for construction of the equipment was fulfillment of a long-standing desire to build a single conversion transceiver free from the drawbacks of multi-conversion designs, which had formed the basis of the home station for the last decade, the simple receiver block schematic published by Plessey Microelectronics, featuring the modern low pre-filter gain approach, Fig 1, was adopted as the design foundation.

Pre-construction calculations indicated that the overall gain obtainable through this signal path would be rather lower than in conventional receivers, and an early decision was taken to include a second SL612 i.f. stage, a proven product detector offering fairly high-gain and (particularly for a.m.) an additional stage of af amplification between the detector and the audio sic. In the event, the second i.f. stage proved totally unnecessary, exhibiting far too readily an ability to overload the detector, and it was accordingly discarded.

Since simplicity was one of the primary objectives, there was no hesitation in dismissing the use of semi-conductors for final signal amplification on transmit; instead, the well-proven arrangement of a Class A EF80 driving a 6146 in AB1, was favoured. This arrangement has featured successfully in all the author's transmitters since his first G2DAF in 1959/60. It was calculated that if the transmit audio and balanced modulator circuits, together with the final conversion mixer, were run at the 100mV level, then about 25dB of gain obtainable from a further SL611 sic should be sufficient to drive the EF80.

The author's operating interests are currently confined almost exclusively to 1·8 and 3·5MHz. Accordingly a simple proven vfo design was adopted, bandswitched to cover the appropriate ranges. Generation of hf sideband appeared to be no problem, as the published specifications of the SL630 and 640 SICs (with the possible inclusion of the SL620 for amplitude control) appeared ideal. Similarly, audio output on receive and audio derived agc, which have been proven as particularly suitable for ssb, were conveniently available from the SL630-SL620 package.

With the sole addition of a display of receiver agc voltage to serve the S-meter function and a suitable frequency calibrator, the basis of the complete design as conceived and constructed is shown in block schematic form in Fig 2. At

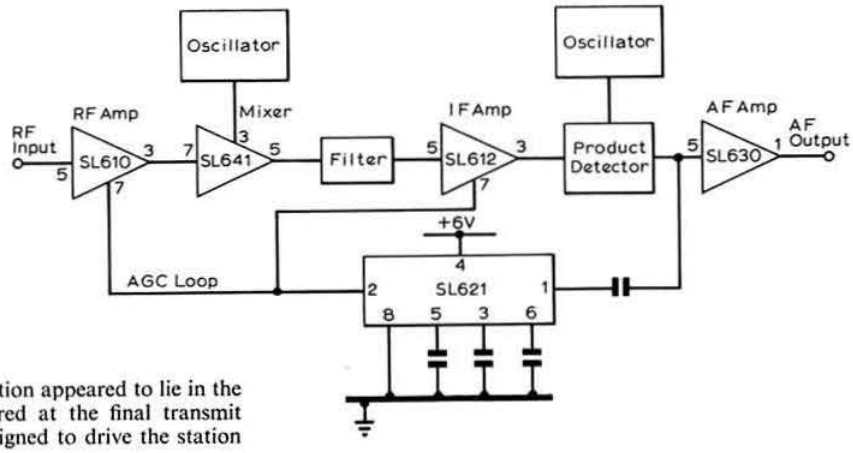


Fig 1. Simple receiver block diagram

this stage the only design complication appeared to lie in the very large amount of gain required at the final transmit frequency, especially as it was designed to drive the station linear to full legal output.

Construction

All of the circuit construction for the SICS was carried out on Veroboard strip using conventional techniques. The modules so produced, excepting the crystal calibrator, the S-meter circuit, the transmit frequency conversion and initial amplification, were mounted in Electroniques diecast boxes specially engineered to accommodate the Veroboard. The S-meter circuit and the calibrator were left unscreened, but the transmit final conversion section was mounted in a small aluminium screening can bolted directly onto the outside of the screened chassis assembly accommodating the EF80 amplifier and 6146 pa.

To minimize unwanted coupling, all signal path and other rf transfer between the modules was carried out at a sufficiently low impedance to allow the use of miniature coaxial cable and plugs. Standard octal plugs and sockets were used for power distribution and other dc coupling (switching voltages, agc and bias lines etc). The method, together with the use of electronic switching, lends itself to great flexibility of spatial arrangement, in that comparatively few modules require mechanical coupling with the front panel. All were finally mounted within one of the Electroniques modular chassis units with a 19in by 7in front panel cut to accept an Eddystone 898 dial. No attempt was made to capitalize on the miniaturization possibilities, much of the space within the individual boxes remaining empty. No doubt other constructors will demonstrate what can be achieved in this direction.

Apart from the unit accommodating the valve amplifiers, there are six main modules:

receiver rf amplifier and mixer;
filter and i.f. amplifier;
receiver detector, audio amplifier, agc generator and 9MHz crystal oscillator;
transmitter audio amplifier and balanced modulator;
transmitter conversion mixer and amplifier; and
vfo.

The need for adequate decoupling of all power and other dc lines to the units was soon established. None of the various schematics which follow show all the decoupling circuits

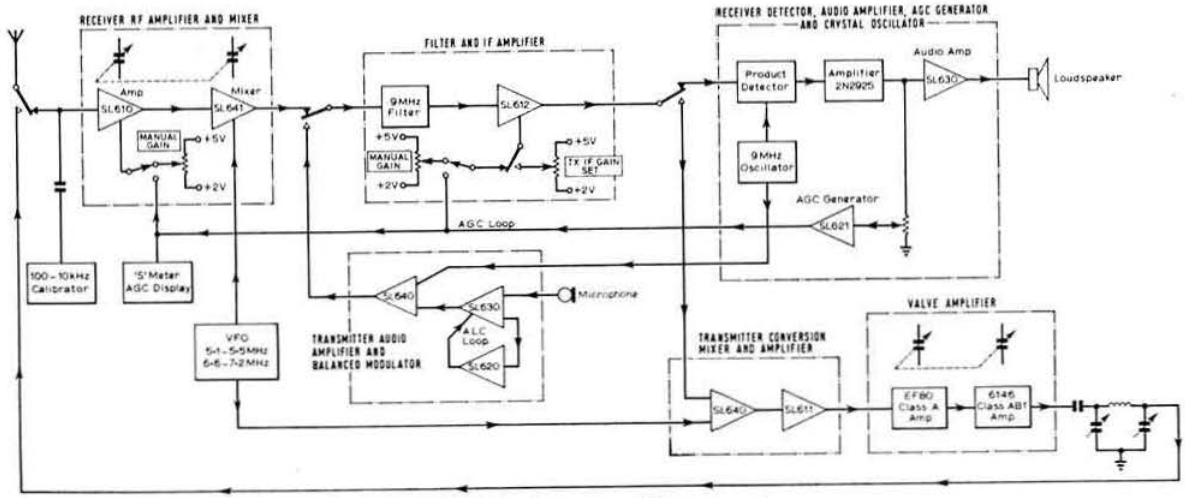


Fig 2. Block diagram of the transceiver

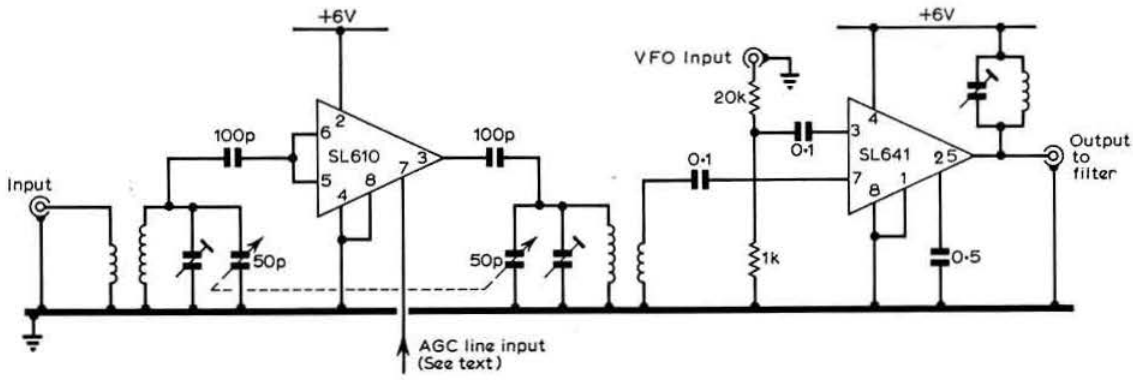


Fig 3. Receiver rf amplifier and mixer circuit

included, but it is emphasized that the provision of adequate decoupling capacitors both at source and destination of individual lines is the wisest policy.

Receiver rf amplifier and mixer

An outline schematic of the circuitry evolved for this module (neglecting bandswitching considerations) is shown in Fig 3. Because of the impedance parameters of the SL610, it follows closely conventional valve techniques using standard Electroniques valve type coils. It will be noted, however, that the mixer coil is reversed (as against conventional valve circuitry) and that the link is used to provide the mixer sic with its optimum low impedance input.

This does, of course, degrade the gain attainable (because of the step down). It lowers also the Q of the mixer tuned circuit, by virtue of the damping effect of the SL610 low output impedance imposed across it, thus degrading the rf selectivity and image rejection. It was done because the reverse arrangement, tried initially, exhibited some instability, and it has been left unchanged only because the resulting gain and image rejection are adequate for the bands currently in use. A better approach, possibly vital for higher frequencies, would be to custom wind coils to match both the output of the SL610 and the input of the SL641. Other more interesting possibilities are discussed in the final section.

Output from the SL641 is taken direct from the primary of a 9MHz i.f. transformer connected between the supply and the output pin. Carrier input to pin 3 is taken from a voltage divider calculated both to reduce the vfo injection to the 100mV level and to match the input impedance of 1kΩ. The output of the vfo at the module input, measured by valve voltmeter, is 2V rms.

Control of gain is by automatic or manual control of the SL610 pin 7 voltage and will be referred to again later.

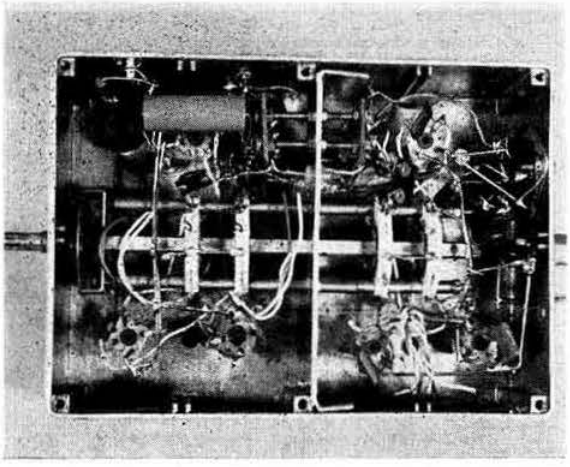


Photo 2. Underside of the receiver rf and mixer module. A two-gang tuning capacitor is mounted on the outside of the top plate. The SICs are each mounted on small chips of Veroboard bolted to the centre screen

Filter and i.f. amplifier

The excellent KVG XF-9B filter was selected for incorporation in the unit, and the very simple circuitry of this and the SL612 i.f. amplifier is shown in Fig 4. As in the previous module, control of gain is achieved by automatic or manual control of the voltage applied to pin 7.

Miniature 12V relays mounted at each end of the strip allow complete switching of the amplifier between receive and transmit paths to be achieved.

Receiver detector, audio amplifier, agc generator and 9MHz oscillator

The circuitry used for the detector, the transistor audio amplifier, the SL630 final amplifier and the SL621 agc generator is shown in Fig 5. One of the main reasons for choosing this particular detector circuit was its ability to function satisfactorily on A3 when the input side of the TR1 base feed capacitor is earthed. TR3 is included both to boost the gain attainable and to cope with the loss of several decibels of gain with the detector circuit in the A3 mode. Because of the high overall gain it was necessary to provide some means of reducing the audio input to the agc generator to the correct level. The potentiometer performs this function and additionally bestows means of controlling the agc characteristic of the receiver.

The 9MHz crystal oscillator circuit used was that recommended by the filter manufacturer and does not warrant reproduction here.

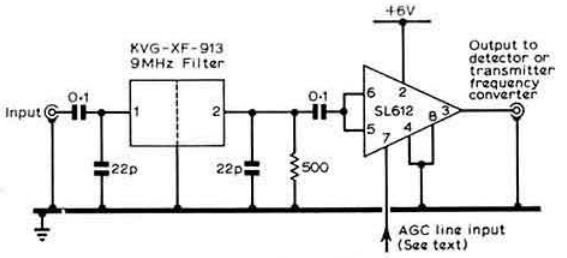


Fig 4. Filter and i.f. amplifier circuit

Transmitter audio amplifier and balanced modulator

The original design featured an SL630, SL620 and SL640 combination in the voice-operated gain control circuit shown in Fig 6 in order to produce an audio signal to the balanced modulator of approximately 80mV over a wide range of audio input. Note that the function of the TR1 emitter follower is purely to match the impedance of the station dynamic microphone (about 100kΩ) to the input of the SL630.

In the event, although functioning electrically, the ensuing signal proved to be not to the liking of sensitive ears on 80m, where it was described variously as limited, restricted or too military. Consequently, use of the SL620 device was discontinued and it has been replaced by a zener-controlled bias (potentiometer adjustable up to 4V) applied to pin 8 of the SL630. The author's opinion is, however, that this simply achieved, but highly sophisticated, control device will prove its value on other bands where the smoothest audio is not so highly valued and sheer talk power is the more important factor.

Transmitter frequency conversion and sic amplification

The very simple circuitry of SL640-SL611 combination for transmit frequency generation and initial amplification is shown in Fig 7. Note that the function of the Rx Ry divider chain is to reduce the vfo input to the 100mV level and to match the SL640 input. The unit, complete in its screening can, is bolted directly to the valve amplifier chassis, thus allowing direct short-path coupling through the chassis to the EF80 grid circuit.

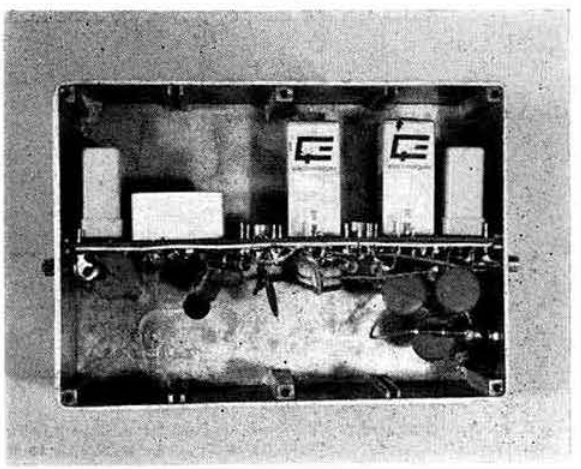


Photo 3. Interior of the i.f. amplifier module showing filter and terminal relays. Two stages (sic and transformer) are clearly visible but only one was ultimately necessary. The i.f. transformers were used in initial circuitry but were subsequently discarded. The twisted pair (centre foreground) is the carrier insertion coupling

VFO

The transceiver as described uses the W3JHR "synthetic rock" circuit, relay bandswitched to between 5·5–5·1MHz and 6·6–7·2MHz for coverage of 80m and 160m respectively.

Any sufficiently stable oscillator with low impedance output is, of course, equally satisfactory, and readers will no doubt have favourites of their own. It is intended eventually to attempt construction of a vfo sufficiently linear over 500kHz to allow direct frequency readout from the 898 logging scale. For this reason the dial has been left uncalibrated.

Valve amplifier

The Class A EF80 and AB1 6146 combination is entirely conventional and, as such, does not merit description here. The two grid circuits are gang tuned, the lesson having been learnt that this is the best way of minimizing spurious responses and ensuring adequacy of drive. The 6146 pa has a standard pi-output circuit.

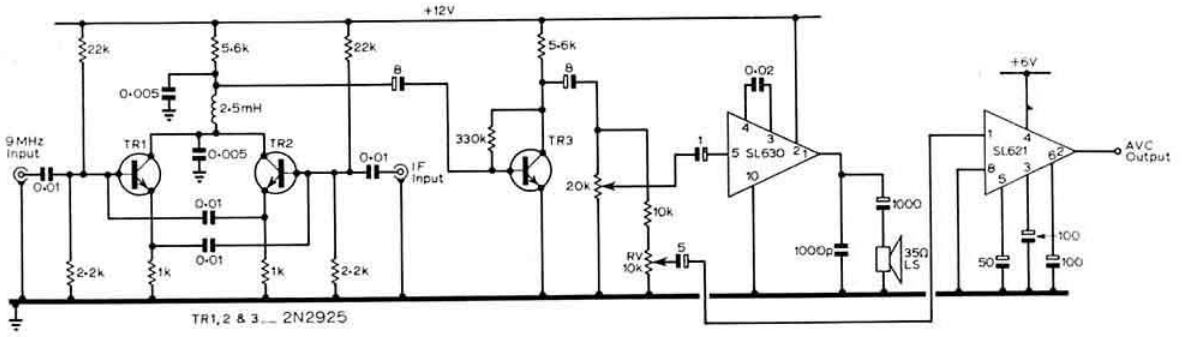


Fig 5. Detector, audio amplifier and agc generator circuit

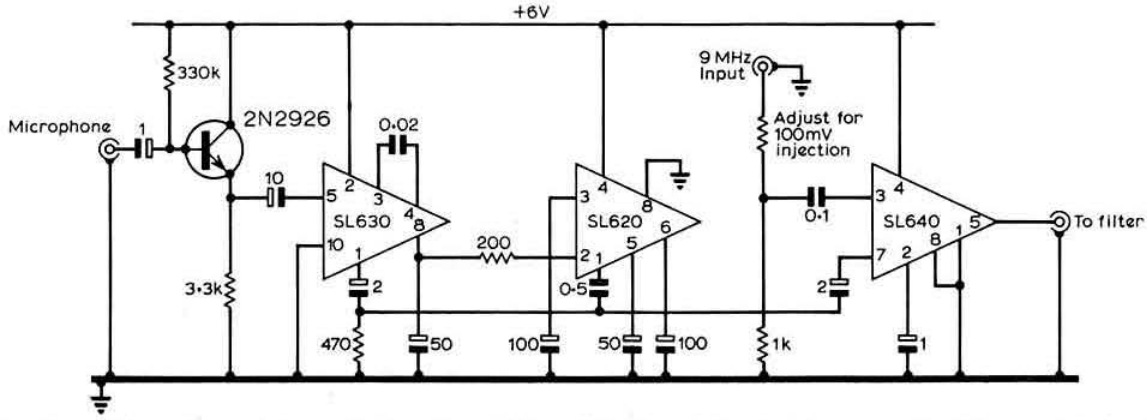


Fig 6. Transmitter audio amplifier and balanced modulator. Note: the divider chain to reduce the 9MHz input to 100mV should be external to this unit to avoid carrier pickup by the output circuit

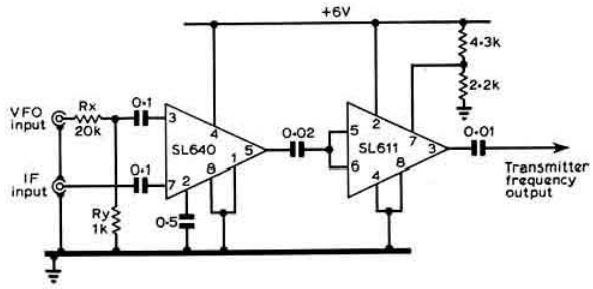


Fig 7. Transmitter frequency generation and initial amplification circuit

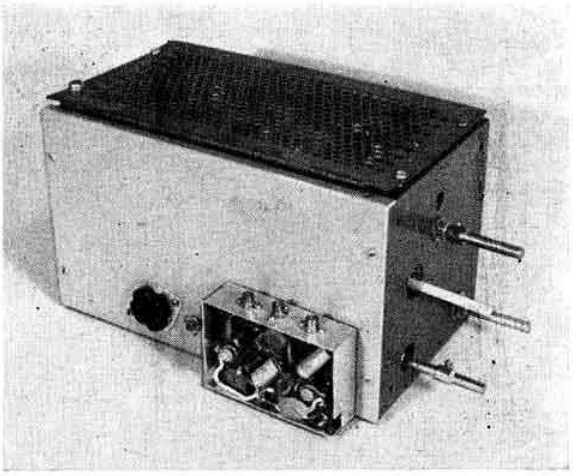


Photo 4. Exterior of the valve amplifier chassis showing the exterior mounted final conversion module with top cover removed. The three miniature coaxial sockets are: vfo input, i.f. input and 6V ht. The socket on the main chassis accommodates the line to the panel-mounted EF80 cathode bias potentiometer

Crystal calibrator 100/10kHz

The crystal calibrator unit, Fig 8, is not original but was first described in *73* of January 1967 by K1DCK. No apologies are rendered for its inclusion, as its simplicity, ease of construction and reliability are of such merit that it will commend itself to many who may not otherwise have come across it. It comprises a μL914 as a 100kHz pulse generator and four μL923s together with one of the flip flops in a second μL914 as a (x 10) frequency divider. The divider may, of course, be omitted and the pulse generator used solely as a 100kHz marker. Either arrangement is thoroughly recommended and the harmonics are easily detected to above 30MHz. The convenience of instant 10kHz calibration has to be experienced to be appreciated.

S-meter

The S-meter enhances the external appearance of the unit, and the function is met by direct display of agc voltage which, for the strongest signals, can be as high as 5V. Any voltmeter possessing even moderate input impedance will suffice, but in the unit here described a μL914 amplifier drives a standard 1mA S-meter for voltage display. The Veroboard strip containing the balancing and range-setting potentiometers are clearly visible in Photo 1. No claims for accuracy or linearity are made, but a careful examination of the agc characteristics of the devices will reveal that potential performance in these respects should, in fact, surpass that of most S-meter circuits in conventional commercial equipment. Additionally, the very sophisticated agc characteristic of the receiver at least imposes a steady reading except during unduly long speech pauses. If these merits do not impress, then the device can be set up to give near full-scale deflection on even the weakest signal—which will be readily appreciated as a factor of the widest possible appeal.

Control circuits

The transmit/receive switching is relatively simple. The supply to the vfo and i.f. amplifier is always present, while its distribution to the remaining modules is controlled by a master relay so that the receiver rf and mixer module and the receiver audio module are not powered during transmit, and the transmit audio and final conversion modules are not

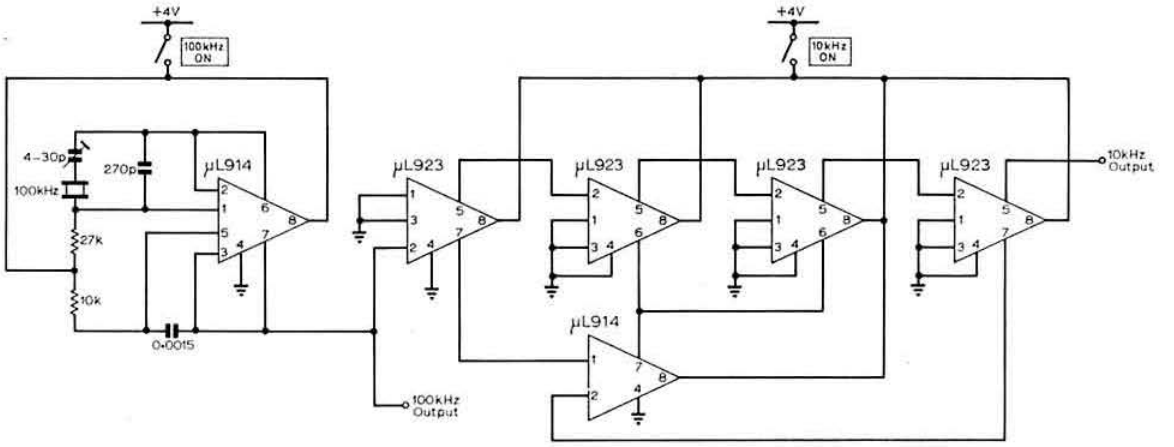


Fig 8. Crystal calibrator circuit

powered during receive. Auxiliary contacts in the same relay bias 6146 beyond cut-off during receive, transfer the i.f. amplifier agc line to a separate transmit voltage control circuit and actuate the aerial changeover and i.f. amplifier terminal relays.

So far as receiver gain control is concerned it has proved extremely simple to achieve exceptional flexibility. Each agc line (pins 7 of both the SL610 and SL612, the latter via the master relay referred to above) is brought to a separate panel single-toggle switch which transfers it either to the receiver agc line or to a 10kΩ front panel potentiometer allowing manual adjustment of the applied voltage between 2 and 5V. It is thus possible to have manual or automatic control of either or both. Additionally, when the rf stage is being controlled automatically, a third toggle switch applies the voltage derived from the rf gain control potentiometer to the agc line, constituting a simple but extremely effective agc threshold control.

Intermediate frequency bias on transmit, together with audio bias, are similarly derived from further 10kΩ potentiometer voltage dividers. Because of the steepness of the bias/gain curves, particularly of the SL630 transmit audio amplifier, and because of the low power level at which it is being used, it has been found necessary to zener stabilize both these voltages. The ht to the vfo and the crystal oscillator is similarly stabilized.

A miniature 12V relay, switch controlled from the front panel, is used both to earth one input to the detector and to remove ht from the 9MHz oscillator, thus providing the a.m. receive facility. The actuating voltage for this relay is taken from the receive ht so that the oscillator always functions on transmit.

Insertion of carrier, either for tune-up or for carrier and one sideband type a.m. transmission, requires only the introduction of a whiff of carrier at the input of the SL612 i.f. amplifier, the coupling being adjusted to give the required insertion. There are numerous ways of achieving this, and the one adopted made use of yet a further 12V relay. Coupling was adjusted so that, at the normal operational setting of the EF80 cathode gain control, insertion of carrier drove the 6146 pa from its normal quiescent current of 25mA to a steady 70mA. Listener reports and tapes recorded from transmissions into dummy load then rated the A3 quality as quite acceptable. At full gain of the EF80 amplifier, the insertion is more than sufficient to drive the pa to full output.

A corollary of this carrier insertion circuitry is that it enables the transceiver to operate transmit in one mode and receive in the other without any switch throwing. No claims are made as to the value of this feature, but it is possibly unique.

Results and general observations

In the receive mode the transceiver proved snag-free and achieved virtually instant success. It is quiet in operation—quieter than the main station G2DAF receiver and equally sensitive—while the selectivity imparted by the excellent characteristics of the KVG filter is of the highest standard. The agc characteristics are remarkably good and cope quite happily with multi-station QSOs—including the nearest neighbour some 250 yards away. Readers who wish to learn more about the highly advanced agc characteristics provided by the SL621 circuit are referred to G3PDM's excellent article in *Radio Communication* of December 1969.

The agc threshold facility has proved of surprising value and even imparts a practical value to the S-meter in that, while listening to a multi-way net, it is but an instant's work to adjust the threshold level so that the agc action can just be seen on the weakest signal.

It is also surprising to experience the potency of 200mW audio output. Originally it had been intended to add yet a further stage of audio amplification up to, perhaps, the conventional 2W level. But 200mW is more than sufficient to raise the usual howls of protest from even the remoter corners of the 'GRY household.

In transmission, as expected, the only real difficulty was in preventing feedback into the low level transmit frequency circuitry. It was necessary finally to decouple the SL640 and SL611 circuitry direct at every dc pin, and to screen fully—as well as liberally decouple at both ends—the ht feed line to the unit. In retrospect, given better initial mechanical fabrication, the problem should not have been as severe as it was.

The values in use for the transmit bias levels are currently 1V for the audio (not relevant if the SL620 agc facility is used) and 3·5V for the i.f. Much depends on the output of the microphone used, but care must be taken not to overload either of the SL640 balanced modulators.

Having reached the stage of near success, several infuriating weeks of operation were experienced, during which the most discriminating persistently disapproved of the audio quality of the transmissions emanating from GW3GRY. After checking and re-checking all of the relevant circuitry for linearity it was with some relief that the fault was finally traced to the microphone in use! Current reports are, almost exclusively, highly favourable.

Reflections

It will have been observed that the transceiver as constructed is no operator's dream; in the sense that bandchanging requires the manipulation of four separate bandswitch controls, quite apart from pa retuning and reloading. Similarly, receiver rf peaking and transmit drive peaking are separate operations. If, however, such operating limitations are happily accepted (and do they really matter apart from contest participation?) then their acceptance does endow considerable benefits in simplicity of mechanical construction.

These benefits, coupled with the ease, using SICs, (now rapidly becoming low-cost devices) by which relatively complex circuitry can speedily and simply be assembled, could lead to a real revival in the art of home-construction.

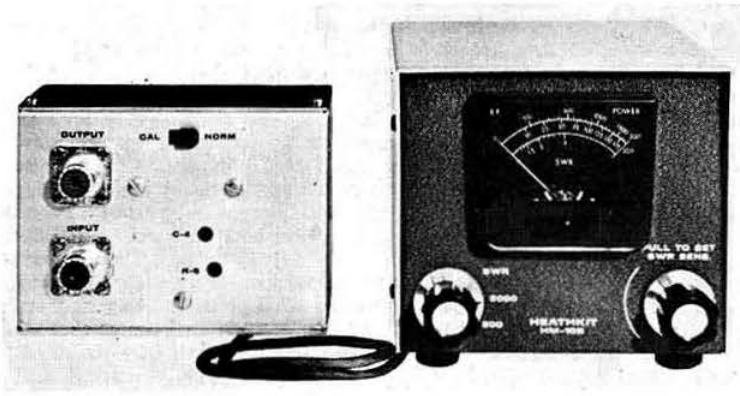
There are intriguing possibilities in the further development of the application of existing devices. Thus, on a minor note, the SL641 or SL640 could obviously function as a product detector; on a major one, the Plessey SICs covered in this article could, on their existing specifications, form the basis of a high-performance rig up to 70MHz. No doubt the frequency scope will shortly extend still further. Complications of feedback in the unit described could largely have been avoided by generating the final frequency at a higher power level using either a conventional diode ring or alternative circuit (sic or other).

On another tack, and especially bearing in mind the admitted shortcomings of the described receiver front-end in respect of lower than available gain and image rejection, the success of the direct coupled SL640/SL611 combination led the author to speculate on the attractions of a direct-coupled front-end with the necessary frequency-selective circuits preceding the SICs. It is intended to investigate the merits of this arrangement before attempting to extend the frequency coverage into the higher bands.

Equipment Review

Heathkit HM-102 wattmeter/swr bridge

by R. F. STEVENS, G2BVN



A recent addition to the range of Heath kits is designed for the measurement of rf power output from a transmitter and the determination of the swr of an aerial system. The lay-out of the equipment comprises a detector portion which may be located up to 6ft away from the indicator, and longer if one is prepared to replace the cable supplied. It is intended for use with coaxial cable of 50Ω impedance and there is a negligible insertion loss so that the instrument may be left in circuit during the normal operation of a station.

A toroid pick-up coil is placed between uhf type input and output sockets on the detector portion, and the voltage induced in this coil is rectified, decoupled and applied through sensitivity and function controls to the indicating meter. Part of the circuit is a mirror image to provide facilities for the measurement of forward and reverse voltages. The power meter circuit uses the same pick-up coil, which is swamped by a 68Ω resistor to eliminate effects due to variations in the transmitted frequency. The wattmeter is calibrated by the measurement of voltage at a divider point. The accuracy of calibration will obviously determine the final accuracy of the instrument.

The detector portion of the equipment is built around a circuit board facilitating a compact unit. This remote chassis can be used at a point some distance away from the indicator or actually mounted in the indicator box if this is most convenient for the station layout. Sensitivity and function switches are mounted on the front of the indicator box, which is finished in the traditional Heath light and dark green colours. The meter scales are large enough and clear enough to be read without effort in normal artificial lighting.

There are two switched ranges for power measurement, 200 and 2,000W. The manual gives instructions for obtaining

readings on a low power range of 1 to 20W. The manual stresses that the highest accuracy of power readings (specification figure ±10 per cent) can only be attained with a 50Ω non-inductive load. In other words, if the aerial system has a high swr then the power output readings may be misleading. A check against a power meter of known accuracy showed that the specification was readily met.

The procedure to obtain swr readings is extremely simple and there are no disadvantages to mention. A check was made using a reflectometer of known accuracy and at the same time two swr bridges of Far Eastern origin were tested. The test instrument, the HM-102 and one of the two oriental bridges gave approximately the same results. The second oriental bridge produced readings that were definitely optimistic.

The Heath assembly manual is the first-class type of production that one expects from the manufacturers. Included in the manual is a useful section dealing with the interpretation of the swr bridge readings. The advice is sound and one notes with pleasure the omission of the suggestion that to reduce the observed swr one should alter the length of the feeder cable.

The price is probably a little more than one would expect to pay for a station accessory, but in the instrument world one generally obtains performance matching the price. Properly constructed and intelligently used the HM-102 is a valuable addition to any amateur station.

Specification

Frequency range	1·8 to 30MHz.
Wattmeter accuracy	±10 per cent of full scale reading.
Power capability	to 2,000W.
SWR sensitivity	less than 10W.
Impedance	50Ω nominal.
SWR bridge power rating	continuous to 2,000W p.e.p.
Connectors	UHF type SO-239.
Dimensions	5¼in wide, 5 1/16in high, 6½in deep when assembled as one unit.
Net weight	2½lb.
Price	£15.50. 30p post/packing.

Another S-meter for the AR-88D

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

ANOTHER solution to the problem of obtaining an S-meter for the AR-88 receiver can be obtained by circuit modification. The original circuit requires a special meter having a right-hand zero, and full scale deflection for a current of 5mA. This is fed by the cathode current of the 1st i.f. stage; the cathode resistor, R20, being returned to earth via the meter. A variable control of about 50Ω is connected across the meter as a shunt to set the full scale deflection (zero signal level).

As the special meters are scarce, it is useful to modify the circuit so that normal left-hand-zero types can be employed. In the following arrangements, the cathode resistor is returned to earth directly, and the meter placed in a bridge circuit in the anode lead of the same stage.

Two preset controls are required, with access by screwdriver at the rear of the set, or space may be available just below, and to each side of, the mains/function switch, S23, on the front panel. One of these controls is used to set the balance of the bridge circuit, so that no current flows in the meter when there is no signal; the other sets the full scale current for very strong signals. As this latter control is connected as a universal shunt, any meter having fsd of 5mA or less may be used. Centre-scale reading will be given by an "S-9" signal, so a rule-of-thumb can be assumed, eg 3 or 4 S-points to the milliamp (for the 0-5mA scale).

Two circuit modifications are required:

(i) To the anode circuit of the 1st i.f. stage: disconnect the decoupling resistor R22 (1,000Ω) from the ht line, and connect a new resistor, 2·2kΩ ½W, in series with it. In the circuit, Fig 1, the diagram is laid out as in the AR-88 handbook, and the new components are numbered R101-104. Point "A" is connected directly to ht before the modification.

(ii) To the voltage regulator circuit: disconnect R30 (2,700Ω WW) from the ht and connect in series a fixed resistor of 330Ω 1W and a preset potentiometer of 100Ω WW. Point "B" in Fig 1 is connected directly to ht in the original circuit.

If a calibrated signal generator is available, the meter may be calibrated in decibels and its scale marked accordingly to enable accurate reports of signal level to be given.

Adjustment of S-meter

(a) Set rf gain control to maximum, aerial shorted, avc on. Adjust R103 for zero current on meter.

(b) Set rf gain control to minimum. Adjust R104 for full-scale deflection.

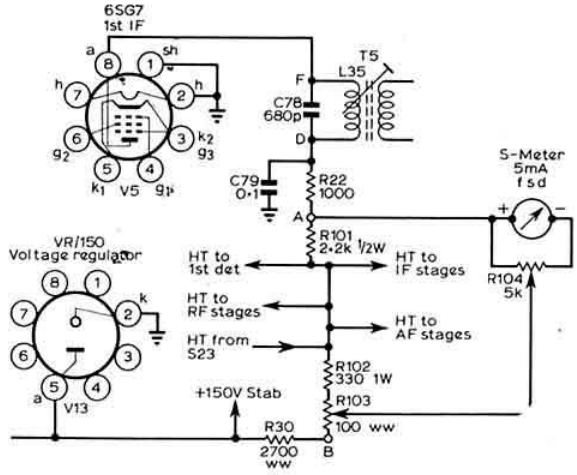


Fig 1. Circuit modifications.

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

Plagiarize and hybridize

An approach to receiver design

by PETER G. MARTIN, G3PDM/W1*

Part 4: Receiver assessment

If an unmodulated carrier is tuned in on an a.m. receiver, the only audible change is a variation in the output noise level. With an ssb receiver, a beat note is heard. This prevents several receiver assessment procedures from being carried out in the normal way. For example, the usual test for cross-modulation in a.m. receivers is to tune in a weak, unmodulated "desired" signal, and to increase the strength of a nearby modulated interfering signal until its modulation is audible. With an ssb receiver, the heterodyne due to the desired signal prevents low levels of cross-modulation from being heard or seen on an oscilloscope. The current procedure in this example is to null out the heterodyne with a high-Q bandstop filter, or to examine the receiver audio output on a spectrum analyser.

The subject of measurements on ssb receivers is discussed fully by Pappenfus *et al* [29].

A wide range of standard laboratory equipment was available to the author for measuring the performance of the receiver described, but this did not include such luxuries as a spectrum analyser. However, many useful measurements were made, and these are described below, and in Tables 3 and 4.

The signal generator used had an accurately calibrated attenuation over the range 10μV–4V rms. A 50Ω switched attenuator was built to extend this range down to 0·1μV. The receiver sensitivity was measured for the ssb and cw modes, and was better than 0·5μV and 0·2μV, respectively, on all bands. (See Table 3).

In Fig 22, the receiver i.f. filter response down to −100dB is compared with the theoretical result predicted by Kosowsky [25]. The frequencies of infinite attenuation of all three sections correspond to $x_{\infty} = \infty$. Fig 23 shows the response curves of the audio amplifiers (curve A), the audio low-pass filter (curve B), and the two-section cw filter (curve C). Fig 24 shows the overall receiver response in the ssb mode, down to the −140dB level.

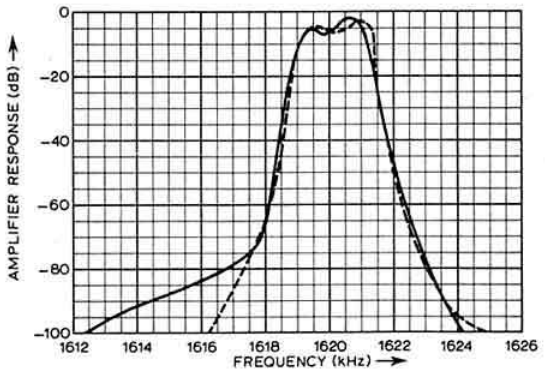


Fig 22. The receiver i.f. amplifier response compared with the theoretical selectivity curve predicted by Kosowsky

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

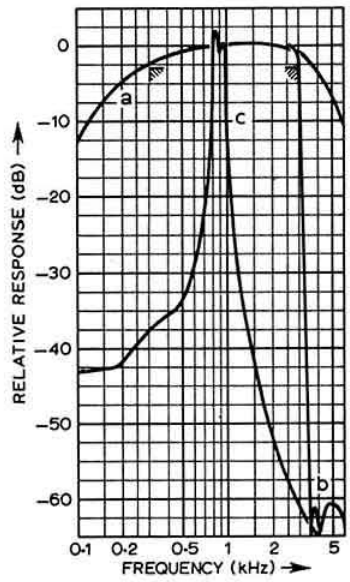


Fig 23. Frequency response of the receiver audio circuits. (a) The pre-amplifiers and output stage (ssb mode), (b) the elliptic function low-pass filter, and (c) the active cw filter

Table 3 also lists the image and i.f. rejection figures for each band. The image rejection figures are barely adequate, but could be improved by the use of a Cohn-filter preselector. The i.f. rejection figures are extremely high because of the use of a balanced mixer. On the 14, 21 and 28MHz bands, 4V of signal injected at 1·62MHz could not be detected, indicating an i.f. rejection figure in excess of 140dB.

Table 3: Receiver sensitivity and image and i.f. rejection figures

Band	160m	80m	40m	20m	15m	10m
Image rejection	60dB	56dB	68dB	56dB	54dB	54dB
IF rejection	88dB	112dB	130dB	>140dB	>140dB	>140dB
Sensitivity (6dB s/n ratio in a 2·2kHz bandwidth)	0·3μV	0·4μV	0·3μV	0·4μV	0·4μV	0·5μV

Table 4: Summary of receiver performance achieved

Frequency coverage:	All amateur frequencies between 1·8 and 30MHz, in 500kHz bands. A further three switch positions are provided for reception of MSF and other stations.
Tuning rate:	9kHz per knob revolution on all bands.
Sensitivity:	SSB: Better than 0·5μV for 6dB signal-to-noise ratio. CW: less than 0·2μV for 6dB signal-to-noise ratio.
Power output:	1·5W rms continuous rating.
Selectivity:	SSB: 2·2kHz at —6dB, 3·9kHz at —60dB, 6·8kHz at —120dB. 6:60dB shape factor: 1·77. CW: 180Hz at —6dB, 660Hz at —30dB, 6·5kHz at —120dB.
Image rejection:	Better than 50dB (see Table 3).
IF rejection:	Better than 85dB on 160m band, and better than 100dB on other bands (see Table 3).
Spurious responses:	All spurii below a 1μV equivalent level, except as noted in the text.
Transient responses:	IF recovery time of 470μs (see Fig 25).
AGC characteristics:	1·5dB rise in audio output for 132dB increase in signal strength above 1·5μV (see Fig 27). Attack time 20ms, hang time 1s and decay time 200ms.
Frequency stability:	500Hz warm-up drift in first 60s, thereafter ±2Hz in any 30min period.
Resetability:	After 12-hour turn-off period, stabilizes within 10Hz of original frequency.

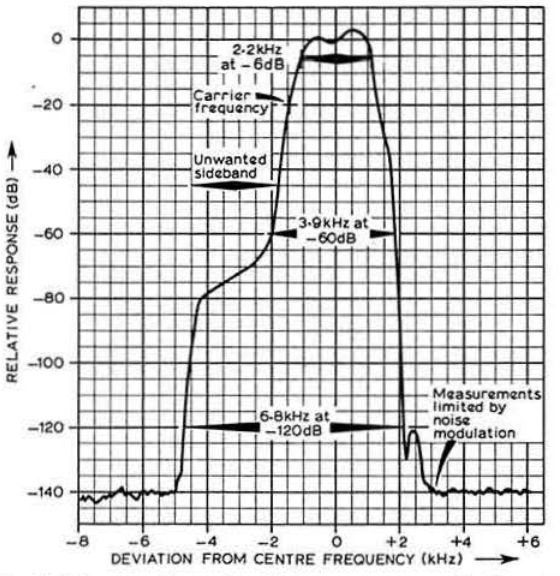


Fig 24. The overall receiver frequency response in the ssb mode

Fig 25 compares the transient response at various points in the receiver with the response of a 10-section mechanical filter published by Hathaway and Babcock [47]. This would seem to indicate that crystal filters are superior in this respect, but the reason is not obvious.

The insertion loss of the noise gate (TR201) is 4·5dB when ON, and 52dB when pulsed OFF by the noise silencer. The latter figure could be improved to 70 or 80dB by using a push-pull driving transformer (T102) and balancing out the

The G3PDM receiver

fet trans-capacitance. The noise gate handles signal voltages of up to 1V without visible distortion. This corresponds to 5V across the secondary winding of T102.

Spurious responses were below a 1μV equivalent level except in the 160 and 80m bands, where several strong carriers were found. Between 1·8 and 2MHz, spurii were found at strength S8 on 1,816 and 1,856kHz, at S1 on 1,840, 1,888 and 1,980kHz, and below S0 on 1,828 and 1,908kHz. A spurious response chart was drawn up showing where any high order mixer products generated in the synthesizer would cross the signal, i.f. or image frequencies (see Fig 26). This showed that the S8 signals on 1,816 and 1,856kHz could both be due to the seventh-order product $2f_3-5f_2$, where f_3 and f_2 are the frequencies of the crystal oscillator and push-pull local oscillator. Examination of the receiver circuit showed that the crystal oscillator output had been inadvertently coupled directly to the local oscillator via the

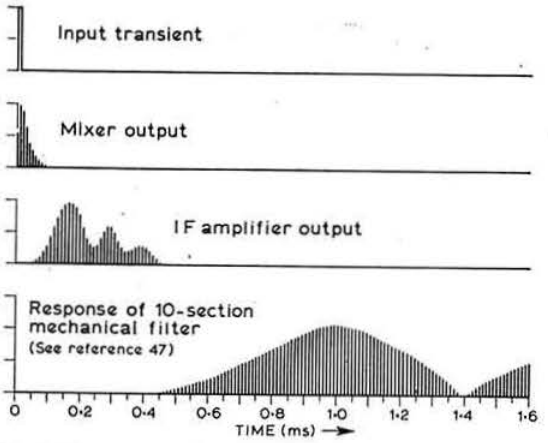


Fig 25. The response to input transients at various points in the receiver, compared to that of a 10-section mechanical filter

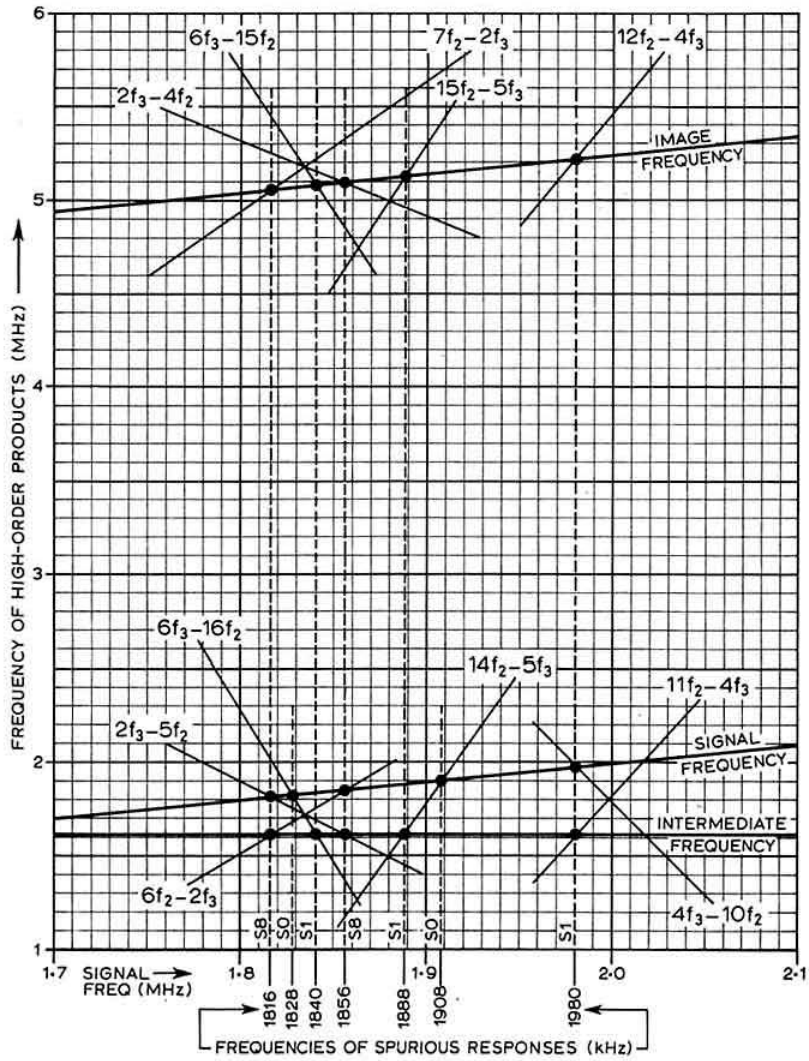


Fig 26. Spurious response chart used to determine the cause of internally generated carriers in the 1·8-2·0MHz band. The strength of each response is given on the horizontal axis. Any product expressed in terms of the local oscillator frequency (f_2) and the crystal oscillator frequency (f_3) can also be defined as a function of the reference oscillator frequency (f_1), because of the relationship $f_1 \div f_2 = f_3$

grid of the synthesizer mixer. The earlier receiver had used a heptode mixer, with its good isolation between inputs, and spurious responses were absent! This experience brings home the point made earlier that spurious signals from frequency synthesizers can be controlled and eliminated at source. It is planned to change the synthesizer mixer valve in the near future.

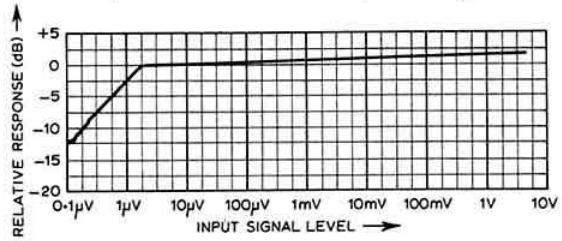


Fig 27. The receiver agc characteristic for signal levels from 200nV to 4V

The weaker spurious responses in the 160m band are found to be 14th or higher order products from the same source. A similar explanation applies to the responses noted on the 80m band.

The receiver agc response is given in Fig 27, showing a 1·5dB rise in audio output for a 130dB increase in signal strength above 1·5μV. This compares favourably with any other receiver known to the author, regardless of cost, and the excellent signal-handling capabilities of the 7360 mixer are endorsed by this result. Fig 28 shows the agc characteristic of the i.f. amplifier chain, with its 150dB dynamic range. The control sensitivity is seen to approximate to 8·4dB/V.

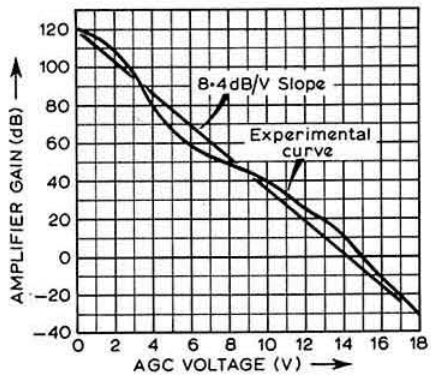


Fig 28. The gain control characteristic of the three receiver i.f. amplifiers, showing the 150dB dynamic range

Conclusion

Although a wide variety of integrated circuits are now available for high performance communications equipment, the results achieved in some circuits with valves can be superior in several respects. To summarize, these are:

(a) lower cross-modulation and intermodulation;
(b) greater dynamic range;
(c) lower noise modulation;
(d) lower noise in oscillators;
(e) better agc performance.

Semiconductor devices have advantages too, but many of these are not strictly relevant to amateur work. The experimenter is not normally concerned with small size, high reliability or low power consumption.

The real attraction of semiconductor circuits to the amateur is the high circuit complexity achievable at low cost, and the compatibility of construction methods with the home environment.

It is hoped that this article will cause experimenters to look back for a moment and count their losses in the race through the silicon slice age.

References

[47] "Survey of Mechanical Filters and their Applications", J. C. Hathaway and D. F. Babcock, *Proc IRE*, January 1957.

(Concluded)

BOOK REVIEW

The Radio Amateur's Handbook (1971 edition). By the headquarters staff of the ARRL. 657 pages, copiously illustrated, and with many tabulations. Obtainable from RSGB Publications, 35 Doughty Street, London WC1N 2AE. Price £2·75, inclusive of postage and packing.

This is the forty-eighth edition of "Old Faithful", and, as the foreword points out, it was the only technical publication on *Time*'s recent list of "all-time best sellers." More than four million copies have now been sold since that eventful first edition in 1926, with which F. E. Handy's name must be associated. The reviewer has been privileged to review the *Handbook* here, almost every year for 40 years, since the seventh edition in 1931. That early edition now looks a slim volume: it had 216 pages and cost only four shillings. The gold title letters and stout red cover are in keeping with a certain elegance of presentation which has become characteristic of the *Handbook*, and, to a lesser extent, of its later parallel publications on specialized topics.

While it is clearly apparent throughout that this book is written for the radio amateur, its usefulness and appeal are felt by many professional engineers and scientists and, in our experience, copies turn up continually in the most unamateur circumstances.

The new edition contains many changes and additions, but the Semiconductor, SSB, and Measurements chapters have been rewritten to reflect modern trends and applications.

One notes some treatment of varactors as frequency multipliers, and more attention to semiconductor stabilization of all sorts, with a brief treatment of applications and representative ic circuits. Reception of fm signals now includes an adaptor for receivers with 455kHz i.f. systems, the digital detector, and the crystal discriminator. CW men especially will study an active filter in which the characteristics of an inductor are simulated by RC circuits and amplification: a four-section one has a 6dB bandwidth at 150Hz, and 40dB down at 420 and 1,120Hz. It is said to have minimal ringing tendency.

Another audio filter of interest serves both phone and cw modes: the cw connection uses a three-pole Butterworth type centred on 900Hz with a bandwidth of 200Hz. The phone connection is a five-pole Chebishev design with a sharp cut-off at 3,000Hz, and attenuation below 300Hz.

The earlier fet converter for 14, 21 and 28 has developed into an attractive "160 through 10" all-amateur-band converter using six crystals, and designed for use with any 3·5–4MHz tuner.

The HB70 receiver retires, and there is now a "receiving package for 1·8 to 144MHz". This is an advanced project, and "inexperienced builders are not encouraged to attempt duplication of the circuits given here",—one wonders if this is its proper place!

A new 75 to 120W cw transmitter is a workmanlike job, designed for ease of assembly; using crystal-control on 80, 40, 20, 15 and 10, it employs a neutralized 6146B as pa, and 6GK6 as co.

In the aerial section are full dimensions and constructional details of a wide-spaced multi-element tri-band beam for 20, 15 and 10, based on optimum gain and minimum losses. It uses a trapped driven element with single coaxial feed, and a tri-gamma matching network. Separate directors and reflectors are used on each band, and weatherproofing of the traps is unnecessary.

Two high-power power-amplifiers for vhf are new, and also the design of a portable station for 3·5 and 7MHz, which is a 2W solid-state transceiver. Its direct conversion receiver covers both bands and uses a dual-gate mosfet as the product detector; a built-in vfo acts as bfo. The design is neat and the appearance impressive. Older style chassis may be used, as may point-to-point wiring.

An electronic voltmeter using an fet and two transistors looks interesting, but perhaps less robust than a vtvm. The treatment of measurements is much improved by a complete reorganization and new material. The QRP enthusiast will welcome a matching indicator which is useful down to 10mW.

These are a few only of the new items in the latest edition. It is very good indeed, and fully true to form—and what form!

T.P.A.

A compact band-pass filter for 144MHz

by G. R. JESSOP, CEng, MIERE, G6JP*

IN this filter, the tuned circuits consist of a simple helix tuned by a small "top" capacitor. The two tuned circuits are arranged so that they are slightly over-coupled in order to provide an adequate bandwidth, which in this case is 4MHz wide with a maximum variation of 0·1dB and an insertion loss of 0·4dB. Coupling of the input and output connections is by tapping "low down" on each of the coils; the position of these taps is important for matching into the circuit because they particularly affect the insertion loss. There are no spurious responses below 600MHz, adjustment is quite simple and can be carried out on a received signal both for the tap positions and the tuning. The performance is shown in Fig 1.

Construction

The general arrangement is shown in Fig 2, and is based on the standard $4\frac{3}{4}$ by $3\frac{3}{4}$ by 2in die-cast box; the aluminium version of which is preferred. In the prototype, type N connections have been used, but any of the usual alternatives may be substituted.

The tuning capacitors used are not ideal, but it is doubtful if there is a readily available cheap alternative. With capacitors of lower minimum capacity it would be possible to increase the value of the inductor, but is not thought there would be any significant improvement in performance. If a different type of capacitor is used it should be remembered that the voltage across it will be relatively high.

The inductors are made from $\frac{1}{8}$in diameter copper wound on a $\frac{7}{32}$in mandrel; they consist of four full turns plus that required at the lower end to reach the central fixing. Care is needed to ensure that the coil spacing is correct; with the dimension given there is sufficient overcoupling to give a small ripple at the nose of the response curve. The method of fixing adopted was to solder the $\frac{1}{8}$in diameter copper into a socket as used for the Erie type K1700 stand-off capacitor (see Fig 2), with the capacitor removed. Any alternative method of making a good electrical contact to the box would be suitable, bearing in mind the relatively high circulating current involved.

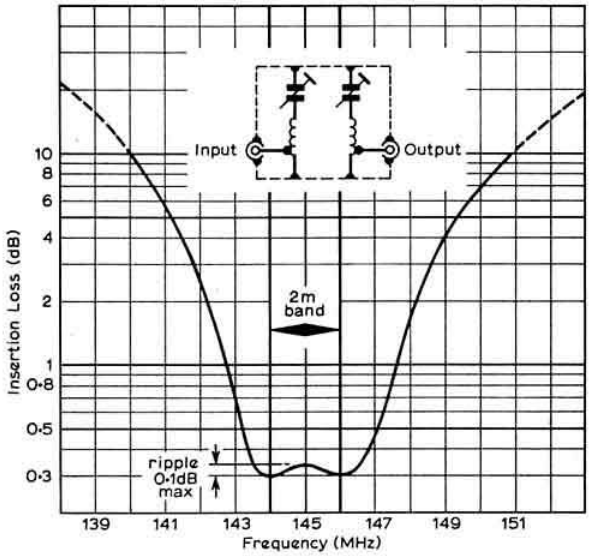
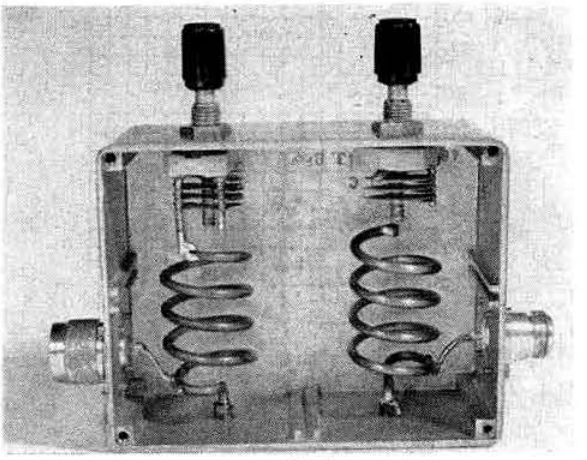


Fig 1. Performance



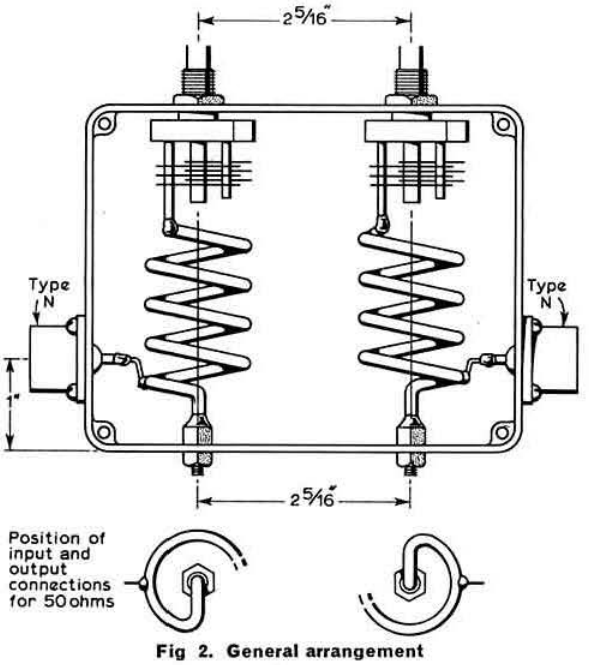


Fig 2. General arrangement

The tuning capacitors are Jackson type C804 trimmers 3·5 to 15pF with two plates removed from both the rotor and stator, leaving three fixed and three moving.

When the capacitor and coil are mounted and soldered together, the circuits should be rotated so that the tap point is opposite the input and output connectors; the connections being made of 16swg copper wire.

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MICROWAVES–1,000MHz and up

by Dr D. S. EVANS, G3RPE*

Microwaves at the 1971 Convention

Judging from the comments made by a number of people, this year's VHF/UHF Convention appears to have been a success all round. From a microwaves point of view, it was gratifying to see so much fine equipment displayed. This included two transistorized 13cm converters; separate aerial feeds for 13cm and 3cm: a multi-band feed for 23, 13, 9 and 6cm: a balanced mixer, variable attenuator and cross-coupler and complete transceivers for 3cm. We hope the exhibitors can be persuaded to write them up for publication.

Many were interested in a demonstration of the reception of 3cm signals and have asked for details. The path was between Whitton and Wembley, 13km away, and would have been optical but for the roofs of half a housing estate. The signal strength varied to a surprising degree, from S7 in the morning to S2 in the afternoon, and included one complete fade-out for half an hour. The transmitter used a 723A/B klystron driving a small travelling-wave tube, which generated 500mW. This was fed to a 6ft dish via a WG18 feed (sic). The receiver aerial was a 3ft dish mounted 20ft high on the roof of the building, the tone-modulated 3cm signals being fed to a receiver at ground level. The receiver consisted of a single-ended mixer (as described in this column last month), a Gunn diode as the local oscillator (this column, April 1971), and either a narrow-band BRT400 or a wide-band receiver as the i.f. amplifier.

Operating standards for the microwave bands

During the last few months, a number of possible operating standards have been presented in this column. Having taken into account the sometimes conflicting reactions of many members, the VHF Committee now recommends the following as provisional general standards.

(a) Polarization

The polarization of signals on all microwave bands should be horizontal. In the special case of the polaplexer type of unit, where the transmitted and received signals are polarized in planes at 90°, it is recommended that the *transmitted* signal should be polarized at 45°, in a clockwise direction from the vertical when looking in the direction of propagation. This is a USA standard.

With these standards, all polaplexer units are mutually compatible and only a 3dB loss is involved when these units are used with horizontally polarized equipment.

(b) Intermediate frequencies in common — i.f. working

Some of the factors relevant to the choice of the first i.f. to be employed in this method of working were covered in the March issue. G8CKZ has since indicated another factor. When a single-ended mixer is employed (as opposed to a balanced mixer), local oscillator sideband noise should also be taken into account.

After considering all the points involved, the VHF Committee remains divided between a first i.f. of 30MHz and one of 70MHz for this type of working. It must be emphasized that the problem of standardizing the receiver first i.f. does not arise when the transmitter and receiver are separate units. In this case the i.f. may with advantage be much higher in frequency, in which case an existing 30MHz could be employed as a second i.f.

(c) Transmitter & receiver bandwith

These should both be ±500kHz.

(d) Pulse modulation

The recommended pulse duration is 1μs.

(e) Tone modulation

The preferred tone modulation frequency is 1kHz.

(f) Preferred frequencies of operation

The preferred frequencies for narrow-band working have been established for some years, and are based on multiples of 1,152MHz in the following way:

13cm band: 2,304–2,306MHz
9cm band: 3,456–3,458MHz
6cm band: 5,760–5,762MHz
3cm band: 10,368–10,370MHz

There is no similar band-planning for wide-band operation. However, on the 3cm band much of the current operation is in the range 10,000–10,100MHz. Within this sub-band there is some merit in adopting 10,035 and 10,065MHz as preferred frequencies of operation.

(g) Talk-back frequencies

During contest working, talk-back should be via the 70cm band. Obviously for local working any convenient band may be used.

No doubt some of these standards will be modified in the light of general experience, and perhaps others added. The VHF Committee naturally will welcome comments.

American-type microwaves

The writer was pleased to receive from K6HIJ a description of the current efforts of the San Bernardino Microwave Society in California. They have for some years pioneered a narrow-band technique using polaplexers, about which we hope to say more in a future article. However, two points are worth making at this stage. Firstly, using this technique they have recently put up the dx record on both 9cm and 6cm to 214 miles. Secondly, according to K6HIJ, most members successfully operate microwave stations at their homes, where usually there are no line-of-sight paths between stations. This strengthens the view that microwaves must not be thought of as being confined to working just optical paths.

First Microwave Contest 1971

A reminder that the first microwave contest of the season will be held on the 20th of this month. Details were given in the April issue.

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TECHNICAL TOPICS

A monthly feature by PAT HAWKER, G3VA

A problem in any regular column is, too often, not the expected one of filling the space—but that of exercising sufficient restraint to stop it from overflowing into pages which are rightfully dedicated to other interests. So this month, no moralizing but straight into the month's quota of aerial and circuit topics.

Another look at transmitting loops

In November 1967, *TT* became the first, in any amateur journal, to comment on the US Army octagon loop aerial, originally described in *Electronics* (31 August 1967). During the following months many further ideas were widely reported: these included simplification of the capacitive matching network which is possible when only single-band operation is required, and the use of loops for mobile operation (*QST*, November 1968). One of the most practical suggestions was that put forward by "Spenny" (G6NA) in the September 1968 *Radio Communication*; p. 576; this was to use "½in coaxial" as a convenient means of achieving the very necessary low resistive losses.

Recently, Jim Fisk, W1DTY, editor of *Ham Radio*, drew my attention to a "Designer's casebook" item in *Electronics*, April 12, 1971. This was by James Taylor, W2OZH, who had written the earlier *QST* piece on "The Mobiloop" referred to above.

In his latest work on transmitting loops, he claims that a very simply constructed low-frequency balanced dipole loop can provide reasonably efficient performance even when mounted close to ground; he suggests that with a maximum linear dimension of under 25ft, a 4MHz loop aerial can provide signals only 5–10dB below those from a full-length, high dipole. Mounted on a wood-frame building, his loop has an input resistance of 59Ω, showed unity swr at 3·942MHz, and 1·5 : 1 swr at ± 50kHz.

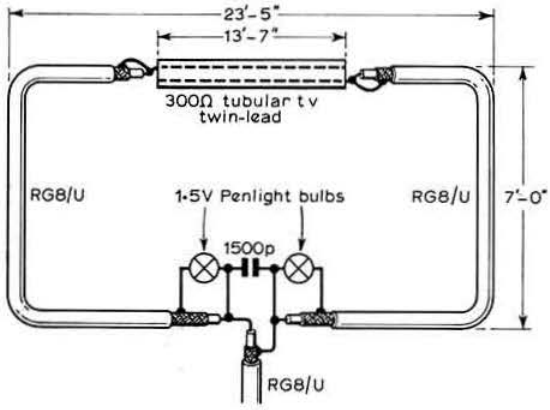

Fig 1. Low-cost balanced loop aerial. This is trimmed to resonance by symmetrically trimming open ends of the 300Ω twin lead. Flashlamp bulbs should indicate current balance at resonance. Dimensions shown are for 3,942kHz and should be scaled proportionately for other frequencies

The construction of the loop is indicated in Fig 1. It will be seen that, as in the Spenny loop, he uses coaxial cable (RG8/U) as a large diameter, low resistance conductor. An interesting further idea, however, is the use of 300Ω tubular twin lead cable to form a high-voltage capacitance which can readily be trimmed for resonance to form a balanced configuration. He also suggests that the impedance match at the feedpoint can be improved by adding a 1,500pF 500V capacitor (adequate for powers up to 500W) across the feedline as shown. The 1·5V flashlight bulbs are used as tuning indicators. The bulbs, which indicate current balance, are brightest when the aerial is at resonance. His arrangement thus eliminates completely the need for any conventional high-voltage variable capacitors. The loop structure should be mounted vertically since horizontal placing will produce an overhead null. If near the ground it would be better to make the twin-lead member the lower one.

Taking radiation resistance as $3{\cdot}1 \times 10^4 (A^2(\lambda^4)\Omega$, then a loop enclosing 165ft yields (at 4MHz) an R_r of 0·27Ω. Taking the rf resistance of the RG8/U cable as 3Ω, this would give an efficiency of 8 per cent or about 10dB below maximum efficiency. W2OZH considers this theoretical figure is borne out by results. Many amateurs may consider that 8 per cent efficiency sounds very low—but in practice many short aerials are in use which must be significantly less efficient than this. It does not depend on any earth connection or ground plane. As Spenny showed very clearly, this type of loop aerial has very practical uses where more conventional aerials cannot be accommodated.

The echelon or Model C aerial

It may seem a far, far cry from the small loop to a long wire aerial. But it seems an opportune time to focus a little attention on an interesting type of long wire aerial which is capable of providing two different bi-directional lobes and can be used to achieve either two- or four-point coverage, without physical rotation or the use of an excessively large area of real-estate.

Although the echelon is included in *The ARRL Antenna Handbook*, we suspect that this form of long-wire aerial, which is closely akin to the far better known Vee beam, is virtually unknown to most British amateurs. Yet, in a few months time, it will be exactly 40 years since it was described in a classic RCA paper in *Proc IRE* (October 1931) where it was designated the Model C aerial (Model D, incidentally, was the Vee-beam).

One of the relatively few detailed descriptions of applying the Model C to amateur operation appeared in *Radio* (January 1938) in an article by Nick Stavrou, W2DFN.

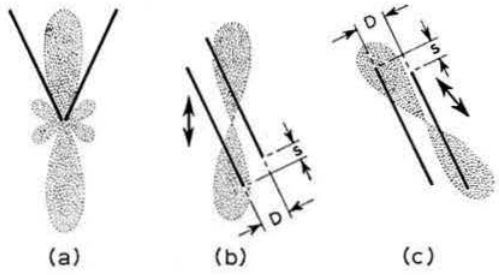

Fig 2. Comparison of the Vee and Model C (echelon) aerials. (a) the bi-directional Vee; (b) the Model C aerial; (c) Model C aerial showing how bi-directional lobes swing round when the stagger is reversed

Why is this aerial worth dragging out from obscurity? After all, the gain is slightly down on a Vee of equivalent leg length. And, more importantly, the Model C is essentially a single-band aerial. These are valid criticisms, but it must be remembered that both the Vee and the rhombic are not only long but also broad—and to provide on hf an equivalent number of lobes would fill up a great deal of space. And furthermore, although originally described for hf, there seems no reason why it should not be used at vhf where it could be fitted very conveniently into quite a modest garden.

For the Model C consists of just two long wire aerials, about a half-wave apart: Fig 2(b). On these wires, the phase is staggered in such a way as to result in two very pronounced major lobes, 180° apart. And, if the stagger is reversed, the two lobes swing round conveniently: see Fig 2(c). The *ARRL Antenna Handbook* indicates that this electronic beam steering can be done simply by changing the phasing of the signal fed to the two wires. Three ways of feeding the aerial are shown in Fig 3. In 1938, W2DFN actually moved one of his wires along by a simple but ingenious system using a counterbalance weight and a rope brought into the shack. He shifted the wire of one leg along by twice the stagger distance: Fig 4.

While, very roughly, the two wires are about 0·5λ apart, and the stagger is of the order of 0·25λ, more exact figures (for optimum lobes) depend on the angle of radiation from the long wire, and this, in turn, depends on how long, in terms of wavelength, the long wire is. Table I, derived from W2DFN's 1938 article, gives typical figures. As with other long-wire aerials such as the Vee and rhombic, the power gain and width of the lobes depend on the length of wire.

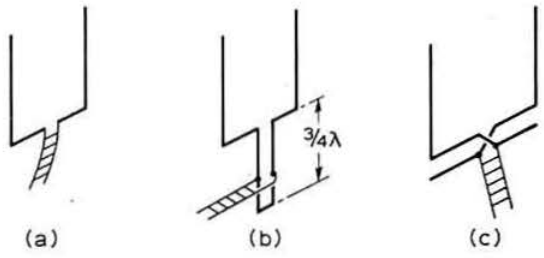

Fig 3. Three methods of feeding the Model C aerial. (a) Zepp feed; (b) stub matching to any impedance transmission line; (c) system shown in *The ARRL Antenna Book*

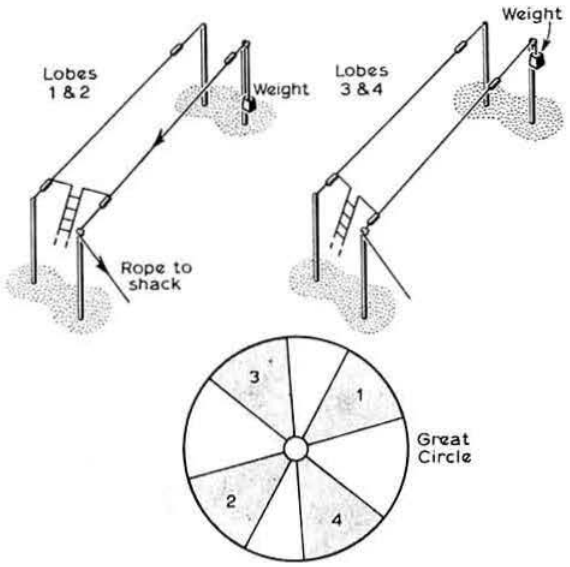

Fig 4. The 1938 arrangement described by W2DFN with directivity changed by hauling in or letting out rope

Apart from Model C, there was also a so-called Model B using sloping wires and a reflector, and producing vertically-polarized waves—this, however, appears to call for very high supports.

We should perhaps stress that while in the past we have been fortunate enough to use Vees and rhombics (although not for amateur operation), we have no personal experience of the Model C or echelon configuration. But it seems a pity if this system is entirely forgotten. We should be interested to learn of any current or past experimental work on this type of beam array.

Table I. Model C (echelon) aerial data

Length of radiators (L)	Lobe angle (α)	Spacing (D)	Stagger (S)
1½λ	42	0·746 × ½λ	0·67 × ½λ
2λ	36	0·85 × ½λ	0·62 × ½λ
3λ	29	1·03 × ½λ	0·57 × ½λ
4λ	25	1·18 × ½λ	0·55 × ½λ
5λ	22·5	1·3 × ½λ	0·54 × ½λ

$$\text{Length of radiators} = \frac{984}{f(\text{MHz})} \times (k - 0{\cdot}025)$$

where K is number of wavelengths.

$$S = \frac{\sin \alpha}{\sin 2\alpha} \cdot \qquad D = \frac{\cos \alpha}{\sin 2\alpha} \cdot$$

To convert to feet, multiply by 492/f(MHz).

Typical 2λ 14·2MHz system:
L = 136·2ft, D = 29·5ft, S = 21·5ft.

Aluminium foil dipoles

QTC (January 1971) publishes an item by SM5JV (with acknowledgements to earlier work reported by DJ7VYA in *DL-QTC* of March 1970). This shows how rolls of household aluminium foil can be used to form short wideband dipole aerials for lofts or for other indoor or wall mounting: see Fig 5. His suggested lengths of 45cm wide foil are:

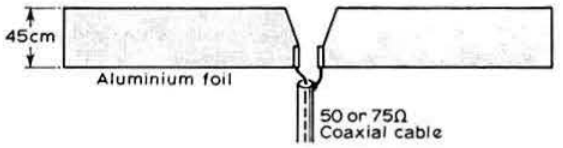

Fig 5. Broad-band aluminium foil aerial. For dimensions see text. Directivity patterns can be changed by having the two foil sections in the same or different planes (eg 180° or 90° or 45° angle between foils).

3·5MHz, 2 by 12m; 7MHz, 2 by 6·2m; 14MHz, 2 by 3·4m. The idea reminds one of the inbuilt vfm/fm aerials in some broadcast radio receivers. It is possible that this could be quite an effective method of constructing loft, room or wall aerials, with broad-band characteristics making it easier to achieve a good match than with most thin-wire indoor aerials. By having the foils at different angles (ie in the form of a short Vee) it should be possible to achieve near-omnidirectional radiation.

Vertical angles again

Over recent months we have included quite a number of comments on low angle radiation and reception (eg the April *TT*) and we have no wish to become a bore on this subject. But one or two additional relevant points have turned up.

For example, a recent paper by Dr E. N. Branley of the Radio & Space Research Station (*Proc IEE*, February 1971) refers very briefly to a recent series of field-strength measurements made at Ditton Park on pulse transmissions over a 3,300km path (actually, we understand, from Cyprus). Large variations in the angle of elevation of a given propagation mode, as *deduced* from observed changes of ionospheric equivalent height and relative lines of travel of the signals, were noted during a year's observations on 10, 17 and 23MHz. On each of these frequencies, the deduced angle of elevation of single-hop F mode ranged from 1° to 10°, while for two-hop it was from 12° to 24°. So here again is further evidence that, for long-distance single-hop working, angles right down to around 1° would be desirable—if only these could be achieved more readily in practice.

It has been indicated on several occasions that one approach to low-angle operation is the use of extremely large ground mats or other natural or man-made ground planes. But there is apparently an alternative approach, which is more or less the exact opposite, making use of *poor* conductivity. This technique is discussed in a paper by E. O. Willoughby and H. Mitt in *Proc IREE Australia* (November 1969) which describes the use of wire mesh aerials over grounds of high Brewster angles. The following is a brief extract: "One of the greatest difficulties in obtaining low angles of fire at vhf and hf is the large area of ground necessary to develop the radiation pattern by ground reflection from a relatively high angle. As an alternative approach, wire mesh aerials were developed with a null along the mesh plane and radiation lobes of opposite polarity above and below this plane. By mounting this mesh a quarter-wave or less above a ground of concrete or bitumen, for vhf, or sand or arid rocky country.... radiation components at low angle of fire above and below the mat add substantively in phase to produce low angle radiation." The paper describes a 110MHz aerial using a 16λ mesh (140ft long). Whether this particular technique has any application to amateur operation seems a bit uncertain, but it is an interesting concept.

Reflectors under dipoles

Ted Cook, ZS6BT, wonders if anyone else has thought of hanging a parasitic reflector a half-wave below a conventional dipole. He has been experimenting with this idea with, as he puts it, "interesting results".

He points out that the use of driven elements stacked a half-wave above one or another is accepted practice (Sterba curtain, Lazy-H etc). And, of course, the advantages accruing from mounting a dipole a multiple of a half-wave above ground have long been recognized. So why not use an artificial ground wire?

ZS6BT writes: "The rules say that if two elements are spaced a half-wave apart, the current in the interfering dipole will be in phase with the driving element and the pattern will be broadside. The rules also indicate that changing the phase slightly will cause the pattern to change from a right-angled broadside; the phase may be changed by varying the spacing or by varying the reactance of the reflector.

"Radiation from a dipole, if viewed from the end, may be represented by a dot in a circle. If a parasitic reflector is used at half-wave spacing the pattern looks more like a dumb-bell. If stacked horizontally, the elements would tend to minimize the up-and-down radiation and concentrate it forwards and backwards, with an increase in gain. I leave it to readers to consider all the implications !

"What goes for a dipole goes for a centre-fed co-linear or a multi-band G5RV with two or more in-line reflectors for each of several bands and each set of reflectors 'doing its own thing'. The use of reflectors should not change the lobe pattern but only increase gain. However, the lobe pattern *might* be changed; for example, a $\frac{5}{8}\lambda$ dipole might have one central reflector or two (in-line) end reflectors, or three in-line reflectors; or two in-line reflectors might have inner ends close together or wide apart; on top of all this is possible change of phase.

"Basically, reflectors should not be shorter than $492/f$ feet (where f is in MHz), and the spacing should have a similar dimension. It would seem preferable to make each reflector a half-wave, rather than to hang (say) a $\frac{5}{8}\lambda$ wire below a $\frac{5}{8}\lambda$ top. Reflectors could be made physically shorter, and then fitted with tuning stubs for phase adjustment."

One suspects that for maximum effect, the original height of the dipole would need to be fairly high, and that in such circumstances there is no reason why one should not opt for a Lazy-H. Nevertheless the whole idea seems well worth considering—and preferably investigating further: after all, as ZS6BT points out, "there are still many assorted types of dipoles in use—why not try and improve them."

Recharging batteries with "dirty dc"

Some time ago (*TT*, May 1966, and subsequently in *ART2/3*), Joe Cropper, G3BY, drew attention to an effective technique for re-charging dry batteries which he termed "dirty dc" and which had originally been described in *Wireless World* in October 1955, after originating in the Netherlands. He

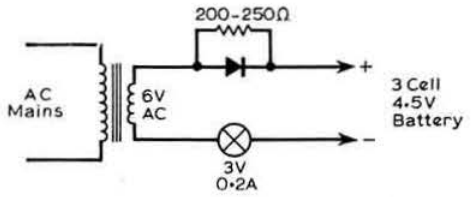

Fig 6. The "dirty dc" charger as suggested by G3BY

mentioned that he had found the system extremely satisfactory in the recharging of cycle batteries used with transistorized field-day equipment. We must admit that although this seemed an excellent way of cutting down the cost of batteries used not only for radio equipment but generally around the home, there has been very little "feedback" from readers suggesting that the technique has been taken up widely. Fig 6 is the circuit diagram of the "dirty dc" charger used by G3BY.

So it was with some interest to find in the Swiss journal *Old Man* (No 3, 1971) an article by Michael Windolph, K8YUC, reprinted from *73 Magazine*. This describes a "reverse-current charging" (asymmetrical ac charging) technique recently investigated in the USA by Donald Vargo of the Lewis Research Centre and found highly effective, not only for recharging a dry battery "even higher than its bought-new charge" but also allowing charging to be carried out at much higher rates than with conventional charging of secondary cells.

Guessed it? Reverse-current charging is our old friend "dirty dc" charging. My only real excuse for referring to this recent article is that it does seem amply to confirm G3BY's belief in the system. It indicates that many successful recharges can be made of ordinary carbon-zinc batteries, and that other cells, including nickel cadmium and lead acid, can be recharged more quickly and more effectively. K8YUC notes that with carbon-zinc cells it is better to recharge when these have dropped only to 1·3V, since after this point the cell begins to develop holes in the zinc, with consequent drying out and deterioration. However, even a cell with small holes can be rejuvenated with reverse-current charging.

In practice, as our earlier item pointed out, all that is needed is to wire a suitable resistor across the diode rectifier. K8YUC suggests that this resistor should be such that the reverse current should be about 10 per cent of the forward current; the resistor should of course be of suitable power rating. He provides a circuit for use on 117V mains; with 240V mains it is more economical to use a step-down transformer as suggested by G3BY.

If the idea is as good as it appears to be, one hesitates to calculate how many batteries could have been saved in the past 17 years. One only hopes that Ernst Been got some return on his patent No 2752550 (if only from battery manufacturers anxious that the idea should not be too widely used!). Rather ironically the same subject of battery recharging turns up in the Dutch journal *Electron* (No 3, 1971) but only in the form of a diode in series with a 240V 25W lamp—and absolutely no sign of any dirty component. A prophet is seldom recognized in his own home country!

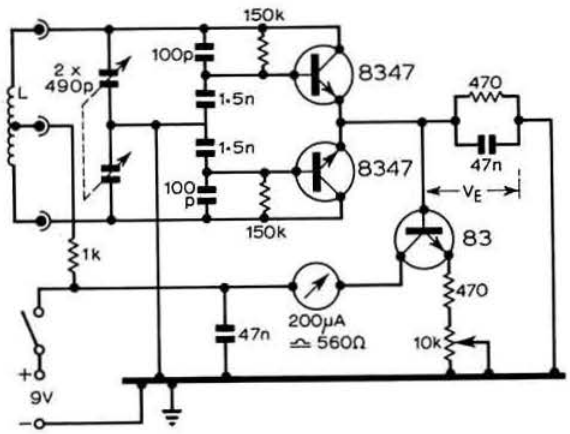

Fig 7. The F3GZ meter for 160kHz to 21 MHz. The low-frequency coils are adapted from broadcast units. 450–850kHz, 2 × 80 turns on 22mm former with 20mm ferrite core; 850–1,750kHz, 2 × 55 turns on 26mm former; 1,700–3,400kHz, 2 × 29 turns on 22mm former; 3,200–6,400kHz, 2 × 14 turns on 16mm former; 6,200–12,400kHz, 2 × 5 turns on 9mm former; 12,000–21,500kHz, 2 × 2·5 turns on 6mm former. In practice, British constructors may have to adjust coil windings to suit their requirements

Carbon mics

Recalling the many stations which used to make effective use of carbon microphones in the 'thirties—some achieving very good results for example with home-made "transverse current" types and double-button units, it has often seemed a little puzzling that so little attention is given these days to a device in which, in effect, the transducer is also an amplifier.

Barry Priestley, G3JGO, has clearly also been thinking along these lines. He writes: "I only realized recently that the MPT was still using carbon microphones but with the exciting current reduced 'now they have discovered the closed magnetic circuit for transformers'. The quality and absence of hiss resulting from the low currents would not degrade most ssb rigs. Is the crystal microphone an expensive non-essential?"

On the subject of quality and ssb, it may not be widely known that the BBC operates a number of point-to-point ssb links to provide programme feeds to their overseas relay stations. Even on music they obtain good quality circuits in this way—this calls for an order of frequency stability better than 2Hz. But instead of the usual communication-type 250-3,000Hz filters, they specify 90-6,000Hz. A description of some of the special techniques involved appears in *Point-to-Point Communication* (January 1971). We mention this not to encourage amateurs to broaden their signals but just to emphasize that quality on ssb can be what you want it to be.

Low-frequency gdo/wavemeter

One hesitates to include "yet another" dip-meter circuit. An excuse in this case, however, is that only rarely are published designs intended for use right down to about 160kHz. But this is stated to be the lowest limit of a unit described by G. Lagardere, F3GZ in *Radio-REF*, No 4, 1970; upper limit is 21MHz using a series of plug-in coils. The good low-frequency coverage is stated to result, in part, from the use of a symmetrical push-pull oscillator. While the original model used type 8347 npn surplus transistors, F3GZ suggests that 2N706A or 2N2369 could be used equally well. A third transistor (npn type 83, but again hardly likely to be critical) is used to amplify the

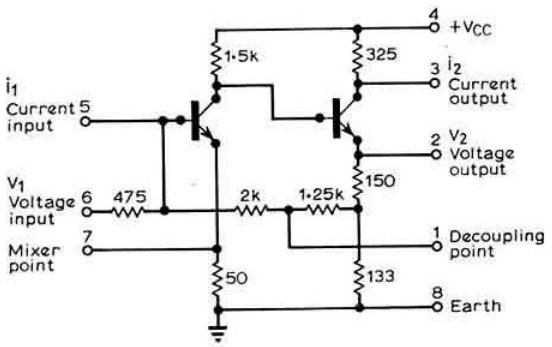

Fig 8. Basic circuit arrangement of the Plessey SL201

With V_{cc} = 9V			
f = 20kHz			
Pins 7 & 8 strapped			
Current gain measured with load of 20Ω.			
i_2/i_1 =	**22 → 24 → 28dB (SL201B)**		
	17 → 24 → 28dB (SL201 C)		
$-v_2/v_1$ =	**11 → 14 → 17dB (SL201 B)**		
	9 → 14 → 17dB (SL201 C)		
f—3dB =	**10**	**→ 15 →**	**—MHz**
$-v_2/i_1$ =	—	6·3	—KΩ
V_{out} (pk—pk)	2·5	—	—V.
R_{in} (5) =	—	60	—Ω
R_{in} (6) =	—	530	—Ω
R_{out} (3) =	—	325	—Ω
R_{out} (2)	—	7	—Ω
i_2/i_1 (I @ ⏦)	100	190	—
I_{supply}	—	10	16mA
V_{cc}	= 15V MAX.		

voltage change appearing across the oscillator emitters. The 10kΩ variable resistor allows the meter current to be adjusted to a convenient figure. F3GZ also points out that the unit can be used as a wavemeter since, when coupled to an oscillator, there will be an increase and then a decrease of emitter voltage as the gdo is swung through the oscillator frequency.

SL201 as Butler oscillator

Andrew Stephenson, G8BUQ, has sent along several ideas, some of them associated with what he terms the "much neglected SL201". This is a fairly simple integrated circuit amplifier made by Plessey: see Fig 8. A few months ago, one version, the SL201/C, was costing only about 33p; another version, the SL201/B, has a higher guaranteed minimum gain and is significantly more costly. For most amateur applications the SL201/C is more than adequate. G8BUQ believes that this unit has many more applications than those suggested in the official data sheet. Two which he has used are a Butler crystal oscillator and, believed to be original, a Schmitt trigger.

The Butler oscillator arrangement has been taken over from a commercial application. G8BUQ has also alternatively used the same circuit with discrete components, including BSY95A transistors. This arrangement (Fig 9) has been used with crystals ranging from 30kHz (in this case the high Q of the crystal, in conjunction with the low loop gain, resulted in the oscillator taking almost 30s to build up to full output) to 10MHz. At low frequencies, it proved necessary to decouple the second emitter to rf to prevent the SL201 from "taking off"; a 0·01μF capacitor sufficed.

SL201 as Schmitt trigger

G8BUQ has also used the SL201 in what he believes to be an original arrangement as an extremely simple Schmitt trigger: Fig 10. The figures shown for output voltages are estimates, but those of inputs are accurate for his SL201. It should always be remembered that performance spreads of integrated circuits tend to be greater than with circuits based on discrete components. The input impedance at pin 5 (direct input) was determined by measuring the voltage drop across a known resistor in series with the input and a low-frequency sine source, and comparing this with that across the input and ground, using a cathode-ray oscilloscope to obtain instantaneous values. Minimum impedance at the point of switching was roughly 1kΩ.

G8BUQ also suggests that readers will be able to think up many other applications for the SL201, such as microphone, rf, and i.f. amplifiers.

More on ic Wien bridge oscillators

N. A. Currey, G3SSM, was interested in the notes on the Wien bridge oscillator using an MC1454G integrated circuit (*TT*, February). He points out that since the function of the No 80 lamp is simply to provide stability of output, it can be replaced quite satisfactorily by the more traditional arrangement of a thermistor. Fig 11 is a typical Wien

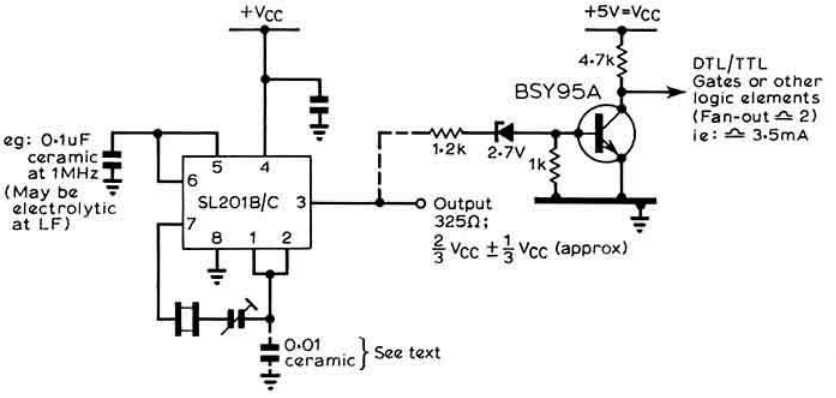

Fig 9. Using the SL201 as Butler crystal oscillator with optional logic-driver buffer amplifier. Can be used with V_{cc} down to about 4V

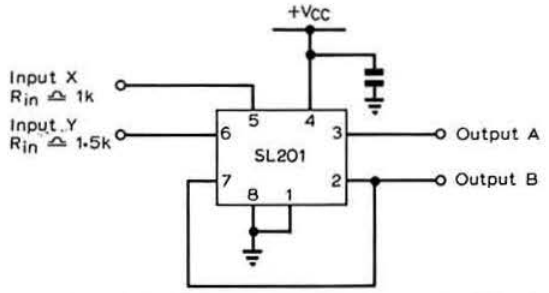

Fig 10. Using the SL201 as Schmitt trigger. The following voltages, with Vcc of 6V positive should be taken as approximate since device spreads will cause variations

V_{in} (ON) ≙ 1·5V.
V_{in} (OFF) ≙ ·9V.

O/P A { V_{out} (OFF) ≙ 1·2V. V_{out} (ON) ≙ 6V.
O/P B { V_{out} (OFF) ≙ 1V. V_{out} (ON) ≙ ·4V.

arrangement using a μA709 operational amplifier. He also notes that although it was indicated that output could be varied over a limited range by changing the value of R3, unfortunately the circuit diagram failed to indicate which was R3. Sorry about that! In fact R3 is the resistor labelled 270Ω (typical). In the type of arrangement shown in Fig 11, the frequency is governed by R1, R2, C1, C2.

G3SSM points out that one trouble with these circuits is the response time of the feedback arrangement which tends to result in the circuit taking some time to stabilize when any attempt is made to use it below about 5Hz. For his own requirement (calling for frequencies down to 0·3Hz) he has developed a faster and more elegant form of feedback.

Phase-lock detection

In the February *TT*, some details were also given of the use being made by W. M. N. Burridge of the Signetics NE560B integrated circuit which provides complete phase-lock-loop fm detection without any external tuned circuits. In a further note, he asks me to mention that the a.m. version is the NE561B (not NE560A). Signetics have produced a useful "applications memo" on both the NE560B and NE561B showing their use for such applications as a.m./fm/fsk. The 561B contains all the circuits of the 560B plus those needed for product (synchronous) demodulation. He uses his 560B to follow a uhf tv tuner (not vhf/fm tuner as stated in February). Since then he has bought a 561B and is planning to use this for such bands as 144MHz. He has also successfully built an external product detector for the 560B and used this to receive the Caen Channel 25 station (French 625-line uhf television stations have *a.m.* sound).

While the 560B/561B integrated circuits are for use up to 30MHz, it is noted that there is also a NE565 intended only for use up to 500kHz, and presumably cheaper than the other devices: this would be suitable for 455kHz i.f. strips.

Digital ttl phase shift

Another item which continues to attract interest is the proposal by GI3DVB on using transistor logic to produce 90° phase shifts (*TT*, February and May). J. F. Craine (GD/GW3XNU) suggests that since this is a form of Johnson or "twisted ring" counter, it should be clocked at four times the signal frequency, rather than twice signal frequency as proposed by GI3DVB. He notes that the upper frequency limit is determined substantially by maximum clock frequency, quoted at 25MHz for the SN7473N, corresponding to a signal frequency of 6·25MHz. The phase errors are then due to propagation time differences of the two flip-flops; he estimates that, with devices on the same chip, there might be a disparity of 2ns corresponding to an error of about 4° at 6·25MHz, and proportionally less at lower frequencies.

GD3XNU has been using a similar arrangement, employing a dual D-type flipflop (Fig 12) for an ssb receiver, as part of his research into techniques which would be suitable for the reception of ssb broadcasting. He is doing this work at University College, Swansea, where, as we mentioned last July, there is also interest in synchronous detection for dsb/a.m. mobile radio. He mentions that a disadvantage of this type of circuit is that the output waveforms are "square" rather than sinusoidal. Since such a waveform contains only *odd* harmonics, an ssb generator intended to produce, say, usb at f_o will also have an lsb output about 10dB down at $3f_o$ and a usb output about 14dB down at $5f_o$. This calls for careful filtering of the output. He points out that the paper by W. Saraga and L. S. Houselander in the *IEE conference book No 64* (Signal processing methods for radio telephony) contains the only other reference he has seen to digital phase-shifting of this type. GD3XNU is also looking at a three-phase detector for ssb. This seems to offer some theoretical advantages from the viewpoint of sideband suppression, although rather more complicated.

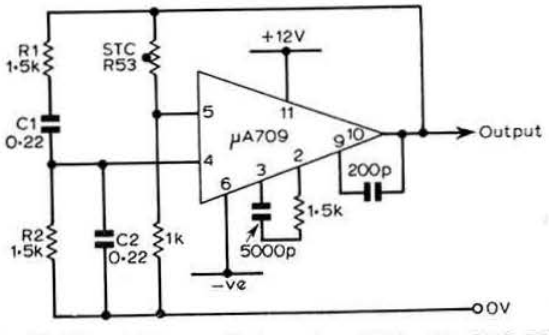

Fig 11. Wien bridge oscillator using μA709 with STC R53 thermistor as stabilizing element

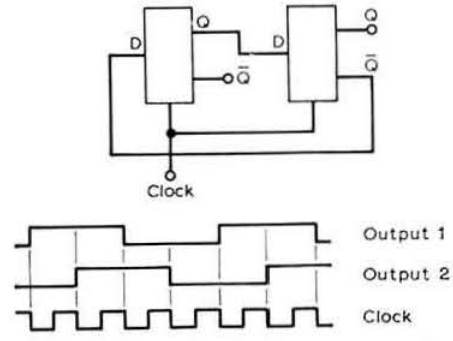

Fig 12. Digital phasing technique being investigated by GD3XNU using dual D-type flipflops (SN7474N)

FOUR METRES AND DOWN

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

The "Seventeenth"

From the outside, the "Winning Post" looked much the same, but alterations since last year's VHF/UHF Convention had transformed the interior. For the Seventeenth Annual International VHF/UHF Convention this year, two large areas were available for the afternoon lectures; and for the evening dinner the rolling away of the partition separating them provided a room of considerable floor area.

Overall bookings were 370: 355 for the afternoon session and 135 for the dinner. All the usual attractions were provided, and while the social side of the convention is important, even more so is the furthering of amateur radio at vhf. The trade show and construction exhibition did this, as, most emphatically, did the afternoon "tech-session".

The "tech-session"

All four lectures at the convention looked firmly into the future. Of the 23-70-2 receiver discussed by G3NNG, it could well be said that this is five years ahead of its time (details in *Radio Communication*, August and September 1970); and as for filter theory and practice, ably expounded that afternoon by G2HIF, here is a subject which has always concerned the radio amateur and is likely to do so increasingly as more stringent specifications become necessary in transmitters and receivers.

These two lectures followed one another as Stream "A". Meanwhile, in the other lecture hall, Stream "B" was opened up to full spate by Malcolm Sparrow, G6KQJ/T, chairman of BATC, in what was in effect a symposium on amateur television that traced its development from the enthusiastic proselytizing of Mike Barlow, G3CVO, in 1949, right through to slow-scan tv (not on vhf!) and of course 625-and-colour, not forgetting methods of generating waveforms with ICs. Full-sized monitor screens on either side of the dais were fed by studio-style cameras wielded by members of Malcolm Sparrow's BATC team.

The object of the exercise, to persuade more (or *even more*) people to have a go at amateur tv—perhaps for a start on the receive side (details of suitable converters were given during the session), was reinforced later when truncation of the 70cm television band was announced. The commonsense of "Use or Lose" or "Reap and Keep" was implicit.

The same philosophy, of putting to good use the frequencies we have, imbued the first lecture—the two hour dissertation on microwaves. The basic ground plan—how to rid microwaves of whatever mystique they still have and encourage more people to try them—was admirably drawn by Dr Dain Evans, G3RPE, and by G3JHM on propagation aspects and G3HWR on the hardware. The G3JHM contribution deployed figures to show the path losses to be expected on the various microwave bands the amateur has available to him, and the order of system gain required to overcome them. What surprised many in the audience was the blackboard demonstration of how gain may be achieved along a non-optical path by diffracting the signal from sharp protuberances en route.

Another demonstration, this time "live": at the end of the G3HWR equipment talk (waveguides, wavemeters, directional couplers *et al* made easy) the 3cm band showed its capability by pumping a powerful signal from the G5FK unit at Wembley down to the "Winning Post".

Afterwards, further potential for demonstrations was to be seen in the display of home-built microwavery which many members had brought along, focus of just the kind of chat-in which G8AFN suggested in *FMD* in January.

G3RPE gave the audience some of the current thinking on operating standards and commented on the new operating awards to be had for each member's first contact on the five bands from 13cm and up. He observed that although these might seem hard to get, it was worth remembering that when in 1949 a challenge trophy was awarded for the best contact on 70cm, the range achieved was 25 miles! He disclosed that he keeps an index of microwave activity throughout the country and is able to put interested individuals or groups in touch with others who may be more "nearby" than is suspected.

The dinner

Before the assembly sat down to dinner, Geoff Stone asked for a minute's silence "... in memory of two silent keys closely associated with past VHF Conventions, G2AIW and

G3JHM at the blackboard illustrating shf carrying characteristics

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Terry Emeney, G3RIM, with the 1962 VHF Committee Cup presented to him by RSGB President F. C. Ward who holds G3RIM's transceiver

President and past-Presidents with the guest of honour at the convention dinner. Left to right: Dr R. L. Smith-Rose, G2BVN, G2CVV, Dr J. A. Saxton and Mr H. Stanesby

G3BVG". There has always seemed to be a singular appropriateness that the convention should be held annually so close to the QTHs of those two beloved and respected personalities, at Whitton itself and at Ealing, a few miles to the north.

Guest of honour this year was Harold Stanesby, CEng, FIEE, Director of Radio Technology, Ministry of Posts and Telecommunications. Central to his speech proposing the toast of the Radio Society of Great Britain were two matters of serious moment, one of them being the reduction in the amateur 70cm allocation to 432-440MHz. In the light of his disclosure that pressure from professionals made it look at one time that the amateur allocations around 432MHz were in serious jeopardy, most present that evening felt a sense of relief that the MPT is batting strongly for the amateur movement and had done well to preserve 8MHz for us.

Mr Stanesby had something to say also about pirate transmissions. There was only one radio spectrum, and it had to carry every radio service that was needed. There was no room for pirates, many of whom were adolescents or immature adults, and he expressed the MPT's appreciation of the help enthusiastically given by the legitimate radio amateur in combating the nuisance.

Other points from his speech:

Reciprocal licensing: The UK has already reached agreement with 15 administrations and is having discussions with another 25.

World Administrative Conference on Space Telecommunications: "We are delighted we are going to have the help of Roy Stevens, G2BVN, and of Dr John Saxton (last year's RSGB President) who will be there in another capacity but will have amateur interests very much in mind."

Amateur activities with satellites: The UK Administration had come to the conclusion that it should be possible for amateurs to use their world-wide allocations for space communications.

In his reply to the toast to "The Society", President Fred Ward, G2CVV, commented on the excellent liaison the Society enjoyed with the MPT. He offered the timely reminder that when G2BVN travelled to the Space Conference he would be representing not only RSGB members but the non-members as well. It should be each member's duty to do all possible to bring the others in.

The President then presented the 1962 VHF Committee Cup for the best item in the Home Constructors Exhibition. "There was no doubt in the selection committee's collective mind who should have it," said Geoff Stone—namely, G3RIM, Terry Emeney of Reigate, for his solid-state vhf transceiver.

The dinner ticket lucky number prize—the now almost customary 10-element 2m aerial from J-Beam—went to G3BHT. An extra-long roof rack will now be needed for the forthcoming 'BHT/BA expeditions.

Four metre fivesome, Left to right: G3OHH, G3VPK, G3TEY (Mrs G3OHH), G3VFD and G6HD.

A surprise prize was put up by Microwave Modules: a year's sub to the magazine *VHF Communications*. Poetically justified was G3IIR's winning of it: he will now have something else to read as well as all those RSGB publications he sells at rallies and at the convention itself.

Finally, from Geoff Stone: "From the comments I've heard, everybody is extremely impressed with the rebuilt venue and the service we have enjoyed here today . . ." And a final final for next year's diaries: The Eighteenth Annual will be in the same place on Saturday 22 April.

Analysis of an aurora

Already this year the disturbed state of the sun's surface has initiated several dx-producing auroral openings on the vhf bands, some of them of short duration, but that of Wednesday 14 April lasting for more than two hours, in the experience of GM3EOJ, Charlie Sherrit of Aberdeen, whose analysis of propagation that night is well worth recording for its scientific value.

Earlier 1971 aurorae have favoured early evening: this latest was later, extending from 2250gmt on the 14th, when the DL and SM beacons on "Two" were overloading the 'EOJ receiver, through to 0105gmt on the 15th, when SP2RO was raised after a patient wait (before that the Pole was working SMs in strings). At Aberdeen SP2RO registered RST56A and gave 'EOJ RST55A.

At 2345gmt a "CQ GM" was heard from UR2CQ. A co-channel call on 144·021MHz brought him back to GM3EOJ with a 57A report. The USSR station also worked G3LTF that night, and heard GM2DRD.

It is possible that these were the first GM-SP and GM-UR contacts on "Two".

Other Continentals worked from GM3EOJ via the aurora were SM, OZ, LA and DK. Only one Scandinavian was heard on ssb, although it is understood that G3LTF worked into SP/UR on sideband. Everything else was cw. At the Aberdeen end G3LTF, G3COJ and many others south of the border were tearing into the 'EOJ receiver—and those who have heard the tearing sound of Tone A will know what we mean. There appeared to be two reflecting areas, one peaking at a beam heading of 055 and favouring SP/UR, the other due north favouring OZ/SM/LA.

Could any of these results be repeated on 70cm? At GM3EOJ a 10W varactor and 18-element Parabeam are ready. So is 432·054MHz telegraphy for a quick QSY from "Two" when the next aurora develops.

Exit QSLs

As unclaimed QSL cards pile up in sub-managers' sitting rooms and other places where the overflow may be parked, the time comes when disposal is inevitable. Adequate notice of the proposed destruction of unwanteds is given over GB2RS. This was done last October in respect of the accumulation at G6QM, sub-managers for G6-plus-2, G6-plus-3, G8-plus-2 and G8-plus-3 up to G8EZZ.

Now, six months later, the moment of truth has arrived, and about half a hundredweight of unclaimed cards has been disposed of at G6QM, an operation that confirms the decreasing value attached to QSLs by the amateur radio movement, certainly the metre-wave part of it.

The new microwave operating awards

A member will be entitled to claim a Four Metres and Down Operating Certificate for the first contact he makes on any of the five microwave bands as follows:

13cm	500 kilometres or beyond	3cm	150 kilometres or beyond
9cm	400 kilometres or beyond	15mm	150 kilometres or beyond
6cm	300 kilometres or beyond		

Claims, supported by a verification card, should be sent to G5UM, VHF Certificates Manager.

Much wasted effort goes into the handling of cards which are not wanted by their addressees, not to mention wasted money printing them. To suggest that cards be originated only when requested is not new, but seems to need reiterating, with a rider to the effect that where a QSL is urgently needed to confirm a specific contact apply direct with sae.

Is your callsign in the block handled by sub-manager G6QM, and do you want cards? If so, ensure that SAEs are lodged with him (A. J. Mathews, 62 Ashlands Rd, Cheltenham). Have you changed your callsign from a Class B one to Class A? Then tell Bert Mathews so that he may amend your G8– – – envelopes accordingly.

Stay intelligible

We remarked last January *in re* band-planning that members who purchase foreign-made rigs for "Two" should specify their crystal requirements for the local zone when ordering. If this is not done they may all too readily find themselves using transmitters set up on frequencies in somebody else's zone where probably the locals do not bother to tune. Result: a paucity of contacts.

This is one snag with ready-mades; another is excessive deviation. An observation from GM3OWU, Vic Stewart of Edinburgh, is to the effect that:

"We are now having QRM problems from stations using Japanese transmitter-receivers on 2m with wide band fm (15kHz deviation has been quoted). Some of the members in Central Scotland are beginning to complain about narrow band fm which is not as narrow as it might be."

In other quarters it is stated that the devices in question are not suitable for use and do not conform with the internationally agreed standard for nbfm. Here again a paucity of contacts will be the likely result if nobody can make out what these rigs are saying—except other users of similar rigs. Modification to a reasonable degree of deviation is the answer.

Shared hills

On a different subject, GM3OWU ventures a word in season to portable and mobile operators who hit the hills where clumps of permanent professional vhf aerials already stand. The thought must have lurked in the minds of many as they set up camp within eyeshot of a professional antenna-farm: "Now, if I operate here am I likely to trigger off the gas board link or perhaps inadvertently call out a taxi?"

Clean rigs should not be capable of doing any of these things, and the fact that reports of interference from vhf amateur operations are so few suggests that most of our rigs

are clean. Sometimes the professional house needs to be set in order. We recall one instance where a base-to-mobile link found to its wrath that it was subject to heavy interference from local 2m amateurs: the trouble was resolved when a dud crystal in the professional rig was replaced!

Even so, it does not do to be too self-satisfied where "clean-ness" of transmitter output is concerned. Let Vic Stewart come in again on this one:

"The frequency of 145·8MHz derived from an 8·1MHz crystal is a very popular one. However, the 15th harmonic comes out on the aircraft distress frequency. There have been several incidents of late where amateurs have been received on official monitoring equipment. It seems timely, therefore, to print a note in *Radio Communication* before any more trouble is caused. The police radio centre here is located on Blackford Hill which is also used by visiting amateurs. In addition to this service, extensive monitoring is done on vhf at the observatory (also on the hill). Again there have been several incidents of interference being caused to these services. I think the trouble arises sometimes because amateurs go up the hill after dark and don't see the extensive aerial farm."

More operating awards issued

When the latest batch of applications for the Four Metres and Down Operating Awards was dealt with by the VHF Committee, both the claims in the 70MHz bracket were for portable operation. To Bob Parkes, G3REP/M (well, "M" is portable!), went No 84, and to Derek Thom, G3NKS/P, No 85.

In the 432MHz batch were two operators who are really out on a limb: G3PBV in South Devon, who gets Certificate No 76, and GC2FZC, No 74. They are dx to most 70-centimentalists for most of the time. More centrally placed, G8BQH in Bucks gets No 75.

Latest issues on 144MHz are: No 208 to G3EFX/P (all the contacts were made on one VHF NFD), No 209 to GC3YIZ, No 210 to GM8BZX, No 211 to G8BYV, No 212 to G3WHK and No 213 to GM8BDX.

A special mention for the one claimant for the 432MHz Senior: Brian Bower, G3COJ, of High Wycombe gets No 10. He already has No 31 Senior for "Two", so if he can pull off a Senior on 4m he will rate for the Supreme Award. To date only one 'Supreme' has been issued: to another Chilterns operator, G3MCS of Aylesbury.

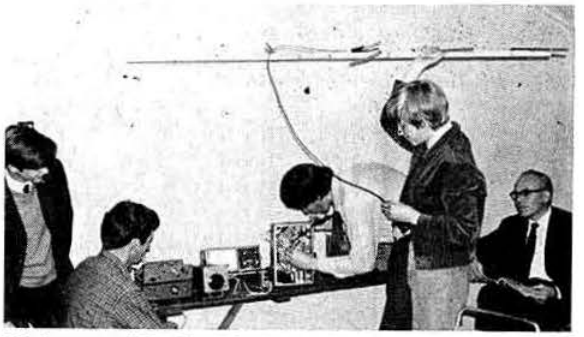
Collect a Region 1 Certificate

The always-popular vhf contest organized for members in RSGB Region 1 by the Ainsdale Radio Club occurs this year on Sunday 27 June from 0900 to 1800gmt, to coincide with the Society's 70MHz Portable event and so calculated to reap a big 4m entry. There are 2m and 70cm classes as well.

Says Norman Horrocks, G2CUZ: "We invite stations outside Region 1, which is the NW of England. to send in logs. There will be a certificate for the operator giving most points to stations in the Region. All Region 1 contacts count, whether in the contest or not."

Send an sae to G2CUZ for a copy of the rules: 34 Sandbrook Rd., Ainsdale, Southport, Lancs.

And still talking about contests . . .



Trial run on "Two" at the Leeds Radio Society (see story "A lead from Leeds", this page).

"May"-hem on "Two"!

At 7pm on Saturday 1 May, a barrage of QRM descended on the 144·15 to 146MHz spectrum, the like of which had not been heard since VHF NFD, and perhaps not then. The 144MHz Portable Contest had begun. Next morning the barrage was reinforced as the participants in the short section came on the air.

We say "from 144·15" with intent: hardly any cw was to be heard. It virtually seemed unnecessary when there were far more phone stations on the band than could be worked, even during the 24-hour "Long", and most of them with enormous signals from high sites (one or two splattering generator whine over much of the spectrum being tuned by operators on the next hill . . . will someone write a "Tech Corner" note suggesting how this perennial trouble may be abated?).

By Sunday afternoon the 200-mark was being approached by many, exceeded by a few. Comment after the event was that much enjoyment was had by all, even those who had to struggle to get the chosen site, but not afterwards: the contacts simply came when you got there. Typically, G8DJT/P was at 2,000ft on Kinder Scout. The party of six carried the gear the last mile, including tents, masts and Honda genny-motor, with a declivity called Jacob's Ladder to negotiate vertically out and back. Reward: 182 contacts, five countries.

Some of the May sites will be reactivated this month for the Microwave Contest on 20 June and the 70MHz Portable the Sunday after. Rules page 280, April *Radio Communication.*

Project Moonray

A continuously operating repeater left on the moon to accept and re-radiate signals on 70cm for a year or more: this is Project Moonray. Liaison by AMSAT with NASA is directed towards carrying the device to the moon in one of the remaining Apollo missions—and there may even be a radio amateur in the crew! More detail on Moonray in a later *FMD.*

A lead from Leeds

A club project of the Leeds Radio Society is to construct a quantity of small portable transistorized 2m transmitter-receivers which can easily be carried to meetings and to outdoor field events. Transmitter powers of 2W are aimed

at, and both single and double conversion receivers are being tried, employing mixtures of FETs, bi-polars and ICs.

Four units comprised the initial "production run"; other members have been encouraged to take part in design discussions, coil winding, printed circuitry and chassis work. The photograph shows an attempt to stimulate interest by demonstrating a quick-built mains-driven rig.

Says Leeds society chairman G3TDZ: "A few of the hf-only men's eyebrows were raised as the activity on 2m made itself clear; we got 5 and 9 contacts from semi-locals almost at once, using the equipment shown and a 4-element aerial inside the city centre club room."

Same voice, new call

"Now here's a new Class A man on the band . . . I seem to recognize the voice. Was he previously a Class B licensee?"

The thought asserts itself almost every week in the minds of metre-wave operators when recently allotted callsigns appear on the bands. To know if you have worked the man before or not is important if you like to keep the documentation straight.

For example, G8BSH, Fred Pratt of Nottingham, has worked something approaching 850 different stations on "Two". When he notches a new one he likes to be sure that it really *is* a new one and not an old "B" friend with a recently acquired "A" call, because you cannot count them twice. People who once worked G8AUE of Derby are working the same station when they work G3ZYC. And Surrey's one-time G8EAE is G3ZZE—*the same station!*

How to distinguish? It is difficult to do so in all cases. Recognizing the other man's voice gives a clue; but it is no satisfaction to well organized documenters like G8BSH to harbour the lurking suspicion that some of the callsigns he adds to his list of new stations worked have been contacted before under different colours.

If new Class A licensees will tell *FMD* what their old Class B callsigns were we will print a list here. Effective from 1 January, 1971, perhaps?

This handsome certificate—it is done in green and black—is awarded by the Farnborough & District Radio Society to operators who work different counties and different prefixes *on one band*. There are 12 classes, from 98 counties and 25 prefixes down to five counties and three prefixes. Each costs 25p to enter. "It's harder than it looks!" remarks chairman G3PQF. The contest—no time limit—is intended to appeal specially to Class B licensees. A copy of the rules may be had by sending an sae to award manager Martin Crayton, 47 Lye Copse Avenue, Hawley, Farnborough, Hants.

BEACON STATIONS

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

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

Expeditionaries

Right now GW3YKP/P should be operating from the county of Merioneth on 144·84, every evening until 11 June.

* * *

Somewhat farther north the redoubtable GW3UCB/P team will be at the summit of Snowdon for the 4m portable event (27 June) and the 2m Open (3-4 July). The team decided on this site only after three years of planning and recce of the site, taking into account that the weather at 3,500ft can be very variable, and operation during an overnight contest positively dangerous for a poorly equipped group.

* * *

From Iain Petrie, GM8BRM, comes word that he will be out portable or mobile almost every weekend during the summer on "Two". Typical of the results he gets are: 41 stations worked from Kincardineshire on 11 April, most of them south of the border and many Gs from a site in Aberdeenshire on 12 April. During the 14 April Ar he heard (beam north) PA0, SP, DL, DJ and UR.

* * *

Andorra again. The G5YC team leaves the UK on 26 June, will operate 2m ssb mobile down through France, and in Andorra will hoist a 2m station to the top of Mt Casablanca, emitting perhaps as much as 3kW p.e.p. Operating frequency 145·41MHz, tuning plus or minus 20kHz, and looking for calls 10kHz above Point 41, nightly between 6 and 7pm bst. Return date, 11 July. Watch GB2RS for callsign details.

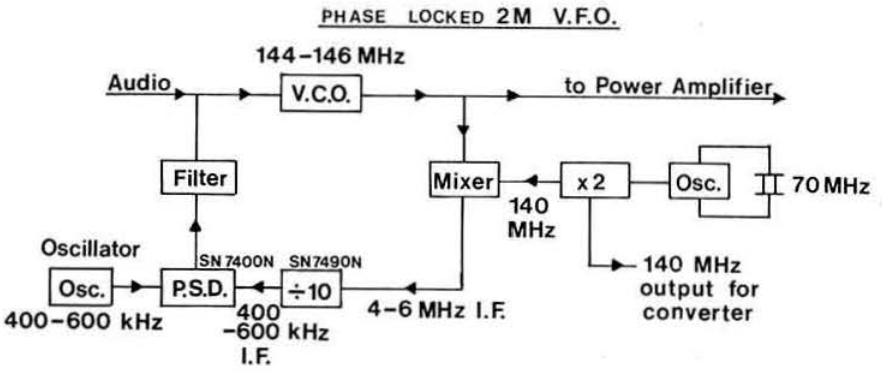
* * *

Tech Corner

From EI6AS (Albert Latham of Dun Laoghaire)

No originality is claimed for the following method of deriving ssb for 4m, but it may be of some interest to members who wish to work both 4m and 2m with the most economical use of equipment.

There is a crystal chain starting with a 37MHz crystal and doubling to 74MHz. This is mixed with 144·208MHz



Block diagram of G3WXO's phase-locked 2m vfo

ssb from the 2m exciter and the difference frequency of 70·208MHz is extracted. This puts EI6AS just inside the Republic of Ireland allocation on "Four".

It is appreciated that the difference frequency is rather close to the output frequency (74MHz) of the oscillator chain, but a series of tuned circuits at the transmit frequency ensures rejection of both the 74 and 144MHz components. There are four such circuits in all; at the mixer anode, driver grids and driver anodes, and of course in the final QQVO6/40A anodes.

* * *

From G3WXO (Phil Harman, Wolverton, Bucks):
Having seen the comment "What Oscillator?" in April *FMD* I thought readers would be interested in my phase-locked 2m vfo, a block diagram of which is shown.

The required 2m frequency is generated directly in a simple voltage controlled LC oscillator. The output is mixed with 140MHz derived from a crystal oscillator. The resulting i.f. of 4 to 6MHz is divided by 10 in an integrated circuit, SN7490N, to produce a final i.f. of 400 to 600kHz. A fet Vackar vfo tuning 400 to 600kHz together with the i.f. is applied to a SN7400N which is used as a phase sensitive detector. The dc output from this psd is fed to a varicap diode in the 2m oscillator, thus controlling its frequency. Frequency modulation is easily achieved by applying audio to the varactor in the 2m oscillator; a few millivolts produces full deviation.

The output of the vfo is very clean as there are no multiplication processes involved, the 140MHz component being buffered from the output by the mixer.

Construction of a stable vfo tuning 400 to 600kHz is very simple and requires very little in the way of voltage or temperature compensation, this being the main advantage of this particular 2m vfo .The drift at 2m is equal to the drift at 400 and 600kHz times 10. However, it is much easier to build a stable oscillator at this frequency than it is at 8 or 24MHz.

When the vfo is phase-locked the coil in the 2m oscillator can be "twanged" with no effect on the output frequency.

Here and there

Note for the diary: the Scottish VHF Convention will be held at the Carlton Hotel, Edinburgh, on Sunday 3 October. Tickets will be available in September.

Holdings Photo Audio Centre, of Blackburn, ask us to state that Trio JR310 receivers sold by them can be supplied converted to cover the range 28—30·1MHz to function as i.f. strips for the 2m band. Price of conversion: £3.

* * *

"Telegraphy gives better results than telephony because a.m. only conveys intelligence on one-sixth of the available power (one sideband) whereas the cw system uses all of the available power. For the same reason ssb will give results comparable with cw"—BRS31448 (LREM C. J. Taylor, on HMS *Arethusa*).

25 YEARS BACK

". . . after many weeks of fine achievement on 5m within the country, the continent has at last been contacted. G5MQ (Liverpool) worked I1IRA (Navarro, N. Italy) on May 19, signals being S8 both ways with the Italian station using ICW"—W. A. Scarr, G2WS, in "The Month on Five", appearing for the first time in *RSGB Bulletin*, June 1946.

When Luton Scouts Council held a recruiting campaign, Dunstable Downs Radio Club gave television coverage for four hours of Scouts' outdoor competitions. From G6AFK/T in the central park went pictures 1½ miles over a non-visual path to G6AGE/T. Strumech loaned a 65ft Versatower to lift the 70cm signal over local obstructions. At least half a dozen local Stroke T men also saw the pictures at their home sites. Commentary was by G8CBU, who is a Luton Scout leader. This was on 2m. Photo shows G6AEV/T (he is also G3VZV) operating one of the o/b cameras.

THE MONTH ON THE AIR

A monthly feature by John Allaway, G3FKM*

QSL cards have been objects of contention for many years, and with rapidly increasing postal charges the point seems to have been passed where they should only be sent to those who ask for them. G3FBA reports that he has to destroy many incoming cards which are not wanted by some of those for whom he acts so competently as sub-manager. These have been sorted by G2MI and posted to him at considerable cost only to end in the waste basket. Would it not be a good idea to say "no QSL" instead of "QSLL"? Your scribe would guess that this would reduce unjustifiable expense by at least half.

It is frequently said that we either use or lose our bands. A letter from VP2LI says that the Ten-Ten Net of Southern California is doing a good job in stimulating interest in more 10m a.m. working all over the world; membership is already over 2000. We have a very wide allocation on this band, dx can be worked very easily with low power and small aerials, and local contacts are liable to be much more pleasant than if they were carried out on 160m. Many readers no doubt will have a.m. equipment available, so why not join in the fun and use it on ten? A very useful specialized news sheet is available in the form of *QUAX* (here is news of ten) which is available from the editor, Alan Taylor, G3DME, "Altadena", South View Rd, Crowborough, Sussex, price 55p per annum. ($1.40, 5DM, or 15 IRCs for air mail despatch worldwide).

W. Hahn, G3UOL (QTHR), is visiting Annapolis Royal, Nova Scotia, for the month of August and is anxious to contact any VE1 who would be prepared to let him operate from his location (with operating permission having been obtained of course). His QTH will be c/o Mr H. O. Gilliatt, PO Box 115, Annapolis Royal, NS, Canada.

Your scribe receives many requests concerning awards and QSL card checking and would like to point out that the Society's Awards Manager is Mr Chas Emary, G5GH, who deals with all awards matters other than those connected with *CQ* magazine. Rules and application forms for awards listed in this column can only be supplied when this is specifically mentioned.

Top Band news

Mick, VK6HD, now has a vertical for use on 160m and intends to be on frequently between 2200 and 2300 on 1,803-kHz. VK6NK has made a number of European contacts already. 6HD will be on throughout the summer and will be happy to QSY from 3·5MHz on request. (The power input level in Australia is 150W.)

George Allen, L6042, (283 Amelia Street, Balga, Western Australia, 6061) has very kindly supplied a full list of European stations heard between October 1970 and 1971—this shows 57 loggings of 28 UK stations! These are: G3s CXX, EKE (?), IGW, IRS, KMI, KYC, LIQ, LYW, MYI, OLB, OLI, RCE, RKJ, RPB, SED, TKF, TR, WXY, XTZ, G6BQ, G6XL (?), GM3s FXM/A, ITN, TKV, WDF, YCB (logged on ssb on 4 January), and GW3XJC. His receiver is an HRO Senior, and he has one aerial 260ft long 5ft above ground level and another which is a 2ft square frame. This is an outstanding performance and George is to be sincerely congratulated.

News from overseas

The 29 DX Club (Western Australia) has now been allocated its own club callsign—VK6II—which it intends to use for contest purposes. This is likely to get it's first airing during NFD on 5/6 June. Please listen for VK6II. VK6KK is arriving in the UK for a holiday towards the end of June.

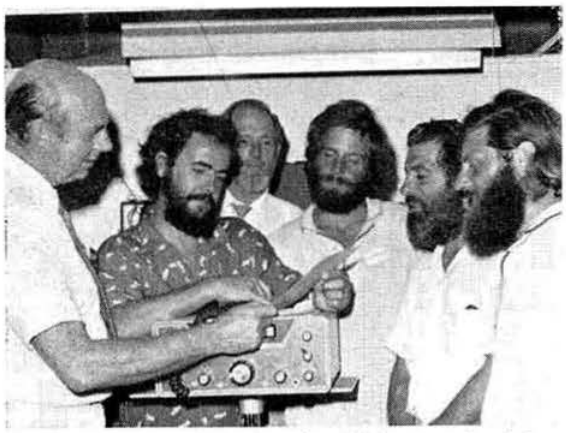
VR2FT leaves Fiji on 10th June after logging some 3,000 contacts with 150 countries and sending out 1,500 QSLs. Les is returning to the UK via VK, 9V1, VS6, JA, and UA3 and expects to reach London on 7 July. Further QSL requests should be routed via G3HZG's home address (see *QTH Corner*).

Colin Pollard, G3DPX, is now in Costa Mesa, California, and in spite of the "kilowatts, massive beams, and poor operating etiquette", he has achieved WAC, WAS and 114 countries worked in two years as G3DPX/W6. He has a three-element beam at 40ft.

Les Cooper, ZS6BDO/G5LC, has been working in South Africa as general manager of the Telephone Manufacturers of SA and has now retired for the second time! He returns

Les Cooper and Iris at his Springs, Transvaal, station.

*10 Knightlow Road, Birmingham B17 8QB



The four crewmen of the *La Balsa* with two prominent Australian amateurs. Left to right: VK4YP, President of the Brisbane DX Club; Vital Alsar, VK4NP, President of the Wireless Institute of Australia, Queensland Division; Gabriel Salas, Marc Modena and Normand Tetreault

to UK this summer via YK, ZC4, OD5, SV and I. During his stay in southern Africa, he and his wife, Iris, have visited Swaziland, Mozambique and Rhodesia.

The Brisbane DX Club entertained the crew of the raft *La Balsa* after they arrived at Mooloolaba (65 miles north of Brisbane) on 4 November last after its 8,500-miles trip across the Pacific from Ecuador. On 15 November the four crewmen were given a dinner which was attended by members and their wives.

Euradio

Sincere apologies are offered to members of this organization who were mis-informed by last month's *MOTA*. Mr Alexander Lex-Arnold (13 Little Rd, Hemel Hempstead, Herts) has pointed out that the organization is still in existence and that further bulletins will be forthcoming. Perhaps it should be said that your scribe is anxious to assist any organization which helps the listening or transmitting reader, but he can only publish information as received. This cannot under any circumstances be guaranteed to be correct but is published in good faith.

Italian prefixes

ARI informs us that the Italian Post Ministry has now authorized Italian amateurs to use the first figure of their QTH "ZIP" instead of the "1" previously used in their calls. The approximate location of Italian stations will now be as follows:

IP1—Piemonte, Liguria, Valle d'Aosta.
I2—Lombardia.
I3—Veneto, Trentino Alto Adige, Friuli-Venezia Giulia.
I4—Emilia.
I5—Toscana.
I6—Marche, Abruzzo.
I7—Puglie, Basilicata.
I8—Campania, Calabria, Molise.
IT9—Sicily.
I0—Lazio, Umbria.
IS0—Sardinia.

Small Italian island groups will be prefixed as follows:

IA5—Isole Toscane (Elba etc).
IB0—Isole Ponziane (Ponza, etc).
IC8—Isole Napoletane (Capri etc).
ID9—Isole Eolie (Filicudi etc).
IE9—Isole di Ustica (Ustica).
IF9—Isole Egadi (Favignana).
IG9—Isole Pelagie (Lampedusa etc).
IH9—Pantellaria.
IL7—Isole Tremiti (Tremiti).
IM0—small Sardinian Is.

Amateurs not wishing to change prefixes may continue to use their old ones.

DX news

Bulletin 1-71 from DXpedition of the Month says that QSLing for VS9OC has been discontinued as the operator will not verify the logs over the air. Some 150 incoming cards from YV0AI and YV0AI/MM were found to be incorrectly filed and have now been despatched. Anyone who is still missing a card for either call is invited to re-apply. Stu Meyer, W2GHK, points out that future DOTM bulletins are available to anyone who sends 9½ by 4½ SAEs with IRCs to Box 17316, Raleigh, NC, 27609.

INDXA's latest list of stations for whom QSLing is carried out includes AP2KS, EQ2CC, FM7WW, FR7AE/E, FY7AF, K3QOS/KB6, KP6AL, ST2SA, TY7ATF, VE8CB, VK9NP, VK0TM, XT2AA, ZB2AY, ZD8AY, ZK1AJ, ZK2AH and ZM7AG. 5U7AW and TR8MR cards should go to VE2DCY, and 5VZWT to W4SPX. The secretary is Bud Kellam, K3RLY, PO Box 125, Simpsonville, Md, 21150, USA; membership is worldwide and costs only $2 or equivalent. Membership gives no privileges other than the satisfaction of helping amateurs in out of the way places to get on the air.

ZM7AG has been heard in Europe, but as his signal is not strong the situation is virtually an impossible one as behaviour on his frequency has to be heard to be believed—stations who are not copying never stop calling. Jim will be there for two years or so and seems to favour 14,180 to 14,200kHz between 0400 and 0700 sometimes with 5W1AR trying to help. His beam should arrive soon.

A number of "nets" are of interest to UK amateurs. The Western Hemisphere Net meets at 0300 every Wednesday on 3,845kHz with Alicia, KP4CL, as net controller. They tune the 3,750 to 3,800kHz segment for European callers. The British Commonwealth Net meets daily on 21,354kHz at 1430 and attracts VS9MB, ZB2, 9H1, 9V1 and many MP4s (until the imminent British withdrawal from the area). The Southern Africa LF DX Net is to be found on 7,050kHz at 1900 on Wednesdays, and on 3,790kHz at the same time on Thursdays—ZS1MH is in control and the net attracts CR6, CR7, FH8, FR7, ZD5, ZS and others.

VS9MT/VS9MM, Dave, is now on the air from Gan. VQ9SM will be leaving Chagos in the autumn for a stay on Rodriguez Is where he will become 3B9CF. Jacky's logs for the period 22/12/70 to 20/3/71 have not yet arrived at JA0CUV/1. KB6CT is putting good signals into Europe on 14MHz ssb and is specially looking for Europeans on Wednesdays at 0600 on 14,278kHz; KH6s HHO and HIF often try to control the pile-ups. There are now two stations on the air from Mawson, in Australian Antarctica. One is VK0CC and the other VK0MX, both operators expect to be there until 1972. VR5DK is now in New Zealand. ZK1AJ

should have returned to Manihiki by now. ZK1BM closed down on 21 April and is now in ZL. UA1XL/UA1 is expected to be heard on 40 and 80m at any time from Franz Josef Land. JX8YN is now home in Norway.

Those looking for contacts with ZS on the lower frequency bands will be interested to learn that ZS5LB is often on 3,502–3,515kHz at 0300, and again between 1900 and 2100. He is also active on 7MHz.

Another station will be on the air from Portuguese Guinea soon; this will be CR3DN who will be using the services of CT1BH as his QSL manager. VK3UV is reported to be moving to E. Pakistan later in the year and has already been given the call AP2USA. 9V1QA will be in Vietnam in May and says that he will operate with low power and a dipole. He favours cw operating and seems to prefer frequencies around 14,050kHz.

G3AAE has had his QSL card for KG4DS returned by VE3BYN with a note that this station closed down in August 1970 and that unless the call has been re-issued, QSOs since then have been with a pirate. G3LPS encloses a note from Heinz, W2HAQ, who has been acting as QSL manager for ZF1AN, expressing his appreciation of a few words of thanks from 'LPS. QSL managers are only human and a few kind words are never wasted.

An Arabian net takes place at 1900 each Saturday on 14,295kHz, and callsigns of those wishing to participate are collected by CT2AA, CT2BB and WA3HUP beforehand. Breakers are discouraged. UA9VB is reported to act as "mc" for UA9VH/JT1 every evening at 2300 on 14,190kHz.

Slow-scan tv

In a further progress report, G3ZGO, G6ADJ/T has enclosed photographs of some of the pictures he has received. All were taken from his home-designed hybrid monitor which uses a 3in tube and is fed by an indoor dipole on 14MHz, and they included shots of OH2FH, SM5DAJ, SV1AB and I1LCF. What are believed to be first G sstv QSOs with each country took place as follows: SV1AB, 21/11/70, I1LCF 2/12/70, W1VRK 13/2/71, EA4DT 13/2/71 (no QSO, but pictures exchanged—language difficulties precluded speech exchanges), FG7XT 23/2/71. Good pictures from VK6ES were received at 1738 one evening on 14,230-MHz (which is the frequency which many European stations are restricted to using). G3ZGO complains of non-co-operation by other UK stations which will not QSY from this frequency when politely requested to do so.

Call caption as received from I1LCF by sstv (see text).

Amateur meeting in Poland

Information concerning an international meeting of radio amateurs which is to take place at Augustow on 10–12 September has been received from ORBIS—the official Polish travel agency. The meeting is organized by PZK and full accommodation in Augustow for the duration of the meeting and also for the services of a guide will cost just under £9. Transport from Warsaw to Augustow will cost £3, an optional day in Warsaw (a very well spent day) £5, and various other excursions may be arranged at equally reasonable cost. An amateur station will be active and foreign visitors can obtain a licence for operation from a fixed station (at no charge) but mobile operation is not permitted. Booking forms and further details may be obtained from ORBIS agents in this country (Thos Cook, L. W. Morland Co Ltd, 308 Regent St, London, and Transcontinental Travel Service, 615 Great Western Road, Glasgow W2).

Contests

The Colombian Independence Contest

0001 17 July to 2359 18 July.

All bands 3·5 to 28MHz ssb, a.m. and cw but not cross-mode. QSO points for European entrants are five for each HK contact and one point for all others. A multiplier is arrived at by adding the total number of DXCC countries plus HK zones worked on each band. Serial numbers consist of RS or RST followed by QSO number (starting from 001). There are single and multi-operator single transmitter, and multi-operator sections. Remember that HK0 counts as HK, HK0 (San Andres) and HK0 zone. Send logs to reach Independence of Colombia Contest, c/o LCRA, Ap.584, Bogota, Colombia, not later than 30 September 1971. Some printed rules are available from G3FKM.

Worked All Massachusetts Cities and Towns Contest

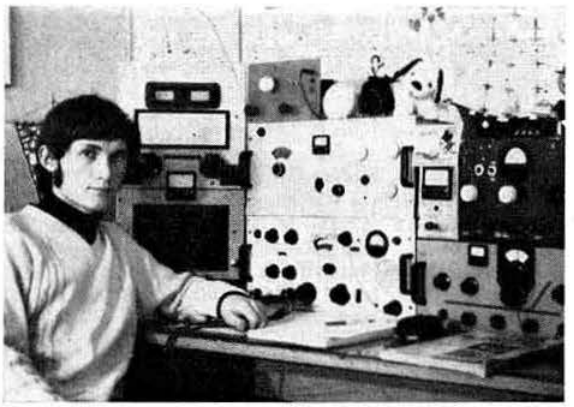
0001 15 June to 2400 19 June.

This is sponsored by the Massachusetts Chapter National Awards Hunters Club as part of the Massachusetts Amateur Radio Week. Exchange report, city, county, state, and one point is gained per station in Massachusetts worked. Multipliers consist of the total of Massachusetts cities and towns worked (351 in all). Send entries to reach Steven Rich, 31 Arlington Av, Revere, Mass, 02151, not later than 31 July.

Awards

WCPR-50 Award

This award will be given to any radio amateur who submits evidence of two-way communication with another radio amateur in each of 50 CPR zones (these are the same as the ITU zones listed on pages 198 and 199 of March *Radio Communication*). All contacts must have been since 1 April 1968 and endorsements will be given for all phone, all cw, two-way ssb, rtty, or mixed modes. A special endorsement will be made if all contacts were made by a mobile station. QSL cards must be in the possession of the applicant but only a list certified by two other amateurs or an official of a



This outstanding 160 station, OK1ATP/Jardey, is in the forefront of dx working from Europe. The 1·8-21MHz, 10-80W home-built rig includes a 15-valve receiver and a three-valve converter. *Photo via W1BB*

local radio society should be sent. QSOs during the IARC CPR contest will not require QSL cards.

Stickers will be issued for working 60, 70, 75, 80 and 85 zones. Applications should be sent to: Harry Whiting, W2JXH, 20 Pocono Place, Holiday City, Tom's River, NJ 08753, USA, together with 10 IRCs. There is no fee for blind applicants. For WCPR-50 stickers and for the WACPR Award (see below) QSLs for /MM contacts must be submitted with the application, and they must show the position of the ship. The award is to the operator and he may have made them from any number of stations or locations.

The WACPR Award
This award has the same rules as for the WCPR-50 Award and is for working all 90 ITU zones. The fee is 10 IRCs.

The P-75-P Award
This is a similar award to the WCPR-50 but is issued by the Central Radio Club, PO Box 69, Praha 1, Czechoslovakia. There are three classes—1 for working 70, 2 for working 60, and 3 for working 50 zones (all since 1/1/1960). The fee is 10 IRCs and a national society certified list (showing QTHs of stations worked) should be submitted. The award is not available to listeners.

The WA Provinces Award
VRZA, PO Box 190 Groningen, Holland.

For two-way communication (any mode/s) with PA stations in each province. These are: Drente (DR), Friesland (FR), Gelderland (GD), Groningen (GR), Limburg (LB), Noord Brabant (NB), Noord Holland (NH), Overijsel (OV), Utrecht (UT), Zeeland (ZL), and Zuid Holland (ZH). An amateur in Noord Oost Polder (NOP), may be counted in place of any missing province. A certified list of QSLs and 10 IRCs should be sent to the address above. The award is free to blind and paralysed amateurs, and is also issued to listeners.

The Munich Olympic Diploma

For contacts with stations in Munich and DOKs C09, C11, C12, C13, C18 or C30 between 1/1/1970 and the day of the official closing of the 1972 Munich Olympic Games. European stations (other than DL) earn four points per fone QSO, and eight for cw/rtty contacts. Class I requires 250 points, Class II 200 points, and Class III 100 points. Stations may be worked once per band and per year. A list of QSOs certified by two licensed amateurs should be sent (with 10 IRCs) to: DJ8ZU, 8 Munich 13, Keuslinstrasse,6 Germany.

The Fairytale Award
EDR Odense Division, OZ7XG, E. Hansen, 14 Sophus Bauditz Vej, DK-5.000, Odense, Denmark.

Requires nine confirmed QSOs (two way cw) with nine different OZ stations representing each OZ prefix OZ1-OZ9, with at least three of the stations worked having been located in Odense. QSOs must have taken place since 6 December 1967 (the date of Hans Anderson's elevation to honorary citizenship of Odense). Contacts with /P or /M stations do not count and minimum report must be RST338. Send list of contacts, QSLs and six IRCs to the address above.

The Hellas Diploma
Radio Amateur Association of Greece, PO Box 564, Athens, Greece.

This award is being issued to celebrate the 150th Anniversary of Greek independence and will be sent to those who submit proof of contact with 10 SZ0 stations (on any or all bands/modes) during 1971. The QSL cards and three IRCs should be sent to the address above.

Jamboree on the Air 1970

The official report of last year's event has just arrived and indicates that the affair was most successful. In the UK, 231 stations took part and between them they contacted 254 Scout stations in 51 different countries overseas. Conditions were poor and as these figures are higher than last year's this indicates a satisfactory increase in participation. The organizers wish to point out that this is *not* a contest and is primarily an *international* event and that far too many stations come on in an unofficial capacity. The ideal station seems to be the one which invites a few Scouts to visit an amateur's home during the weekend when dx conditions are good. The UK organizer is L. R. Mitchell, G3BHK, 28 Darwell Drive, Ascot, Berks.

The West Midland DX Club

The aim of this club is to further the well-being of amateur radio, and membership is open to anyone who has proof of contact with not less than 250 countries as per the ARRL DXCC list. Meetings are held four times a year (in Birmingham) and anyone who is interested in becoming a member is invited to contact the secretary, G3HCT, "Brooklands", Ullenhall, Solihull, Warwicks. Present membership includes G2BOZ (President), GC2LU, G2LB, G3DO, G3s AAM, HCT, LNS, G4s CP, MJ, OI, VK6HD, and your scribe.

Dxpeditions

Following their ZA5Z operation, Martin, OH2BH, and OH5SE will be flying to Fernando Poo for two weeks of operation as 3C0EG. During this time an effort will also be made to put Annobon Is on the air as 3C0AN, and if transport can be obtained to make this 500-mile trip they will be

QTH Corner

CR3VV	Box 306, Bissau, Portuguese Guinea.
ET3ZU/A	via I1IJ, Viale XXI Aprile 34, 00162, Rome, Italy.
FG7TI/FS7	via VE3EUU, 67 Tavistock Rd, Downsview, Ont, Canada.
FG0MH	see VP2EEL.
FS0MH	see VP2EEL.
HB0XTG	see VS9MT.
KB6CT	(ops Bill, Art, Jim-c/o Federal Electric Corp. APO San Francisco, Calif, 96401 USA
MP4TDS	Ron Galpin, 633 Signal Troop, Caribbean, BFPO 12.
PJ8DZ	via W9ZRK, 1320 N Delaware St, Indianapolis, Ind, USA.
PJ8RD	see VP2EEL.
PJ9BB	W2VIA, 80 Garden Rd, Scarsdale, NY, 10583, USA.
VK0CC	Ray Kearney, 13 Kiaora St, Canley Vale, NSW, 2166, Australia.
VP2ABN	see VP2EEL.
VP2EEL	WB8ABN, 1745 Oakstone Drive, Rochester, Mich, 48063, USA.
VP8KF	G3TWV, 2 Wyke Lane, Farndon, Newark, Notts.
VP8LZ	G8DTM, 21 East Rd, Wymeswold, Loughborough, Leics, LE12 6ST.
VP8LR	WB4FIN, 5608 Idlewood Lane, Louisville, Ky, 40291, USA.
VR2FT	G3HZG, 95 Oakenshaw Rd, Redditch, Worcs.
VR5DK	via WA6QWW, 824 Bell Av, Sacramento, Calif, 95838, USA.
VS9MT	via G3LQP, 56 Combe Rd, Tilehurst, Reading.
ZF1BA	WB2CKS, 30 Maxwell Drive, Westbury, NY, 11590, USA.
ZF1QW	W4IQW, 1121 N Halifax, Daytona Beach, Fla, USA.
ZF1WP	W4YKH, 3154 Ravenwood Drive, Falls Church, Va, 22044, USA.
ZD8TS	G3WDV, 36 Low Green, Gainford, Darlington, Co Durham.
ZL4JF/A	ZL2AUF, 8 Bristol Crescent, Palmerston North, New Zealand.
ZL5AX	ZL1SV, 7 Paice Av, Auckland S.2, New Zealand. (or via bureau to ZL1SV)
ZS3KC	K4TXJ, 5504 Datura Lane, Louisville, Ky, USA.

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

active for three days. Frequencies will be 14,020, 21,020 and 28,020kHz (cw) and 14,195, 21,295 and 28,595kHz (ssb). Gear will consist of a Tempo 1 transceiver with separate vfo, TH3 beam and 14AVQ vertical. Support may be sent to OH2NB.

All the rumours concerning Clipperton Is seem to have been false so far. *West Coast DX Bulletin* quotes M. Rene del Amar, who is believed to be the Chief Director of Communications in French Oceania, as saying that there is no possible chance of amateur operation at this time. He receives up to 15 licence applications yearly which he has to reject.

The ET3ZU/A operation took place during early May and was surrounded by the worst possible operating procedures. It is said that ARRL has accepted the islands for DXCC credit and the operator, Aldo, is expected to continue to make occasional visits to service the lighthouse.

Various dates are being given for K2IXP's intended visit to Mellish Reef and Willis Is, and the trip may still not have taken place by the time this reaches readers. All water requirements will need to be taken to Willis by the expedition and this tends to be a severely limiting factor.

Spratly Is rumours are still rife—the VS6 operators are said to be unable to go, but there is some hope that DX1HMI and DU1DB may go sometime before the typhoon season in the latter's 60ft boat. DU1FH's second operator, and Earl and Enos, W4VPD, may join them. INDXA is still discussing the problem with HS3DR.

AP2KS has been heard to say that he has applied for a licence to operate from Burma (XZ) and if permission is granted he will go there in August.

Peter First Island, Antarctica, may be put on the air for the first time ever by LA6RL later this year.

Expeditions

G3APA will be signing GC3APA from the island of Sark on 160m for about five months. Operating times will be irregular but usually between 2100 and 2300. QSL to "Caro Mio", Sark, CI.

1971 Countries Table

	1·8 MHz	3·5 MHz	7 MHz	14 MHz	21 MHz	28 MHz	Total
G8VG	1	16	29	25	44	20	135
G3YHB	—	4	5	48	62	15	134
G3YWX	—	12	10	43	10	—	75
BRS27263	—	76	57	169	115	86	503

In the reference to G3s IKR, VPE, XIP and ZXO's Isle of Skye expedition in last month's *MOTA*—the operating bands on 15, 16, 17, 23 and 24 June were given as 160m and 20m—this should have read 160m and 2m.

Limerick Radio Club will be visiting Bere Is in Bantry Bay from 5 to 7 June. Callsign will be EI0DX and all bands from 160 to 10m, cw and ssb, will be used. QSL to EI5BX.

Band reports

Many regular readers will have been confused by the change of closing date for this number of *MOTA*, and extra thanks are due to the following who noticed that their contributions were needed sooner: G2HKU, G3AAE, G3GVV, G3LPS, G3UKH, G3UOL, G3YHB, G3YWX, G3ZBA, G3ZOQ, G6GH, BRS16567, BRS19682, A6966, A7056 and A7437.

Stations listed in italics were on cw, the rest on ssb.

1·8MHz. 1900 OE5KE. **2200** GB3SK, *GM3SVK/A*.

3·5MHz. 0100 AP2MR, HI8LC, KV4FZ. **0200** YV1KZ. **2000** EP2TW **2100** EA8HA, OD5BA, 7X0WW. **2200** ZC41K, ZS1MH, ZS2MI, 6W8DY. **2300** KV4FZ, VP2s AA, GBG, 9G1DY, 9L1RP. **2400** VP9GD, ZB2A.

7MHz. 0100 *PY0AD, VP2AAA.* **0200** *PZ1AP.* **0400** *OX3ZO*, PY, *TA1TS, TG9CD, XE1CE.* **0500** *CT2AK*, HC2GG/1, HC6MJ (QSL via DJ3JR), ZL4OL/A, ZS5XA. **0600** *CX1AA*, CP1BWS, OA4BH, VK2AVA etc, YV4TI. **0700** HK0BKX, *HR2HH*, VP5JA, 9Y4KR. **1200** G3RFH /LX. **2000** EP2BI. **2100** JY9WB, ZB2CC.

14MHz. 0600 *KH6IJ* **0700** KH6s, KL7s, KW6AA. SV1FK (ZL2AAW in Greece for rest of 1971), VR6TC, ZK2AF, 5W1AK. **0800** *UA0ZI* (Kamchatka), VK9LV. **0900** K6CJJ /KS6, M1D (QSL via I1MKN), W1. **1100** C21AA, *VK0CC*. **1300** ET3ZU/A, YK1AA. **1500** HS4AEF. **1600** *5R8AP*. **1900** JD1ABO, TA3KE (QSL to VE3MR), *VU7US*. **2000** *G6ZY/CN/M*, SU1MA, TJ1BA. **2100** JY2, JY9AA, VKs, VP8HZ, *VP8JH* (S. Orkney), ZL3GS. **2200** VU2BEO, *6Y5SR*. **2300** VP2MY/2A.

21MHz. 0900 VU2HLU. **1000** JAs, 3V8CZ. **1100** KX6IP, VR4EE, VS9MB, VU7US, 9N1MM. **1300** AP2KS, *TU2DD*. **1400** TU2CH (QSL via W7VRO). **1500** *EA9AQ*, WC4BBT (Chesapeake Bay QSO party). **1600** *KG6JAR, TY1ADE*, VS9MT. **1700** EA9EA, EL2CW, *KR8CF*, VP9GE, 9K2CW, 4S7PB. **1800** FH8CY, *FY0SE*, 9X5AA. **1900** CR4BC, HC4KL, VP5JA, 4X9HD, *9E3USA*. **2000** CEs, CP6DH, ZD8JC, *ZD9BM, K4BZH/VP7*. **2100** 5H3JR, 8R1G.

28MHz. 0900 5N2AAU. **1100** VK6CT. **1200** VU2BEO. **1300** ZC4RS. **1500** TI2CF, 9G1DY. **1600** EA9EJ. **1700** CE8AO, EL2CG. **1800** LU5XE, 9U5AC.

Very many thanks to all correspondents and specially to the following for items obtained from their publications: The **DX'ers Magazine** (*W4BPD*), **NARS Newsletter** (*5N2ABG*) **Long Skip** (*Nick Sawchuk*), the **West Coast DX Bulletin** (*WA6AUD*), the **Ex-G Radio Club Bulletin** (*W3HQO*), **DX Press** (*PA0TO*), **DX News Sheet** (*Geoff Watts*), the **29 DX Club Newsletter** (*VK6PG*), and **QUAX** (*G3DME*). Please send all items for July issue **to reach G3FKM before 5 June,** for **August** by **9 July,** and for **September** by **4 August.**

Propagation Predictions

The months of June, July and August are the most unfavourable for dx conditions, especially on 28MHz.

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

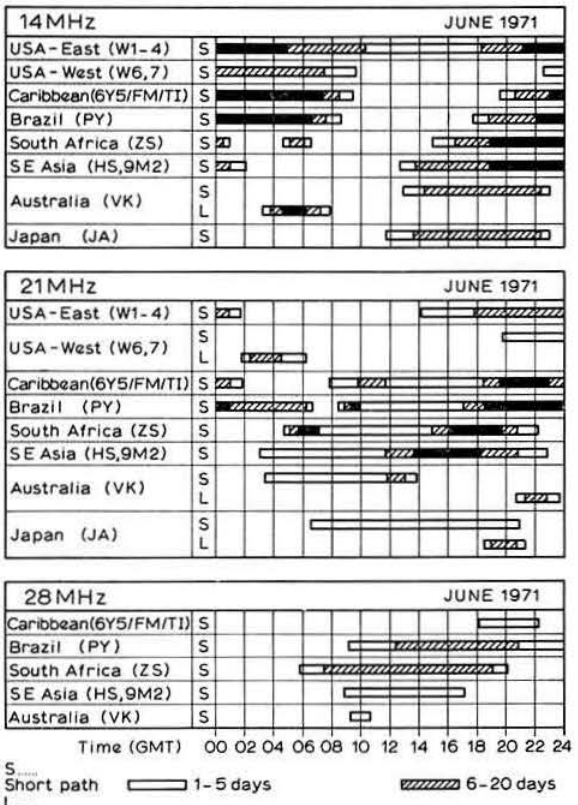
On **21MHz** the unfavourable conditions will also be noticeable. North America, Australia and Japan will only be heard on days with above average F2 MUFs. Contacts with the west coast of North America will be possible in the early hours of the morning, and with Japan and Australia in the latter part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

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

On **7** and **3.5MHz** the chances of dx during the night will be relatively low, as the nights are short and atmospheric disturbances will be strong.

The dead zone will not appear on **3.5MHz**, even shortly before sunrise.

The provisional sunspot number for April was 70·7 with the highest period of solar activity occurring in the middle of the month. The predicted smoothed sunspot numbers from the Swiss Federal Observatory for August, September and October are 61, 59 and 57 respectively.



MOBILE RALLY NEWS

Elvaston Castle Mobile Rally, 13 June
This will take place at Elvaston Castle County Park five miles south-east of Derby on the B5010. All the usual attractions. Talk-in stations: G3EEO on 160m, G3ZBI on 2m. DF run in the afternoon—bring o/s sheet 121. Special car park. Facilities for caravans—book with Mrs Webb, Elvaston Caravan Park, Borrowash Road, Elvaston, Derby, tel Derby 73735. Further details from G3WFU.

Hanworth Mobile Rally, 27 June
Echelford ARS is organizing this event at Hanworth Air Park, approx three miles south of London Airport along the A305 from London. Talk-in stations from 9am, callsign GB3HCW, on 160, 80 and 2m. There will be a gymkhana, rabbit show, flower show, licensed bar and refreshments. Further info from A. G. Wheeler, 32 Feltham Hill Road, Ashford, Middx.

South Shields Mobile Rally, 4 July
Taking place this year at Redwell County Secondary School, Prince Edward Road, South Shields, the rally site can be reached either from Seaburn, along the A183 coast road, turning left at Marsden roundabout onto the B1300, or from the A1(M) via the A158(M) then onto the A1055 and B1300. The school is half a mile from the coast on the right. Talk-in stations on 160m and 2m, trade stands, raffles, competitions, refreshments. Further info from F. Harrison, G3SFL, 42 Woodlands Road, Sunderland, SR67UD.

Cornish RAC Mobile Rally, 4 July
Truro Rugby Club's ground will be the venue for this rally, and talk-in stations will operate on 160, 4 and 2m from 0900gmt. There will be refreshments and a licensed bar. Full details and a map are obtainable from G3UCQ QTHR.

Upton Mobile Rally, 11 July
Taking place at Hill County Secondary School, Upton-on-Severn, this rally will be arranged by Worcester and District ARC. It will open at 11am and there will be a talk-in station on 160, 4 and 2m. Attractions included crystal exchange, trade stands, Raynet, frequency measuring service, and a youngsters' playground and refreshments at reasonable prices. Further details from G3WUI. QTHR. Tel Malvern 3088.

Mobileer's Family Outing, 17 July
This event, arranged by the Winchester ARC in conjunction with the Montgomery of Alamein School fete, opens at 2pm and will have talk-in stations on 2m and top band. Details from Winchester ARC, c/o Flowerdown House, Harestock Road, Winchester.

Scarborough ARS Mobile Rally, 18 July
Taking place at Burniston Barracks, Scarborough, attractions at this rally will include trade stands, bring and buy stall and raffles. Refreshments will be available and there is ample parking space. Talk-in stations will be on the air from 10am, G4BP/A on 1,980kHz and G3NRS on 145·8MHz.

Visitors to Drayton Manor Park Rally on 18 April included (l to r) G6LD, G2CVV (President, RSGB) and G3BA (past-president, MARS)

SOCIETY AFFAIRS

A brief report of the Council meeting held at Society HQ on 5 April 1971

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

Apologies for absence were received from Messrs J. O. Brown, E. G. Ingram, A. C. Morris and Dr J. A. Saxton.

Computerization of membership records
Mr Hughes reported that Mr Walling, G3RZK, had attended the Finance and Staff Committee meeting on 31 March 1971 when the computerization of subscription records had been discussed.

Membership and affiliation
It was resolved:

(i) to elect 39 corporate members and eight associates;
(ii) to waive the subscriptions of five members on the grounds of blindness or other disability;
(iii) to accept reduced subscriptions from four members;
(iv) to grant life membership to one member;
(v) to grant affiliation to the Clacton and District Radio Club, Kaduna Polytechnic Communications Society, Banbury Amateur Radio Society and the Bicester Amateur Radio Society.

Society Historian
Mr Jessop suggested that there was a need for a Society historian and it was agreed that Mr L. E. Newnham, G6NZ, be invited to act as Society Historian. Mr Newnham accepted the invitation with pleasure.

70cm band
Mr Stevens reported that he had attended a meeting with MPT on 18 March, which had been called to discuss reductions in the allocation of frequencies for use by amateurs in the 420–450MHz band.

Amateur Television Licence
It was reported that the BATC had asked MPT to consider a revision of the terms of the Amateur (Television) Licence. Copies of the suggested alterations had been sent to the Society, and Council members wishing to make any comment were asked to advise Mr Stevens as soon as possible.

Proposed alterations to USA telephony sub-bands
Mr Stevens explained the proposed alterations to the USA telephony sub-bands as outlined in the FCC Docket 19162. He stated that the proposals which affected the 14, 21 and 28MHz bands were detrimental to amateur operations outside the USA and accordingly a letter to this effect had been sent to the FCC.

Telecom 71 Exhibition at Geneva during Space Conference
It was reported that during the Space Conference in Geneva, June-July 1971, an exhibition known as "Telecom 71" would be held, at which IARU Region 1 would be organizing an amateur exhibit. In addition there would be a special Press Exhibition at which copies of *Radio Communication* and the *VHF/UHF Manual* would be displayed.

Regional meeting
Mr Scarr reported that an ORM would be held on Sunday 19 September, at Weston-super-Mare.

Report on WTD 1970
Mr Stevens reported that an ITU booklet on the 1970 World Telecommunication Day contained very complimentary remarks on the participation of the Society.

VHF beacons: GB3GM, Dounreay: GB3LER, Lerwick
Mr Smith reported that the 144 and 70MHz beacons at Dounreay were operational. Mr Stone confirmed that the MPT had agreed in principle to the establishment at Lerwick of a beacon operating on 50·1MHz during the night hours, and plans for its installation were being made.

Presidential visits
The President reported that he had visited St Dunstans, Brighton, on 19 March, and the Sutton and Cheam Radio Society Dinner on 27 March.

Minutes of committee meetings
Council approved the minutes of the HF Contests Committee (4.3.71) and Membership & Representation Committee (12.3.71).

OBITUARIES

Mr C. G. Allen, G8IG
"Bert" Allen of Keston, Kent, who died in April, was an early pioneer of radio. In the early 'twenties his experiments included transmitting from a train and communications with aircraft. He was also the first person to receive Australian broadcasting outside the USA, and to obtain a WAZ phone. G8IG held the Rotab trophy and No 5 EDX certificate, and a year ago, after a lull in activity, he obtained ssb equipment and again became a well-known call on the bands.

Mr N. Hardy, G3VXG
Norman Hardy died on 8 April, aged 47. A well-known amateur in the York area, he was active until shortly before his death on both hf and vhf bands.

We have also been advised of the deaths of:

Mr R. G. Drewery, G6OY, of Hull, on 25 November 1970.
Mr Thomas Hill, G3UMY, of Rosewood Avenue, Chester, at the age of 48, on 1 April.
Mr P. H. Hawkes, G3NLO, of Monks Kirby, Warks, on 8 April.
Mr John Bain, GW2FMM/G2FMM/ZS1MM.

YOUR OPINION

The Editor
Radio Communication

Sir—May I ask the chairman of the VHF Contests Committee for a national justification, in your columns, for Rule 13c (VHF NFD) which prohibits pre-arrangement of contacts on other bands during VHF NFD.

For the benefit of those not familiar with the pattern of UHF operation in Europe and the USA, I should explain that because of the use of high-gain aerials with beamwidths less than 10° and the tendency of operators to spread out over a 2-3MHz range (compare 14MHz) it is necessary to pre-align aerials and exchange frequency data on a lower frequency band. Before the G8+3 was even a gleam in the RSGB's eye, this was the way, remember, that 432MHz contacts were made. Eventually, I agree, as everyone starts to use 3dB NF transistors, preamps, reasonable transmitter powers and ssb at legal limits 1,296MHz will go, as 432 has done, to a mode of non pre-arranged contests. This is some years off.

In recent years on NFD it has been possible to make some 1,296 QSOs by calling CQ. In general these have been short range, 40-50 miles. Longer distances worked without pre-arrangement have been made by "following up" a nearby station who himself made the

pre-arrangement and was overheard. In such a case the only unknown factor is one frequency. Beams are already aligned. Ranges covered on VHF NFD on 1,296MHz have been gradually increasing over the years and more groups in the remoter areas of the country have been making gear for the band, taking it out portable and making QSOs down country or across the channel. I would cite the Norfolk group as an example.

Surely this promotion of dx working on 1,296MHz is one of the purposes of holding an international contest; this rule will discourage it.

I should like to suggest an analogy to this rule; it is to me as if the AAA, having watched Bannister gradually improving his technique to finally break the four-minute mile barrier, had then said "Right—rather than press on towards 3 minutes 45 seconds we decree, unilaterally, that all further races will be run in Wellington boots."

Now I know that one answer is to use a high gain and a low gain aerial, one for searching and one for a nice 'comfy' phone QSO, but what about the station at 150 miles who is only 10dB over noise on the dish when you can hold it steady; he is not there on the bent hairpin or Parabeam with about 10dB less gain. How do the smaller groups react to finding two lengths of low-loss coax?

To summarise, the effects of this rule will be as follows:

(a) A drop in the number of 1,296MHz QSOs, particularly dx ones, and a drop in the number of participating 1,296MHz stations;
(b) A reduction in maximum range QSOs;
(c) A ridiculous situation in which a QSO on 432MHz will go like this—"I just happen to be about to transmit in your direction on 23cm, I'm using a tripler and I make my frequency at present 432·15MHz. If you have your 1,296 antenna aligned you might like to listen—do you use a tripler OM?".

In conclusion I would ask how one explains to a Frenchman who has just passed you his frequency, asked you to tell him yours on 1,296 and call him in three minutes, that it's no use doing so because he has just invalidated the QSO by breaking rule 13c. Perhaps the contests committee has been in touch with REF or IARU on this one?

If you really want to slow up the progress towards being able to make QSOs directly on 1,296MHz, and ensure as a by product that the dx records remain in the USA forever, then why not consider banning parametric amplifiers next year?

Yours faithfully,
P. K. Blair. G3LTF

The chairman of the VHF Contests Committee replies:

G3LTF is not alone in his criticism of VHF NFD rule 13c, nor is the VHF Contests Committee unappreciative of his point of view. However, as operating techniques on 23cm are so different from those on 4m, 2m and 70cm, the real issue is whether or not it is desirable to include 1,296MHz in a vhf event now that the June Microwave and the October UHF/SHF NFD contests are becoming established in their own right.

The continued inclusion of 23cm on VHF NFD does not have universal support, and unless these frequencies can be made more compatible with operation on other vhf bands it may become difficult to resist pressure from those who advocate restricting its use to the microwave events with which it has characteristics in common.

Rule 13c was formulated in the hope of improving this compatibility by adopting a less experimental approach to the 23cm QSO. It is felt that contestants should be discouraged from using another band as a protracted telephone link in order to set up the first half of a 23cm contact, and thence, through the same linking medium, to complete the second half of the QSO without any reference to the first half. Such a procedure may be a necessary and legitimate part of a microwave event, but it is undeniably out of place in a contest where operating skill has become a major factor in achieving a good score.

It is not the committee's intention that rule 13c shall disallow any contact which takes place on a beam heading accurately aligned during a previous QSO provided that both stations transfer simultaneously to the new band. A pre-arranged QSO is defined, therefore, as one in which cross-band working is a necessary preliminary to the setting up of a scoring contact.

While it is appreciated that this rule may reduce the number of dx QSOs on 23cm, it is hoped that the amended scoring bonus will be sufficient to redress the balance. The reactions of all contestants and the effects of the rule upon the overall results will be studied carefully. All are assured that before the rules for 1972 NFD are published, due consideration will be given to every shade of opinion concerning the future role of 1,296MHz on VHF NFD.

Cliff Sharpe, G2HIF

The Editor
Radio Communication

Sir—It has come to the notice of the committee of The British Amateur Radio Teleprinter Group that a certain amount of confusion exists concerning the allocation and use of certain frequencies in the 2m band by rtty stations.

The two channels in question, namely 144·6MHz and 145·3MHz, were both first agreed upon about five years ago in discussions between the committee of BARTG and the VHF Committee of RSGB. Subsequently the frequency of 145·3MHz was designated as an international rtty channel at a Region 1 IARU Conference. Since that time both frequencies have been shown as being rtty channels in all publications concerning vhf band planning.

If any vhf operator who has crystals for these channels feels in any way hard-done-by, I can confirm that there are many members of BARTG who would be only too pleased to purchase these crystals from him.

Yours faithfully,
G. P. Shirville,
Honorary secretary, BARTG

The Editor
Radio Communication

Sir—Several circuits have been published in *Radio Communication* using 88mH toroids. A case recently came to my notice where the toroids had been incorrectly connected with the result that the circuit failed to work.

When purchased, these toroids have four wires coming from them, the winding being in two sections. In some cases two of these wires are fitted with sleeving and it was this which had led to the error.

The two windings must be connected in series in such a way that the start and finish of the complete toroid adjoin one another. Lay the toroid on the bench so that two wires leave it at six o'clock and two at twelve o'clock. Join together the wires at six o'clock keeping the connection between the sections as short as possible. The wires at twelve o'clock form the start and finish of the complete 88mH toroid.

Yours faithfully,
J. E. Hodgkins, G3EJF

SPECIAL EVENT STATIONS

Grafton RS Annual Field Day, 13 June
This will be held on the usual site, Tumulus Hill, Hampstead Heath, using the club calls G3AFT (10–160m) and G8DWL (2m). Visitors welcome but the GLC does not permit cars.

Baptist Church Garden Party
The Baptist Missionary Society of Great Britain will be on the air on 10 July with the call GB3BMS. Operating times (gmt) and approximate frequencies are 1100-1200, 14·285MHz; 1300–1400, 28·550MHz; 1400–1500 (schedules by previous arrangement), and 1500–1600, 21·360MHz. Equipment used will afterwards be dispatched to the Congo for missionary use. Schedules should be sent to GB3BMS, 34 Landrock Road, London N8 9HL.

Weymouth Quatercentenary
As a part of the town's quatercentenary celebrations, GB2WQC will be operating from Weymouth Arts Centre. From 9 to 11 July it will be active on 2m and the hf bands from 2.30pm–9pm. This station is being organized by the South Dorset Radio Society and special QSL cards will be sent.

Gala day at Corringham
The Vange ARS will organize and operate GB3MOC on all hf bands from 2pm onwards at the Pegasus Social club's gala day at Herd Lane, Corringham, Essex, on 12 June. Special QSL cards will acknowledge all contacts.

"Southern Steam" Steam Engine Rally
Southdown ARS will operate GB2SS at this rally, to be held at Milton Gate, Lewes Road, Polegate, from 24 to 25 July. All bands will be worked from 160m –2m, with talk-in on 1·975MHz, 70·26MHz and 145MHz. Special QSL cards will be available. Gates open at 11am each day and attractions will include a fun-fair and historic vehicles. Admittance: adults 30p, children 10p.

CONTEST NEWS

IARU Region 1 VHF, UHF and SHF Contests

Contests held in IARU Region 1 on the 144MHz and higher frequency bands fall into two categories, regional (or international) and sub-regional (or national). Regional contests are judged by the organizing society, which may be any of the societies in Region 1. Sub-regional contests are organized and judged by the national societies, but are arranged to coincide.

There have been no changes in the programme for 1971. The contests are a uhf/shf 24-hour contest (including portable operation) on 2–3 October and an all-band cw contest for the night of November 6-7. The popular vhf/uhf 24-hour contest (including portable operation) remains on September 4-5 and the RSGB VHF NFD will coincide with this. The rules for the RSGB event have been framed to encourage the maximum number of people to enter the IARU event. (The main difference is in scoring, as other societies in Region 1 firmly retain the one point per kilometre system).

There is now to be an RSGB event to coincide with the October uhf/shf contest; RSGB will receive entries and publish details of UK results. Certificates will be awarded to the leading UK entrants in each section.

Other RSGB events which do coincide with contests held by other societies in Region 1 are the July 144MHz open and November 144MHz cw contests. It should be noted that on these dates there are also 432MHz and 1,296MHz contests taking place on the Continent.

The organizing society for the 1971 international events is NRRL (Norway), while 1972 will see the turn of RSGB.

UK amateurs are particularly requested to support the international contests.

Rules for September 1971 IARU Region 1 VHF/UHF Contest

The following rules have been extracted from the general rules for IARU Region 1 vhf/uhf contests:

1. Eligible entrants. All licensed radio amateurs resident in Region 1. Multiple operator entries will be accepted provided only one callsign is used. Contestants must operate within the letter and spirit of the contest and at no greater power than permitted in the ordinary licences of their country. Stations operating under special high power licences do so *hors concours* and cannot be placed in the contest proper.

2. Sections.

(i) Fixed stations 144MHz
(ii) Portable/mobile stations 144MHz
(iii) Fixed stations 432MHz
(iv) Portable/mobile stations 432MHz

Portable/mobile stations may not change their location during the event.

3. Date and time. 1800gmt on 4 September to 1800gmt on 5 September.

4. Number of contacts. Each station can be worked once only on each band, whether fixed, portable or mobile. If a station is worked again on the same band only one contact will count for points, but any duplicate contacts should be logged without claim for points and should be clearly marked as duplicates.

5. Types of emission. Contacts may be made on A1, A3, A3j or F3.

6. Contest exchanges. Code numbers exchanged during each contact shall consist of the RS or RST report, followed by a serial number commencing at 001 for each band and increasing by one for each successive contact on each band. This exchange must be immediately followed by the QRA Locator of the sending station. (Example 579021YG46E.) QTHs may also be exchanged if desired.

7. Scoring. Points will be scored on the basis of one point per kilometre. The final claimed score must be shown at the top part of the first sheet.

8. Entries. Entries must be set out as shown in the example below. (See notes and VHF NFD Rule 19) They must be postmarked not later than 20 September and must be addressed to: Secretary, VHF Contests Committee, 108 Gascoigne Road, New Addington, Croydon, Surrey CR0 0NE. Late entries will not be accepted.

9. Disqualification. Entrants deliberately contravening any of these rules will be disqualified. Minor errors may result in loss of points. Errors in callsigns and code numbers will be penalized by deducting the following percentage of claimed scores for both stations.

One error: 25 per cent. Two errors: 50 per cent. Three or more errors: 100 per cent.

The claimed contact will be disqualified for

(a) an obviously wrongly stated QTH when no QRA Locator is exchanged, or (b) a time error of more than 10 minutes.

10. Judging. Submission of a log implies acceptance of the rules. The decision of the organizing society is final.

11. Awards. The winner of each section will receive a certificate. The top score on 144MHz, whether fixed or portable, will be awarded the Region 1 VHF Trophy. The winner in the remaining 144MHz category will be awarded the PZK Cup.

Rules for October 1971 UHF/SHF Contest (As part of IARU Region 1 UHF/SHF Contest)

1. Eligible entrants. As for September VHF/UHF Contest above.

2. Sections. There will be two sections, fixed and portable/mobile, on 432MHz and every other higher frequency amateur band.

3. Date and time. 1800gmt on 2 October to 1800gmt on 3 October.

4-7. As for September VHF/UHF Contest above.

8. Entries. Entries must be set out as shown in the example below. (See notes). They must be postmarked not later than 18 October and addressed to: Secretary, VHF Contests Committee, 108 Gascoigne Road, New Addington, Croydon, Surrey CR0 0NE.

9-10. As for September VHF/UHF Contest above.

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

Notes

(1) In some countries it is customary to use a band identification letter (A for 144MHz, B for 432MHz and C for 1,296MHz, etc). Should this letter be used or not used, no penalty will be exacted.

(2) An RSGB cover sheet, Form 427, and RSGB log sheets may be used for entries. In the case of the September VHF/UHF Contest, entrants in RSGB VHF NFD may enter both the radial ring score and the score based on points per kilometre on the same log sheet. (See also rules for VHF/NFD published in the March issue of *Radio Communication*, p207.)

Sample contest log sheet

Contest..... Date..... Claimed score.....
Section..... Callsign .....
Name .....
Home address.....
Location of station ..... Latitude .... Longitude..
Height above sea level in metres .... QRA Locator .....
Transmitter ..... Input power .....watts ..
Operating frequencies ..... Crystal or vfo .....
Receiver ..... Aerials .....

Date/ time	Call-sign	Serial sent	Numbers received	QTH	Emission	Dist. km	Points claimed

Declaration.

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

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

RSGB 7MHz DX Contests 1971

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

Transmitting contests

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

2. When. CW Contest: From 1800gmt Saturday 23 October to 1800gmt Sunday 24 October 1971.
Phone Contest: From 1800gmt Saturday 6 November to 1800gmt Sunday 7 November 1971.

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

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

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

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

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

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

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

6. **Entries** must be addressed to: The HF Contests Committee, c/o J. Bazley, Brooklands, Ullenhall, Solihull, Warwickshire.

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

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

Receiving contests

The attention of entrants is drawn to Rule 6(ii).

1. **When.** CW Contest: 1800gmt Saturday 23 October to 1800gmt Sunday 24 October 1971.
Phone Contest: 1800gmt Saturday 6 November to 1800gmt Sunday 7 November 1971.

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

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

Logs must be posted by 22 November 1971 and must be addressed to: The HF Contests Committee, c/o J. Bazley, Brooklands, Ullenhall, Solihull, Warwickshire.

All entries must contain the following declaration:

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

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

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

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

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

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

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

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

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

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

(ii) The practice of logging a series of contacts made by one station is deprecated. Log entries must not include the same callsign more than 20 times in the "Station being worked" column.

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

Listeners Contests

July 1971 144MHz

From 1800gmt 3 July to 1800gmt 4 July.

July 1971 432MHz

From 0900gmt to 1700gmt 18 July.

1. The contests are open to all non-licensed fully-paid-up members of the RSGB. Only the entrant may operate his station, fixed or portable.

2. Logs must show in columns:
1. Date/Time (gmt).
2. Callsign of station heard.
3. Report on his signals (including any defects such as over-modulation).
4. Report and serial number sent by station heard.
5. Callsign of station being worked.
6. QTH and QRA locator given by station heard.
7. Points claimed.

A given callsign may only appear once in column 2.

CW or test calls will not count for points and should not be logged. In addition, the following general rules, as published in the January issue of *Radio Communication*, will apply, the station heard being considered as a contact: 1, 2, 3, 4b, 5a, 6a, 9a, 12a, 14, 18, 19, 22, 24. Entries to be sent to the respective transmitting contest adjudicators.

August 1971 144MHz SSB Contest

From 1900 to 2200gmt 9 August.

All entries and check logs must be sent to the adjudicator addressed to: VHF Contests Committee, c/o G3EDD, 39 Angle End, Great Wilbraham, Cambridgeshire.

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

August 1971 70MHz CW Contest

From 0600 to 1100gmt 15 August.

All entries and check logs must be sent to the adjudicator addressed to: VHF Contests Committee, c/o G3JKX, 8 Devon Close, RAF Benson, Oxfordshire.

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

Stop Press

Summer 1·8MHz Contest

Rules and details as last year, see p404 June 1970 ***Radio Communication***, **except: 2**—from 2100gmt 3 July to 0200gmt 4 July; **6**—entries to R. L. Glaisher, 279 Addiscombe Road, East Croydon, Surrey.

DF Qualifying Round—Grimsby/Scunthorpe

Date: 27 June 1971.
Map: OS Sheet 104 (Gainsborough).
Assembly: 1300bst for start at 1320bst.
Location: Elsham Airfield (disused) NGR TA 034 136.
Frequencies and callsigns will be announced at the start.

This event is being organized jointly by Grimsby and Scunthorpe ARS and intending competitors are asked to notify John Reynolds, G3RSD, of the numbers in their parties requiring tea. His address is 91 Davenport Drive, Cleethorpes.

DF Qualifying Round—Salisbury

Date: 8 August 1971.
Map: OS Sheet 167 (Salisbury).
Assembly: 1300bst for start at 1320bst.
Location: Approximately 1½ miles south-west of Wilton, NGR 081287. Frequencies and callsigns will be announced at the start.

The event is being organized by the Salisbury and District Short Wave Club, and intending competitors are asked to notify Mr A. C. A. Newman, G2FIX, 74 Victoria Road, Wilton, Nr. Salisbury, Wilts. of the numbers in their parties requiring tea. Please advise him as soon as possible, and in any case not later than 1st August.

DF Qualifying Round—Dartford Heath

Date: 5 September 1971.
Map: OS Sheet 172 (Chatham & Maidstone).
Assembly: 1300bst for start at 1320bst.
Location: Service area (south side), Farthing Corner, M2, Rainham, Kent, NGR 816634. Frequencies and callsigns will be announced at the start.

The event is being organized by the Dartford Heath Direction-finding Club, and intending competitors are asked to notify Mrs M. Worbey, 13 Havelock Road, Dartford, of the numbers in their parties requiring tea. Please advise her as soon as possible, and in any case not later than 22 August.

Affiliated Societies Contest Results

Unfortunately, the entries and the result for the 1971 event were delayed by the postal strike. Possibly for the same reason, the number of entries is rather fewer than usual, although the number of stations participating seemed normal. At least 20 club stations known to have been active did not submit an entry.

Of the 43 entries received, two had to be disallowed and many of the highest claimed scores have been drastically reduced by checking. The final result was extremely close and the accuracy of the submitted logs played no little part.

This year the Edgware Trophy goes to Mid-Sussex Amateur Radio Society (G3ZMS) with a checked score of 1,524 points from 154 contacts. It used an inverted Vee with the centre at 90ft and a KW2000 transceiver; the four operators are to be congratulated on an excellent log.

Surrey Radio Contest Club was runner-up with a checked score of 1,517 points. Operated from Coulsdon, Surrey, by G3BFP and G3EUE, G3SRC used a home-constructed transmitter with an AR88 receiver and a 180ft end-fed aerial.

Echelford ARS took third place with 1,492 points, using a 200ft end-fed aerial.

Comments from participants

"Conditions not exceptional"—Echelford.

"Some stations started again with 001 on the second night"—Southgate.

"Marked lack of AFS activity from GC, GI and GW"—Verulam.

"Dinner served in college at 7.30; hungry operators!"—Cambridge University.

Comments from the adjudicator

A number of logs suffered large reductions in points as a result of errors. If your club suffered in this way it is suggested that you consider whether your logging arrangements are adequate under contest conditions. Remember that the committee can only judge on the submitted log—in many cases points may have been lost simply because a second operator failed to get the contest exchanges down correctly.

The usual outbreak of "funny clocks" was noted at the start and finish on both days—points have been deducted in respect of out-of-hours contacts noted by HF Contests Committee members.

The George Kent ARS from Luton submitted a log claiming 921 points, unhappily it was not affiliated to the Society at the date of the contest and its entry could only be accepted as a check log.

Posn	Name	Callsign	Points
1	Mid-Sussex ARS	G3ZMS	1,524
2	Surrey RCC	G3SRC	1,517
3	Echelford ARS	G3UES/A	1,492
4	Southgate RC	G3SFG	1,482
5	Addiscombe ARC	G3VYI/A	1,481
6	Verulam ARC	G3VER	1,467
7	Thames Valley ATS	G3TVS	1,454
8	Crawley ARC 'A'	G3WSC	1,434
9	Fareham & D ARS 'C'	G3YRO	1,423
10	Purley & D RC	G3SJX	1,400
11	Cambridge University WS	G6UW	1,388
12	Maidstone YMCA ARS	G3TRF	1,386
13	Reigate ATS 'B'	G3FM	1,384
14	Crawley ARC 'B'	G3TR	1,380
15	Sutton and Cheam RS	G2DMR	1,371
16	Solihull ARS	G3GEI/A	1,352
17	Pentlands ARC	GM3OXX/A	1,349
18	Edgware & D RS	G3ASR/A	1,317
19	Royal Naval ARS	G3BZU	1,307
20	IBM Lab ARC	G3YXR	1,290
21	Leyland Hundred Group	G3WYY	1,266
22	Stevenage & D ARS	G3SAD/A	1,261
23	Fareham & D ARC 'B'	G3VXM	1,247
24	Wimbledon & D RS	G3WIM/A	1,240
25	Crawley ARC 'D'	G3TNO	1,238
26	RAF Locking ARS	G8FC	1,197
27	Clifton ARS	G3GHN	1,168
28	Loughton & D RS	G8AB	1,129
29	Crawley ARC 'C'	G3MGL/A	1,125
30	University of Keele RS	G3UOK	1,123
31	Fareham & D ARC 'A'	G3VEF	1,103
32	ARC Nottingham	G3EKW	1,097
33	Acton, Brentford, Chiswick RC	G3IIU	1,063
34	Shefford ARS	G3FJE/A	1,039
35	Reigate ATS	G3REI/A	1,036
36	Mansfield ARC	G3GQC/A	998
37	Cornish RAC	G3OHB/A	968
38	Adur Contest Group	G3LQI	962
39	South Shields & D ARC	G3DDI	925
40	Hull & D ARS	G3AMW/A	887
41	Eccles & D RS	G3GXI	583

The following entries were disallowed for the reasons stated:
Portsmouth & D RS (G3DIT), Single-operator only, (Rule: Eligible entrants)
Mid-Herts ARS (G3WGC), No declaration or cover sheet (Rule 8d).

80m Low-power contest 1971

A welcome increase in activity and interest has produced a good entry from 15 stations—the highest number for some years. The HF Contests Committee hopes this trend will continue.

Conditions were poor for the start of the contest, but improved considerably after mid-day. Even so, very few Continental stations appeared in the logs, and not all of the southern stations managed to work the GMs that were active.

The leading entrant, who has supported this event for many years, was A. J. Gould, G3JKY, with 4,500 points, from 46 contacts. His station consisted of a solid-state transmitter using 2N706 transistors throughout, an R1475 receiver with a Q multiplier, and a dipole. Second place was taken by R. A. Wybrow, G3JVJ, who made 45 scoring QSOs with a TT11 transmitter, an Eddystone 888A receiver, and an inverted Vee dipole with the apex at 43ft. P. H. Ellis, G3WTJ, operated /P from near Whitby and gained third place using his solid-state direct conversion transceiver and a dipole. Altogether eight completely solid-state transmitters were in use, and a further two stations had semiconductor VFOs. The valved rigs employed a 958, and EF50, an 807, and an EF91 in their PAs.

"Got a report of tvi—is this a record?"—G3JKY. "Found it (the contest) rather short",—G3YKV. "Felt very isolated in Ayrshire."—GM3VYI. G3KZR made a number of interesting comments and suggested that non-entrants should call CQLP for identification purposes, indicating that they wish to contact contest stations only.

The 1930 Committee Cup will be presented to G3JKY, and certificates of merit will go to G3JVJ and G3WT.

Posn	Callsign	Points	Power	Posn	Callsign	Points	Power
1	G3JKY	4,500	0·5W	9	GM3VYI/P	1,400	0·5 & 1W
2	G3JVJ	4,350	0·5W	10	G3XWZ/A	1,330	0·5 & 2W
3	G3WTJ/P	3,800	0·5W	11	G2BTO	850	2W
4	G3NEO	3,250	0·5W	12	G3IGU	440	0·5 & 4W
5	G3TR	2,700	0·4W	13	G3KZR	300	0·4W
6	G3YKV	2,450	0·5W	14	G5DZ	290	1·6W
7	G3VCP/P	1,650	0·9W	15	G3BY	184	4W
8	G3ZXK	1,600	0·5 & 1W				

March 1971 144/432MHz Fixed Station Contest

Owing to the postal strike the rules for this contest were not known by most until after the event. Some entrants used the rules for last year's single-band open contest. Nevertheless over 400 stations were known to be active on 2m and 75 on 70cm.

The winner in Section A was G3ILO from Gloucester. He operated solely on 2m, as did the runner-up, G8BCL. The G3OXD/A team is to be congratulated as the overall winner and leading station in Section B, with G3XEP/A as runner-up.

Most competitors found conditions to be about average with a slight lift evident on Sunday. This allowed G3OXD/A to record the best dx with PA0MS/A on 2m. Partial contact was also achieved on 70cm. The best completed contact on this band was G3LTF to PA0EZ using two-way ssb.

The two-band nature of the contest seems to be popular, but almost all uhf operators agreed that a multiplier for 70cm was essential to make it worthwhile changing bands. Several competitors would like to see this event return to being an open contest. Others would prefer to see the rules allowing home station operating only.

Entries from two portable stations, who operated under the rules for 1970, have been accepted for tabulation but they are not eligible for awards.

SECTION A

Posn	Callsign	County	Score Total	Score 2m	QSOs 2m	QSOs 70cm	Best dx (km)
1	G3ILO	GR	705	705	164		310
2	G8BCL	YS	658	658	106		350
3	G8AVC	DY	582	520	108	12	270
4	G8DJV	WR	463	463	124		230
5	G8CUT	EX	361	361	88		290
6	G8DBW	GR	350	350	87		295
7	G3ZMD	BD	335	335	102		260
8	G3GXQ	YS	297	297	74		335
9	G8DMY	WE	255	255	78		256
10	G8CUO	NM	237	237	72		230
11	G8EBJ	EX	219	219	104		298
12	G8AWA	BE	215	215	60		280
13	G5UM	LR	185	151	46	14	360
14	G8CRN	CE	176	176	36		204
15	G8DWT	BE	163	162	82		148
16	G8CTT	KT	147	147	57		290
17	G8DYS	LD	144	144	76		164
18	G3THY	EX	138	138	58		350
19	G8CCH	HE	135	135	45		190
20	G8BKR	GR	127	123	48	2	240
21	G8DAW	BD	120	120	39		276
22	G8BXJ	GR	114	114	42		270
23	G8DXS	YS	111	111	38		260
24	G3YDY	EX	107	107	31		317
25	G3ZYC	DY	91			27	185
26	G3LTF	EX	85			12	319
27	G3XFW	ST	83	83	31		203
28	G8DQZ	SY	71	71	41		170
29	G8CIT	MX	26			20	87
30	G8CEA	SY	11	11	7		87

SECTION B

Posn	Callsign	County	Score Total	Score 2m	QSOs 2m	QSOs 70cm	Best dx (km)
1	G3OXD/A	WR	903	881	209	8	525
2	G3XEP/A	YS	725	725	124		355
3	G3NNG	BE	670	628	147	11	351
4	G8BMP	SD	519	519	119		260
5	G3WSC	SX	406	406	110		430
6	G8TA	SD	351	351	120		265
7	G3YZN	SX	315	315	80		265
8	G3BRK	KT	237	224	104	9	260
9	G3LRS	LR	227	227	72		230
10	G8DYZ/A	SY	208	208	78		225
11	G8DWP	LD	196	196	92		270
12	GW3VKL	GN	195	195	68		252
	G8BHH/P	SE	861	861	133		317
	G8BQX/P	SX	764	764	164		357

Check logs were received from G8BXI/P and G8DXD/P.

1970 144MHz Fixed Station Contest Results

This contest was run on 6 December 1970 in average to poor conditions. Despite this, as usual, some good dx was worked, the best being G8BBB's contact with DK2AM at EN41G. This, and other good contacts, put Roger into first place with a total of 334 points, closely followed by G8BCL with 302 points. In third place was G8CUL with 190 points.

It is becoming increasingly obvious that any station hoping to do well in a contest will have its chances greatly enhanced by having ssb facilities on 144MHz. Despite the superiority of cw for weak-signal working, the facts of life are that ssb activity is far higher than cw, especially in the countries of Western Europe. It is also increasingly advantageous to use vfo-controlled transmitters when Continental working is attempted since this also appears to have obtained far greater acceptance there than in the UK.

It is interesting to note the trends in the active devices used in receiver rf stages: In this contest 22 per cent were valves (mainly nuvistors), 22 per cent bipolar transistors, and 56 per cent were FETs—both junction and insulated gate type.

Posn	Callsign	Score	Contacts	Pwr	Rx rf stage*
				a.m. 120 i/p	TIS88(F)
1	G8BBB	334	93	ssb 400 o/p	
2	G8BCL	294	60	35	TIS88A(F)
3	G8CUL	190	60	30	TIS88A(F)
4	G3SXK	181	59	100	2N4416(F)
5	G3TDH	176	79	12	2N5245(F)
6	G5UM	170	62	40	6CW4(V)
7	G8OHH	157	59	90	TIS34(F)
8	G3ILO	151	66	10	6CW4(V)
9	G8AXZ	148	76	150	2N4060(F)
10	G3UKV	146	55	30	Mosfet
11	G2AMV	145	60	25	TIS88A(F)
12	G3NYY/A	137	93	50	6CW4(V)
13	G8BQX	131	45	25 o/p	TIS88A(F)
	G8CKT	131	92	60	TIS88A(F)
15	G3ZMD	130	56	8	AF139(B)
16	G8BXX	129	78	45	6CW4(V)
17	G8CUT	127	51	45	2N5486(F)
18	G8DKN	124	54	45	TIS34(F)
19	G8DBW	121	55	140	2N3823(F)
20	G3RAF	118	51	110	Nuvistor(V)
21	G3WHK	113	79	12	6CW4(V)
	G8DTA	113	48	30	TIS88(F)
23	G8BWW	107	44	20	6CW4(V)
24	G8ASR	105	73	30	40602(F)
25	G2WS	103	39	70	Nuvistor(V)
26	G3ZMF	101	61	30a.m. 45cw	—
27	G8COA	94	54	25	BF180(B)
28	G8DMY	91	42	6	BF180(B)
29	G8AZU	90	68	5	3N140(F)
30	G2XV	86	39	100	EC88(V)
31	G8AUN	85	32	70	6CW4(V)
	G8BPN	85	71	25	—
33	G8CHC	83	41	70	TIS88(F)
	G3YED	83	47	10	40603(F)
	G8DJF	83	62	150	BF180(B)
36	G3THY	81	62	114a.m. 150cw	FET
	G3YZS	81	49	90	AFZ12(B)
38	G8CCH	73	37	12	40600(F)
39	G8CXK	70	42	30	AF239(B)
	G3XFW	70	29	12	BF180(B)
41	G8EGS	69	29	9	40603(F)
	G3XKT	69	38	24	AF139(B)
43	G3YPP	68	40	10	AF139(B)
	G3AKF	68	32	80	TIS34(F)
45	G8BKR	66	38	15	6CW4(V)
	G8DJU	66	52	30	40603(F)
47	G8BWF	64	36	40 (peak)	AF239(B)
48	G8COK	62	32	10	TIS88A(F)
49	G3WTX	59	21	28	3N140(F)
50	G8CEA	58	47	25	2N4416(F)
51	G8DLZ	57	22	25 60a.m.	2N5245(F)
	G8AJC	57	26	80ssb	2N5245(F)
53	G8DEN	55	27	35	2N5245(F)
54	G8CRN	54	30	40	TIS34(F)
55	G3LCH	53	41	10	Mosfet
56	G8BXJ	52	30	30	2N4416(F)
	G6CMU	52	27	16	2N3819(F)
58	G8BDM	51	35	30	—
59	G8AWA	49	21	12	AFZ12(B)
	G3YGD	49	17	30	2N5245(F)
61	G3XUS	45	21	45	40602(F)
62	G8EDK	41	23	25	TIS88A(F)
63	G8DQZ	39	37	15	AFZ12(B)
	G8DMA	39	23	15	BF180(B)
65	G8CXQ	37	27	3	6BA6(V)
66	G8CDW	32	28	24	6CW4(V)
67	G3YZN	29	15	4	40602(F)
68	G8CBZ	26	10	28	GM0290(B)
69	G8DOM	16	14	10	E88CC(V)
70	G8BYK	10	10	7	E88CC(V)
71	G2AVC	8	8	45	EF91(V)

Check logs received from: G2HH, GM3WOJ/A, G8CKC, GW3XAD/P, GW3UCB/P, BRS32123.

Disqualified: G3IAR (no cover sheet), G8CVD (entries sent to wrong address), G8BRT (entries sent to wrong address), G8CUO (late entry).

*F — fet, B — bipolar, V — valve.

April 1971 70MHz Open Contest Results

It is not unusual for the high scoring stations to consider conditions good and the rest of the entry poor to average. This contest was no exception. An interesting entry was G3NNG who was using full power with a transistor transmitter, the only other transistor transmitter was used by G3DDQ. GM3RLE/P provided many with their best dx. GM3RLE/P was the only station to report arctic weather with ice forming on the aerial installation.

The leading stations in each section and the runners-up in sections A and C will receive awards.

B.D.A.A.

SECTION A

Posn	Callsign	Score	QSOs	County	Pwr	Aerial	Best dx (km)
1	G3OHH	537	87	SD	50	4	295
2	G3VPK	345	67	EX	50	4	480
3	G3TDH	339	82	BD	42	4	442
4	G3LAS	281	62	HF	40	4	484
5	G3DOV	260	38	NK	25	—	—
6	G6HD	248	72	KT	35	4	506
7	G3EKP	176	42	LE	18	4	350
8	G3VIR	175	51	SY	17	6	—
9	G3WWF	154	22	YS	25	3/3	320
10	GD2HDZ	136	19	IM	40	—	—
11	G3COJ	134	25	BS	40	4	450
12	G5UM	126	24	LR'	24	3	340
13	G3HBG	100	29	SY	30	4	290
14	G3RDQ	97	26	BS	2	4	214
15	G3REP	91	23	GR	30	—	—
16	G3XMG	75	30	LE	50	4	218
17	G3VEB	40	15	CH	12	4	252

SECTION B

Posn	Callsign	Score	QSOs	County	Pwr	Aerial	Best dx (km)
1	G3QXD/A	462	81	WR	40	4	—
2	G3XEP/A	333	51	YS	15	6	335
3	G3NNG	307	55	BE	50	4/4	427
4	G3BRK	246	77	KT	15	—	—

SECTION C

Posn	Callsign	Score	QSOs	County	Pwr	Aerial	Best dx (km)
1	GW3UCB/P	783	116	DB	50	6	348
2	GW4ABR/P	696	96	MG	40	—	325
3	GM3RLE/P	611	54	LK	25	4	—
4	GW8ONP/P	599	82	RN	40	4	364
5	G3FDW/P	473	55	WD	22	6	447
6	G3TDM/P	347	84	BS	15	4	360
7	GW8NWR/P	343	73	FL	25	4/4	—
8	G3FZL/P	260	80	SY	25	—	—
9	G5PI/P	251	50	CE	8	4	—
10	G3VPF/P	223	25	DT	25	4	287
11	G3XUS/P	204	53	SX	25	4	320
12	GM3SJX/P	134	17	AY	20	—	—
13	G2WS/P	110	16	ST	9	3	448

LISTENERS

	Score	QSOs	County	Aerial	Best dx (km)
BRS28005	202	44	SX	3	380
BRS15882	101	36	LD	3	—
BRS30386	25	19	SY	—	—

Check logs from GW3ITZ, G3KSU/P, G3VPS/M.

1971 432MHz Cumulative Contest Results

The entries in the 1971 Cumulative Contest showed a small, but encouraging, increase over 1970, with 28 stations submitting logs for three or more activity periods. The staggering of the sessions through the week, which was begun last year in an endeavour to please the majority, remained popular, although it must be recorded that there are at least two entrants who would like to see a return to weekends only.

While several competitors were unable to obtain the standard log sheets and 427s owing to the postal dispute, and a number of entries were received after the extended deadline, no points have been deducted on these counts. Actual logging errors were few and barely affected the positions as determined by contestants' claimed scores. Some stations claimed their total from more than three sessions, and one obviously sent his QRA incorrectly as being 150km east of his true QTH, but with these exceptions, the final and claimed scores rarely differed by more than two per cent.

Conditions for each of the five sessions were no better than might be expected for the time of the year, and only five stations reported their best dx further than 200km. At least six stations braved the rigours of a /P site in winter for the hope of gaining an advantage, but as only two such stations submitted entries it must be presumed that the effort did not pay off.

First place went to M. J. Sneap, G3ZYC (ex G8AUE), who operated from a fixed site 18km north of Derby for each of the five sessions. G3ZYC's winning total was obtained from the second, third and fourth sessions.

The runner-up was D. Cannings, G8BGC/P, whose claimed score from sessions one, two and three actually equalled that of G3ZYC. G8BGC operated from a site on the Berkshire Downs which was shared with another competitor for a large part of the event. Both the winner and runner-up are to be congratulated on their success. G8ATK, with the greatest number of contacts, achieved third place.

The check logs received from G3HVI, (claimed score 70 from one session); G8ADP/M, (claimed score 15 from two sessions); G8CRN, (claimed score 4 from two sessions); and G8DLX, (no claimed score, five sessions) are gratefully acknowledged.

G2HIF.

Posn	Callsign	Points	QSOs	Best dx	km
1	G3ZYC	172	68	G3LTF	180
2	G8BGC/P	169	63	G3ZYC	173
3	G8ATK	159	69	G8ATS	160
4	G3EHM	151	53	G3LTF	180
5	G8APZ/P	139	60	GW8AWS/P	226
6	G3PTM	133	48	GD2HDZ	267
7	G5UM	118	48	GW8AWS/P	160
8	G8AMG	112	68	G3NNG	110
9	G8PMX	107	41	G8AWS/P	280
10	G8ADC	105	49	G2FNW	103
11	G3XEB	102	42	GW8AWS/P	260
12	G8ABI	100	42	G3NEO	110
13	G8BWO	98	39	G8ATS	168
14	G3OHH	95	36	G8ATS	195
15	G3COJ	87	57	GW8AWS/P	220
16	G8BQH	86	64	G8BBB	105
17	G8AVC	85	67	G8BYV	194
18	G8BIL	73	34	GW8AWS/P	120
19	G8CIT	70	54	G8BBB	110
20	G8AZU	62	50	G3NNG	86
	G8CXH	62	32	G8CKX/P	190
22	G8BXC	51	31	G3NNG	120
23	G2WS	39	27	G3ZVC/P	77
	G8ACJ	39	27	G8ADC	68
25	G3WJG	30	30	G8ATK	48
26	G8BKR	29	33	G3ZVC/P	53

First 1971 1·8MHz Contest Results

The postal strike was responsible for the much reduced entry in this contest. Although the deadline for entries was extended to cover the four weeks following the end of the strike, only 35 entries were received, although activity was on a level with last year's event.

However, the low entry in no way detracts from the win by Tom Boucher, G3OLB, whose capture of the Somerset Trophy was made with the help of a home-brew rig, a three-quarter wave aerial at 60ft, an Eddystone 750 and 123 QSOs. Peter Lamb, G3VRW, only five points behind in second place, used a 6BW6 pa, 250ft end-fed and a HE80 receiver. Third place was taken by Bill Luke, GW3XJC.

The Maitland Trophy goes this year to J. Christie, GM3FXM, whose scores in this and the 2nd 1970 1·8MHz Contest totalled 1,225 points. The runner-up was GM3UKG with 1,032 points.

Conditions were quite good, although entrants noticed a considerable drop in activity during the last two hours of the contest. G3WTA commented on the lack of activity from the North of England which made the going difficult. A comparison of the logs of G3OLB in Bristol and G3VRW in Burnley, Lancs, shows that they each worked virtually the same number of stations in different areas of the UK. Local and semi-local QSOs were concentrated in the first part of the contest, the more distant stations coming in better after midnight.

G3VRW would like the contest to begin an hour earlier to avoid the fall-off in activity towards the end. However, it is probably desirable to divide the contest either side of midnight in order to strike a balance between long and short skip conditions.

G3XOQ suggests dividing points by aerial height and length—an idea which would not, presumably, appeal to G3WTA who uses 700ft and a three-mile radial earth system!

As usual, logs were fairly diverse in their accuracy. One station lost over 100 points in checking—another, none at all! Many entrants commented that they were glad to hear so many new callsigns in the contest and one would hope that the new G4 plus 3s will be well represented in both the Summer and November contests.

Check logs from OK1HBT, OK1KRS, OK2PAW, OK3TQQ and OL0ANV—extremely useful in checking—are gratefully acknowledged.

Posn	Callsign	County	Score	Posn	Callsign	County	Score
1	G3OLB	GR	711	19	G3SKC	MX	420
2	G3VRW	LE	706	20	G3WSN	EX	399
3	GW3XJC	GN	650	21	G3XDY	LN	375
4	G3XTT/A	CE	611	22	G3XOQ	SY	368
5	G6BQ	KT	606	23	G3XZK	GR	333
6	G3YDX	CL	589	24	G3MGL/A	SX	312
7	G3HZL/A	MX	570		G3UQW	KT	312
8	G3PEK/A	CH	567	26	G3XWZ	NM	294
9	G3YUV	DH	541	27	G3FJE/A	BD	273
10	GM3FXM	FE	529	28	GM3YOR	FE	255
11	G3WTA	ND	527	29	GW3GWX	CV	242
12	G3TIR	SX	503	30	GW3JI	CV	204
13	G3XSV	MX	483	31	G3VLX	KT	200
14	GM3UKG	BF	482	32	G3IGW	YS	168
15	G3TR	SY	480	33	G3LDB	LN	160
16	G3SAK	HF	462	34	G3LCH	LD	150
17	G3TUX	MX	436	35	G3XRH	WR	60
18	G8AB	EX	435				

Contests calendar

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 May 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)
27 June—DF Qualifying Round—Grimsby (Rules in this issue)
3-4 July—Summer 1·8MHz
3-4 July—144MHz Open (Rules in May issue)
3-4 July—144MHz Listeners Contest (Rules in this issue)
10-11 July—HP FD (Rules in March issue)
18 July—432MHz Open (Rules in May issue)
18 July—432MHz Listeners Contest (Rules in this issue)
18 July—DF Qualifying Round—Derby (Rules in next issue)
7-8 August—WAE CW
8 August—DF Qualifying Round—Salisbury (Rules in this issue)
9 August—144MHz SSB
15 August—70MHz CW
28-29 August—All-Asian CW
2 September—DF Qualifying Round—Dartford Heath (Rules in this issue)
4-5 September—VHF NFD (Rules in March issue)
4-5 September—IARU Region 1 VHF/UHF
11-12 September—WAE phone
12 September—80m FD
19 September—DF Contest Final
2-3 October—UHF/SHF NFD (Rules in this issue)
2-3 October—VK/ZL/Oceania phone
2-3 October—IARU Region 1 UHF/SHF
9 Oct-30 Dec—70MHz Cumulative
9-10 October—21-28MHz Telephony (Rules in May 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

Mobile Rallies Calendar

13 June	GW2OP's Bucket and Spade Party.
13 June	Elvaston Castle, Derby.
16 June	Swindon Mini Mobile Rally.
27 June	Echelford, Hanworth Airpark.
27 June	Anglian, Suffolk Show Ground.
27 June	Longleat Safari, Longleat House, Nr Warminster.
4 July	Cornish RAC, Truro.
4 July	South Shields.
11 July	Worcester, Upton on Severn.
17 July	Winchester, Family Outing.
18 July	Scarborough ARS.
8 August	Woburn Abbey.
15 August	Derby.
15 August	Torbay, Newton Abbot Rugby Ground.
22 August	Swindon, Wroughton Aerodrome.
29 August	Stratford-on-Avon.

RADIO AMATEURS' EMERGENCY NETWORK

by S. W. LAW, G3PAZ*

Summer already and the mobile rally dates mount up; since we cannot miss out on Woburn and its ancillary attractions, why not a Raynet section? The Raynet Committee has had this in mind for some time and efforts are being made to get something organized along these lines. The chairman would be glad to hear from any group with offers of help or practical suggestions. Details of what may be expected will be published in the August issue.

We were privileged recently to view some documentary films made some 20 years ago on 8mm stock by a well-known and long-established Raynet member in the South in connection with a certain well-organized body which carried out a number of most interesting exercises across wide tracts of country. Although these had no connection with radio, they reminded us that we in Raynet have little of a like nature to show to interested parties at the moment. However, since the very generous offer by committee member G3GJW to provide colour film stock for either slides or movies, may we hope that this summer will bring forth a spate of useful lecture material in order that the work we are prepared to do can be shown to the greatest number? Get in touch with G3GJW (QTHR) with your ideas, and do not forget to quote details of the apparatus you have available.

Group frequencies

The list of frequencies now being compiled by the indefatigable G3GJW is growing, but to date only just over half the groups in the UK have sent in full particulars of the frequencies used and for what purpose, so please send them in as soon as you can. In fact, do it now!

Incidentally, a word in your ears; do **NOT** use 70·125MHz. There is a very good reason for this request which we will not mention at this juncture. It would also be appreciated if the teletype frequency of 70·560MHz could be only employed for that purpose and not for cw or phone in any mode.

SE Controllers meeting

There was a keen attendance at the meeting of SE Controllers at RSGB HQ on Sunday 9 May, and much appreciation was expressed in connection with the Raynet Committee's suggestion for RAEN representation at the coming RSGB mobile rally at Woburn. The meeting, as always, was a very satisfactory session from all points of view, and another date is to be arranged for 7 November.

Registrations

The honorary registrations secretary suspects that the postal strike may have caused a number of members and controllers to overlook re-registrations which would normally have been sent in during that period. Could you be one of that number? Have a check-up; these things can be overlooked in such a case.

Raynet Committee

We must apologise for the error in announcing the date of the last meeting. It was tentatively arranged for the date printed and only later was it realised that there was a clash with the VHF Convention. Unfortunately the matter had gone to press before the correction could be made. The meeting, which took place on 24 April, was very well attended and it was a pleasure to see some faces round the table which, for reasons of health and so on, have been missed of late.

With 11 members present the discussion was brisk and purposeful. It was noted that certain Raynet exercises had been observed to clash with advertised contest dates; this was deemed to spoil the image and should be avoided except in genuine emergency. Noted also was the lack of information from certain areas where groups were reported to exist, yet repeated applications had failed to elicit a response. New registrations were 30 in the last period with 92 re-registering in addition.

The committee was in session for nearly five hours.

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

CLUB NEWS

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

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

REGION 1 — RR B. O'Brien, G2AMV

Merseyside Luncheon Club—First Monday each month, 1230 for 1245pm, HMS *Landfall*. Please advise G3VQT or G2AMV beforehand if you wish to attend.

Ainsdale (ARC)—9, 23 June, 7 July, 8pm, The Morris Dancers, Scarisbrick.

Allerton (Liverpool) Scout ARS. North West Region—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)—Third Wednesday in each month with a discussion night on the first Wednesday, The Clarence Hotel, 176 Bradshawgate, Bolton. Secretary, G3ZQS.

Bury (B & RRS)—Second Tuesday in each month. 8 June (Postmortem on this year's RAE), 8pm, George Hotel, Market Street, Bury. Secretary, G3VVQ.

Carlisle (C & DARS)—Mondays, 7.30pm, 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 start with a morse class, main feature at 8pm.

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

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

Douglas (D & DARS)—Second and fourth Wednesdays in each month, 7pm, Douglas Holiday Camp, Victoria Road, Douglas, IOM. Secretary, J. Parnell, Upper Crankbane Farm, Quines Hill, Port Soderick, Braddan, IOM.

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

Leyland Hundred (LHARG)—Net nights: Thursdays at 2000gmt on 1,915kHz. Saturdays at 1900gmt on 145·8MHz.

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

Liverpool (NLRC)—4, 18 June, 2 July, 8pm, Labour Party HQ, 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)—Fridays, 8pm. 4 June (Open night at new club QTH), 11 June (Talk by winner of home-built equipment contest), 18 June ("Construction of ssb and cw crystal filters", by W. L. Seddon, G3VIW), 25 June ("How to pass the RAE", by B. Cross, G3ZBZ). Meetings now at new QTH, Sale Moor Community Centre, Norris Road, Sale. The vhf section of the club (G3UHF), meets on Mondays at the club shack, "Greeba", Shady Lane, Manchester 23.

Manchester University (ARS)—G3VUM is hoping to have its quad working by October for "Freshers week", a KW2000A is usually on the air in the lunch hour. Prospective members are invited to contact G3ZNS or G8BVF for further details.

Preston (PARS)—10, 24 June, 8 July, 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 MPT engineers who meet on Wednesdays, 6pm, 8th floor (river end) Dial House, Chapel Street, Salford 3. Further details from secretary at same address.

Stockport (SRS)—Second Wednesday in each month—discussion night. Fourth Wednesday in each month—lecture night. 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—The club is giving up its room in Milnthorpe, meetings are to be arranged in Kendal. Further details from Ted Goonan, Longridge, Storth, Milnthorpe.

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 A. Fisher, G3WSD, 34 Glenmore Road, Oxton, Birkenhead.

Wirral (Wirral DX Association)—Last Thursday in each month at members' homes. Further details from J. Share, G3OKA, 219 Prenton Dell Road, Prenton, Birkenhead.

REGION 2 — RR K. Sketheway, BRS20185

Barnsley (B & DARC)—11 June ("Aerials and transmission lines", by H. Taylor, G3NAH), 25 June (Ladies night), 7.30pm, King George Hotel, Peel Street, Barnsley. *G3LRP.*

Bradford (BRS)—5, 6 June (NFD), 15 June (What went wrong?), 29 June (H. Moore, G3WVD), 6 July ("Power supplies", by A. Petts, G3PXF), 7.30pm, 10 Southbrook Terrace, Great Horton Road, Bradford 7.

Durham (DCARS)—3 June (NFD final preparations), 17 June (Summer junk sale), 7pm, Room 146, Durham University's Elvet Riverside Block, New Elvet, Durham City.

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

Halifax (NHARS)—Alternate Wednesdays, 7.45pm, Peat Pitts Inn, Ogden, Halifax. At the recent AGM the following officers were elected: chairman, G. Theasley, G8BMI; secretary/treasurer, A. Robinson, G3MDW; minute secretary, L. L. Cobb, G3UI; and committee members A. D. Benn, G8AFV, G. Fuller, G3TFF, P. Allen, G3USH, P. Sheard, G3YCJ, H. F. Bottomley, G8BCL. *G3MDW.*

Hartlepool (HARC)—Every Monday, 7.30pm, Middlegate Room, Borough Building, Hartlepool. At a recent meeting members were given a lecture by Prof J. B. Harding, G3JYH, on navigation ancient and modern. A vote of thanks was given by "Jonty" Thompson, G3KQU. Visitors are always welcome. *S. Clements, BRS7323.*

Hull (H & DARS)—4 June (NFD preparation), 5, 6 June (NFD), 11 June ("Converting 405 to 625 with dx tv in mind", by G3SSA), 18 June (Swl night. Basic amateur radio), 25 June ("Fault finding", with G3AGX and G3SSA), 7.45pm, 592 Hessle Road, Hull. RAE classes every Friday, 9.30pm. *M. E. Longson.*

The **North Leeds ARC** meets every Tuesday evening, and is active on 2m with the callsign G3ZIS. Secretary: Trevor Brown, G8CJS, 12 Hollin Hill Drive, Leeds LS8 2PW.

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

Scarborough (SARS)—Thursdays, 7.30pm, c/o RAF Association, 3 Westover Road, Scarborough. Secretary J. Cutler, G3VAN. *G8KU.*

Sheffield (SARC)—Meetings now held on the third Monday in each month. 21 June ("Mobile", by G3JMV) 8pm, Sheaf House Hotel, Bramall Lane, Sheffield. President, G8NN; treasurer, G3JMV; secretary, Cliff Kilvington, G8EPH, 658 Stannington Road, Sheffield S6 6AE. *G8NN.*

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

Spen Valley (SVARS)—3 June (Satellite communications), 10 June (Demonstration of marine models on Batley Park Lake), 17 June (Open meeting), 24 June ("What's new?", by S. Marsden of West Riding Electronics Ltd), 1 July (AGM), 7.30pm, The Grammar School, Heckmondwike. *G8DSB.*

Sunderland (SARS)—Meetings on the first and third Tuesdays in each month, 7pm, Sunderland Polytechnic. *G3XID.*

Tyneside (TARS)—In June the club is hoping to start a weekly meeting instead of the present second and fourth Mondays in each month, it also hopes to provide theory courses and slow morse for beginners and juniors. The following officers were elected at the recent AGM: chairman, M. Morey, G8BXF; vice-chairman, C. Morgan, G3ZTJ; secretary, G. Lowdon 21 Winifred Gardens, Wallsend; assistant secretary, L. Dixon, G3XXQ; treasurer, B. Baker, G3NIJ; assistant treasurer, S. Metcalfe; hf representative, N. Hay, G3ZWR; vhf representative, N. Carrick, G8DAZ; swl representative, J. Hunter, G3YFJ.

REGION 3 — RR R. W. Fisher, G3PWJ

Special regional events:
19 June, Midland VHF Assembly and Dinner, Oldbury, Nr Birmingham. For further details contact Mr G. Badger, G3OHC, telephone 021 308 2512. 11 July, Upton-upon-Severn Mobile Rally, organized by Worcester and District ARC, Hill County Secondary School, Upton-upon-Severn. *G3WUI.*
22 August, Bromsgrove ARC Mobile Picnic, Avoncroft Museum of Buildings, Stoke Prior, Bromsgrove.

Birmingham (MARS)—4 June (Natter night), 15 June, 8pm, Midland Institute, Margaret Street, Birmingham 3.

Bromsgrove (B & DARC)—11 June (Talk and demo on electronic calculators by K. Stanton), The Royal Oak, Barley Mow Lane, Catshill. 12 June (Second round of inter club quiz at Worcester DARC).

Dudley (DARC)—8. 22 June, 8pm, Central Library, St James' Road. *G3PWJ.*

Lichfield (LARS)—First Monday and third Tuesday in each month. 3 July (Club station), at Uttoxeter Carnival, The Swan Hotel, Lichfield. *G3UUN and G3ZIF.*

Redditch (RARC)—10, 24 June, Old People's Centre, Park Road, Redditch. Members are constructing a HW 100 at the moment. *G3EVT.*

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

Stourbridge (S & DARS)—First Tuesday of each month, Longlands School, Stourbridge. For details of meetings contact the secretary, D. Robins, 36 Wolverley Avenue, Wollaston.

Sutton Coldfield (SCRS)—14 June (Film night), 25 June (Visit to PO Tower), 28 June (Natternite), Clubhouse, Sutton Town Football Club, Coles Lane. *G8CZM.*

Telford (WARS)—Every Wednesday, 8pm, Ketley Bank Youth Club, Main Road, Ketley Bank, Telford. *G3UKV.*

Wolverhampton (WARS)—7 June, 8pm, Neachells Cottage, Stockwell End, Tettenhall.

Worcester (W & DARC)—Third Saturday in each month, Crown Hotel, Broad Street. *G3WUI.*

REGION 4 — RR T. Darn, G3FGY

Burton on Trent (BARS)—9, 23 June (Df practice nights). Transmissions are on 1·910MHz commencing at 7.30pm until 9.30pm. The hidden station will be within a seven-mile radius of Walton on Trent Church.

Derby (DADARS)—5–6 June (NFD, operation from Blagraves Lane, Littleover, everyone welcome), 9 June ("Receiver Alignment" demonstration), 16 June (Df practice night), 19 June (Dinner and dance at the Regency Rooms, Ilkeston, 7.30pm. Tickets £1.50 from G3FGY or G2CVV), 23 June (Proposed visit), 30 June ("Mobile antenna" lecture). All meetings commence at 7.30pm at the clubroom, 114 Green Lane, Derby. Visitors are always welcome.

Derby (NHCAARG)—6 June (Df practice run), 11 June (Preparations for mobile rally), 13 June (Second Mobile Radio Rally at Elvaston Castle), 18 June (Film show, G3ALA), 23 June (Film "Ring of bright water"), 25 June (Quiz).All meetings commence at 7.30pm in Room 7, Nunsfield House, Boulton Lane, Alvaston, Derby. *G3WFU.*

Chesterfield (CADRS)—Meetings held every Wednesday evening, 7pm to 10pm, Zion Methodist Church, Chatsworth Road, Chesterfield.

Grimsby (GARS)—10 June (Df hunt), 24 June (Visit—to be arranged). *G8DEN.*

Leicester (LRS)—Meetings every Sunday at 10.30am; every Wednesday at 7.30pm.

Lincoln (LSWC)—Meetings every Tuesday, 7.30pm, Club HQ, No 2 Guardroom, Sabraon Barracks, Breedon Drive, off Burton Road, Lincoln.

Newark (NARCS)—General meetings held on the first Friday in each month, 7.30pm; informal meetings held every Tuesday, 7pm. Both take place at the Newark Technical College. Further information from G3YCT, telephone Southwell 2377.

Nottingham (ARCON)—Meetings held every Thursday, 7.30pm, Sherwood Community Centre, Mansfield Road, Nottingham.

REGION 5 — RR S. J. Granfield, G5BQ

Bedford (B & DARC)—Club meets on Thursdays at the "Dolphin", Broadway, Bedford. An NFD station will be operating from Cranfield Aerodrome. Secretary, John Bennett, G3FWA, 47 Ibbett Close, Kempston, Bedford.

Cambridge (C & DARC)—Fridays. 4 June (NFD preparation), 11 June (NFD post-mortem), 18 June (Informal), 25 June (Mobile/portable contest), 2 July (Results of contest). Club HQ, Corporation Yard, Victoria Road, Cambridge. Secretary, Dennis Unwin, G8CKU, 11 Carlton Rise, Melbourn, Royston.

Luton (George Kent ARS)—Sad news from this club. The hon secretary and several other members have been made redundant, so the future is uncertain at present. Hard luck, chaps. We hope for better news from you before long.

Shefford (S & DRS)—Thursdays. 3 June (NFD preparation and quiz), 10 June (NFD post-mortem and financial report), 17 June (Df hunt), 24 June (Morse quiz). Club meets at Church Hall, Ampthill Road, Shefford, Bedford. Secretary, A. Sullivan, G2DGF, 12 Glebe Road, Letchworth.

Stevenage (S & DARS)—Meetings held on the first and third Thursdays in each month. Full details are available from F. Collett, G3OVT, 8 Silam Road, Stevenage, Hertfordshire.

REGION 6 — RR L. W. Lewis, G8ML

Cheltenham (RSGB Group)—First Thursday in each month, 8pm, "Royal Crescent", Clarence Street, Cheltenham. *G2FWA.*

Oxford (O & DARS)—Second and fourth Wednesday of each month, held at 7.30pm in the Cherwell Hotel Clubroom, Watereaton Road, North Oxford. For further details contact the secretary, D. R. Ward, Tel. Oxford 47771.

South Bucks VHF Club—6 July, talk on test equipment. 8pm at Bassetsbury Manor, High Wycombe.

REGION 7 — RR P. A. Thorogood, G4KD

Acton, Brentford & Chiswick (ABCRC)—15 June (The G3CCD 2m transceiver), 7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick.

Addiscombe (AARC)—Second and fourth Tuesdays, 8pm, Prince George Hotel, High Street, Thornton Heath.

Ashford, Echelford (ARS)—Second Monday and last Thursday in each month, 7.30pm, St Martin's Court, Kingston Crescent, Ashford, Middx.
Barking (BR & ES)—Thursdays. 10, 11 July (Exhibition station at the Dagenham & Barking Town Show), Meetings at 7.30pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking. The first issue of the society's journal was published recently; called *Carrier*, it incorporates nine pages of information. The editor is G3FZP, 223 Salisbury Avenue, Barking, Essex.
Bexleyheath (NKRS)—Second and fourth Thursdays, 7.30pm, Congregational Church Hall, Chapel Road, Bexleyheath.
Cheshunt (CDRC)—First Friday in each month, 7.30pm, Methodist Church Hall, opp Theobalds Station, Cheshunt.
Chingford (RSGB Group)—Fridays, telephone 01-524 0308.
Chingford (SRC)—Fridays, 8pm, Friday Hill House, Simmons Lane, Chingford E4.
Croydon (SRCC)—Third Tuesdays, 7.30pm, Swan & Sugarloaf, South Croydon.
Crystal Palace (CP & DRC)—19 June ("Components and materials", part 2, by G3SBV, G3OOU and G3XFT, 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.
Edgware & Hendon (E & DRS)—Second and fourth Mondays, St George's Hall, 51 Flower Lane, Mill Hill, NW7.
Farnham, Bucks (Burnham Beeches RC)—Fortnightly on Mondays. 17 June (Thomas Grey Exhibition, special station GB3TG from Stoke Poges), 1 July ("Rtty", by G3UHK), 17 July (Junk sale), 7.30pm, Buffaloes Hall, Victoria Public House, Victoria Road, Farnham Common. The club will this year support HF NFD, operating from theWalter Davies Camp Site.
Gravesend (GRS)—Mondays, 8pm, Northfleet Recreation Centre, Springfield Road, Northfleet, Gravesend.
Greenford (GARS)—11, 25 June, 7.30pm, Greenford Community Centre, Oldfield Lane, Greenford.
Guildford (G & DRS)—Second and fourth Fridays, Guildford Engineering Society, Stoke Park. At the recent AGM, Peter J. Hopwood, G8CQM, was elected hon secretary.
Hampton Court (TVARTS)—First Wednesday in each month, 7.30pm, The Three Pigeons, Portsmouth Road, Surbiton.
Harlow (DRS)—Tuesday (General and cw practice); Fridays (Junior), 7.30pm, Mark Hall Barn, First Avenue.
Harrow (RSH)—Every Friday. 4 June (Practical), 11 June (Junk sale) 18 June (Practical), 25 June (Talk), 8pm, Harrow County School for Boys, Sheepcote Road, Harrow.
Havering (H & DARC)—Fortnightly, 8pm, British Legion House, Western Road, Romford.
Hemel Hempstead (HH & DARS)—First and third Fridays, 7.30pm, "Addmult" Sports Club, Hemel Hempstead.
Holloway (GRS)—Mondays (RAE, 7pm; Wednesdays (Morse), 7.30pm, Fridays (Club), 7.30pm, Whittington School, Archway School Annexe, Highgate Hill, N19.
Ilford—Every Thursday, 8pm, 50 Mortlake Road (off Ilford Lane), Ilford.
Kingston (K & DARS)—Second Wednesday, 8pm, Penguin Lounge, 37 Brighton Road, Surbiton.
Loughton—Fortnightly on Fridays, Loughton Hall, Rectory Lane, (near Debden station).
New Cross (CARS)—Second and fourth Fridays, 8pm, 255 New Cross Road, SE14.
Paddington (P & DARS)—Wednesdays, 8pm, Beauchamp Lodge, 2 Warwick Crescent, W2.
Purley (P & DRS)—First and third Fridays, 8pm, Railwaymen's Hall, side entrance, 58 Whytecliffe Road, Purley.
Reigate (RATS)—First Wednesday in each month, 7.45pm, George and Dragon, Cromwell Road, Redhill.
Romford (R & DRS)—Tuesdays, 8.15pm, RAFTA House, 18 Carlton Road,
Scouts (ARS)—Third Thursday in each month, 7.30pm, Baden Powell House, Queensgate, South Kensington, SW7.
Sidcup (CVRS)—First and third Thursdays. 17 June (Natter nite), 8pm, Congregational Church Hall, Court Road, Eltham, SE9.
Southgate (SRC)—Second Thursday in each month, 7.30pm, Civil Defence Hut, Bowes Road, N11.
St Albans (Verulam ARC)—16 June (Peter Balestrini, G3BPT, will desoribe the Port of London telecommunication system, to be held at the Council Chamber, St Albans Town Hall), 2 June (Informal meeting at Salisbury Hall, London Colney. Rex Browne, G3MMJ, of Garex Electronics will show their products).
Sutton & Cheam (SCRS)—Third Tuesday in each month. 15 June (NFD inquest and junk sale), 8pm, The Harrow Inn, High Street, Cheam.
Welwyn (Mid-Herts ARS)—Second Thursday in each month. 10 June (Lecture and discussion on direct conversion receivers), 8pm, Welwyn Civic Centre, Welwyn.
Wimbledon (W & DRS)—Second and last Fridays in each month, 8pm, St John Hall, 124 Kingston Road, South Wimbledon, SW19.
Wembley (GECARS)—Thursdays, 7pm, Sports Club, St Augustin Avenue, North Wembley. (This club is open to non-GEC employees by invitation. Telephone D. Evans, G3RPE, 01-904 1262 for details).

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

The committee and members of **Thanet Radio Society** wish to thank the anonymous donor of £10 to club funds.
Canterbury (EKRS)—24 June (SSB Part 2, by G3MDO), 22 July ("Electronic Clock", by G3WAW), 19 August ("Phase lock oscillators", by G8AJC).
Brighton (BTCRC)—7 June (G3TCB on the air), 21 June ("Integrated circuits" slide lecture by G3SKI), 24 June ("Clayton Windmills" with Mid-Sussex), 28 June (G3TCB on the air).
Mid-Sussex (MSARS)—17 June (Sale of surplus equipment), 24 June (Mobile evening at "Clayton Windmills").
Eastbourne (SRAS)—Meetings held on the first Monday in each month at Victoria Hotel, Latimer Road, Eastbourne.
Worthing (W & DARC)—Meetings held every Tuesday at "Rose Wilmot Youth Centre", Littlehampton Road, Worthing.
Maidstone (MYMCAARS)—Meetings held every Friday, 'Y' Sports Centre, Melrose Close, Loose, Maidstone. Details of meetings from G3WXL, QTHR.
Dover (SEKYMCAARC)—Meetings held every Thursday 7.30pm, YMCA, Leybourne Road, Dover.

REGION 9 — RR J. Thorn, G3PQE

Sunday, 19 September is the date, Weston-Super-Mare's new technical college is the venue, the Regional Meeting is the occasion, and it is hoped that many members will gather to make it a great success.

Bristol, City & County (BARC)—Tuesdays and Thursdays. 15 June (Visit to the Bristol United Press Building), 24 June (Home constructed equipment evening), Club HQ, G3TAD, 41 Ducie Road, Barton Hill, Bristol 5. *G3RKH,*
Bristol RSGB Group (RSGB)—28 June ("Air traffic control", by G. Booth, G3HKA), 27 June (The group's big day of the year event, Longleat Mobile Rally on the usual site in beautiful Longleat Park. Helpers are always required, and the earlier the better. Bring your surplus gear and put it up for sale on the group's junk stall (with a full description of what it is and does, on a display card). Bring your family and make a pleasant day out for all and meet your fellow amateurs in a personal QSO. Offers of help to, and details from, G3PQE/G3ULJ/G8AGT. Next group meeting is the home-constructed equipment evening; get your projects ready. *G3ULJ.*
Shirehampton Club—Every Friday, 7.30pm, Twyford House. *G3SXY.*
University of Bristol—Every Saturday afternoon, Dept of Physics, Royal Fort, Tyndall Park Road, Bristol. *G8ADP.*
Exeter (EARS)—Meetings held on the first Tuesday in each month (Station working night); second Tuesday in each month (General meeting); third Tuesday in each month (RAE talks); fourth Tuesday in each month (Construction night), 7.30pm, Community Centre, St David's Hill, Exeter. A new secretary has been appointed: Mr A. W. Bawden, 232 Exwick Road, Exeter EX4 2BA.
North Devon (NDRC)—9 June (Technical topics), 23 June (Ragchew), "Grinnis", High Wall, Sticklepath, Barnstaple. *G4CG.*
Plymouth (PRC)..First and third Tuesdays in each month, Virginia House, Batter Street, Bretonside, Plymouth. *G3SPI.*
Torbay (TARS)—Every Tuesday and Friday. 26 June (Film show and NFD discussions), Club HQ rear of 94 Belgrave Road (Bath Lane), Torquay. *G3NQD.*
Weston-Super-Mare (WSMRS)—4 June (Meet at new technical college, discussion on NFD arrangements, then a visit to the site). *G3GNS.*
Yeovil (YARC)—Every Thursday, 3 June ("Elements of radio valve theory", RSGB tape lecture), 24 June ("My new rx", by G3XFW), 1 July ("VHF", RSGB tape lecture), 7.30pm, Park Lodge, Yeovil Youth Centre, Park Road. *G3NOF.*

REGION 10 — RR D. Thomas, GW3RWX

Blackwood (ARC)—It is tragic to have to report that at the time of writing these notes it is not possible to say when the club will again hold meetings. One of the oldest clubs in South Wales, Blackwood had its own headquarters building, which from time to time has been subjected to vicious vandalism culminating recently in the complete destruction of the building and its contents by fire. Since it was rather isolated and not continuously occupied, insurance was impossible, and the sympathy of all GW amateurs is extended. It is hoped to hold future meetings at the Oakdale Community Centre, and details are available from either G6BK or GW3TNG.
Barry College of Further Education (ARS)—Thursdays, 7pm, Barry College of Further Education, Colcot Road, Barry, Glam. *GW3VKL.*
Cardiff (RSGB Group)—14 June (Visit to BBC Studios, Broadway, Cardiff). It is hoped to revert to the normal meeting place, TA Centre, Park Street, Cardiff, in July, when extensive re-building and decorating work should have been completed. *GW3GHC.*
Glamorgan Raynet Group—Details of meetings and of excercise periods available from GW3ZFG, telephone Cardiff 62411.
Haverfordwest (ARS)—Tuesdays, 7.30pm, HQ, Rosemary Lane, Haverfordwest, Pembs. Club callsign GW3XCT. *GW3YBB.*
Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, Nr Merthyr, Glam. Secretary, Mr F. E. Tribe.
Port Talbot (ARC)..Second Tuesday in each month, 7.30pm, Trefelin Club & Institute, Trefelin, Port Talbot, Glam. *GW5VX.*
Pontypool (ARC)—Tuesdays, 7pm, Educational Settlement, Rockhill Road, Pontypool, Monmouth. Details of meetings during school vacation periods from GW3JBH.
Pembroke (ARC)—Last Friday in each month 7.30pm, Defensible Barracks. Pembroke Dock, Pembs. The annual GW2OP Bucket & Spade Party will be held on Sunday 13 June at the Regency Hall, Saundersfoot, Pembs. Ample car parking space and covered venue in case of rain. *GW3LXI.*
Sully & District Shortwave Club—Tuesdays, 7pm, The annexe, Sully Bowls & Social Club, 59 South Road, Sully, Glam. Secretary, Mr Glyn Maggs, 3 Thorley Close, Cyncoed, Cardiff.
Rhondda (ARS)—Meets at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glam. The annual social held on 30 April was very successful, and was attended by members of most of the South Wales clubs, and zonal and regional representatives. *GW3PHH.*
Swansea Telephone Area (ARS)—Tuesdays. 1 June ("Receivers", part 1), 8 June ("Receivers", part 2), 15 June (Hi-fi demonstration), 22 June (Treasure hunt), 29 June (TV receivers), 7.30pm, Telephone Engineering Centre, Gors Road, Swansea. Secretary, Mr D. E. Connor, 7 Glanmon Road, Sketty, Swansea, Glam.
University College, Cardiff (ARS)—June will see the end of the activities for the session, and new students entering college in October should contact the secretary as soon as possible via the Students Union, Dumfries Place, Cardiff.
University College, Swansea (ARS)—Details of meetings from the secretary, Students Union, University College, Singleton Park, Swansea.

REGION 11 — RR P. H. Hudson, GW3IEQ

Bangor (B & DRC)—Meetings held on alternate Thursdays at a new location, the Drill Hall, Bangor. A net is active every Sunday on 3,700kHz at 1300. Anyone interested in radio is invited to contact B. V. Davies, GW8CGP, 15 Erw Faen, Tregarth, Bangor.
Bangor (UCNWARS)—Meetings on alternate Thursdays, 5.15pm, Small lecture theatre of the Engineering Dept, Dean Street, Bangor. Anyone coming to the university interested in radio is invited to get in touch with the secretary, G3UUT.
Conway Valley (CVARS)—The June meeting will be covered by the AGM, followed by a general natter at the Parade Hotel, Llandudno.
Rhyl (R & DARS)—Meetings held on second Thursday in each month, 7.45pm, Mona Hotel, Market Street, Rhyl.

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

Mr E. H. Ross, GM3LWS, has resigned as Area Representative for Fife following his posting abroad. Many thanks to Ted for his help in looking after Society affairs in the north of the region. Will any member in the locality interested in taking on this appointment please contact GM3OWU as soon as possible.

Berwick (BARS)—6 June (Mobile picnic). Details from C. H. Crook, G3YOG, 19 Matters Lane, Berwick, or G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick.
Edinburgh (LSR)—10 June (Radio controlled models), 24 June (AGM), 7.30pm, 66 Hanover Street, Edinburgh.
Glenrothes (GDARC)—First Sunday in each month, 7.30pm, Old Nursery Buildings, Leslie, Fife. Further details from K. Home, GM3YBQ, 14 Liss Way, Kirkcaldy.

REGION 14 — RR N. G. Cox, GM3MUY

Ayrshire (AARG)—6 June (NFD), 4 July, 29 August, 7.30pm, YMCA Howard Street, Kilmarnock.
Ayrshire (Ardeer Recreation ARC)—1, 3, 8, 10, 15, 17, 22, 24, 29 June, 7.30pm, Ardeer Recreation Club, Amateur Radio Section, Stevenston. Details from J. F. McCreight, GM3DJS, 70 Auchenharvie Road, Stevenston, Ayrshire.
Falkirk & District RSGB Group—25 June, 7.30pm, Temperance Cafe, Lint Rigg, Falkirk.
Glasgow University (GURC)—4 June, 7.30pm, George Service House, University Gardens, Glasgow, W2.
Greenock (G & DARC)—4, 11, 18, 25 June, 7.30pm, James Watt Library, Union Street, Greenock.
Mid-Lanark RSGB Group—18 June, 7.30pm, YMCA, Brandon Street, Motherwell.
West Scotland (ARS)—4, 11, 18, 25 June, 7.30pm, Royal Signals, Lowland HQ, 21 Jardine Street, Glasgow W2.
The **West of Scotland ARS** has now obtained its own premises at 81 Virginia Street, Glasgow, and meetings will be held at 7.30pm every Friday. Secretary: Ken McDermott, GM3SSB, 22 Fettercairn Avenue, Glasgow W5.

REGION 15 — RR J. Thompson, GI3ILV

City of Belfast YMCA Radio Club—Meetings on Wednesdays and Saturdays, 8pm, City YMCA (3rd floor), 12 Wellington Place, Belfast, BT1 6GE. Further details from YMCA general office. Five members of the club have now passed their RAE, and two of them have their morse as well. Two GI4s and a GI8 are in the pipeline as a result.

REGION 16 — RR W. J. Green, G3FBA

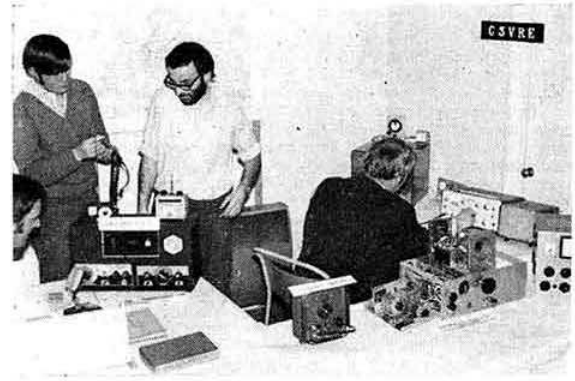
Club secretaries may like to note that the RR from time to time receives information on new members in the region. If they would inform him of the area that their particular club covers, details of new members will be forwarded as they become available. Mr Green's present address is Wilby Cottage, West End Avenue, Brundall, but will shortly change to 29 Oaklands, Old Buckenham. Attleborough, Norfolk.

Chelmsford (CARS)—First Tuesday in each month, 7.30pm, Marconi College, Arbour Lane, Chelmsford. *G3VCF.*
Haverhill (HDRS)—Alternate Wednesdays, 7.30pm, Leiston Hall, Community Centre, Clements Estate, Haverhill. *G3WQF.*

Lowestoft (L & DARC)—4 June (Slide show, by G. E. Grimmer, G3KGU), 18 June (Free evening), 8pm, YMCA, Park Road. Visitors are welcome. *G3GNK*.
Norwich (NARC)—The club recently elected the following officers: chairman F. A. E. Porter, G2CDX; secretary, J. L. Lockwood, G3XLL, 29 Coppice Avenue, Hellesdon, Norwich, NOR4 9M. G3XLL's telephone number is 35974 at present but changes to 48685 after 1 June. Programme details to be published.
Gt Yarmouth (GYRES)—Meetings temporarily suspended.

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

Basingstoke (BARC)—Meetings on the first Saturday in each month for morse practice and receiver operation. 19 June ("Radar", talk by Alan Stables), 7pm, Chineham House, Popley, Basingstoke. *G3CBU*.
Chippenham (CDARC)—1 June (Df hunt), 5, 6 June (NFD), 26 June (Display at Monkton Park). A new committee was elected at the AGM on 27 April. Secretary is now P. J. Tuck, 186 Edith's March, Bramham, Chippenham, Wilts.
N Berks (AERE, Harwell, ARC)—Meetings on the third Tuesday in each month, also informal meetings and junk sales every Friday lunchtime. 15 June, 7.30pm, Social Club, AERE Harwell, Didcot, Berks. *G3NNG*.
Reading (RDARC)—Club meets on alternate Tuesdays. 5, 6 June (NFD at Wargrave), 8 June ("The G3LFM transceiver", talk and demonstration by M. F. Taylor, G3LFM), 22 June (Construction competition, three awards), 25 July (Informal vhf picnic to be held near Ink Pen Beacons, 12 miles west of Newbury. A sketch map and further information is available from the secretary, 16 Three Firs Way, Burgh Field Common, Reading), 7.30pm, Victory Public House, Meadway Precinct, Tilehurst, Reading. *G3NBU*.
Swindon (SDARC)—2 June (Informal), 16 June (Mini-mobile rally at Barbury Castle, nr Swindon), 30 June (AGM), 7.30pm, Penhill Junior School, Penhill, Swindon. *G3JAP*.



At an exhibition in April to promote interest in local clubs and societies, the Chippenham Radio Club (G3VRE) ran a station in the town hall. This photograph shows the /A station with G3UTO on 160m and G3UUV operating the club's KW2000

Looking ahead

18 June—RSGB Dinner Club, Kingsley Hotel, London WC1.
25-27 June—IARC Convention, Geneva.
26 October—RSGB Lecture at the IEE.

RSGB SLOW MORSE PRACTICE TRANSMISSIONS

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

Clock time	Callsign	MHz	Town
Sundays			
1000	G3WNR	1·920	South Shields, Co Durham
0930	G3HZL	1·940	Isleworth, Middlesex
0945	G3YRO	1·860	Fareham, Hants
0945	G3USK	1·975	Mablethorpe, Lincs
1000	G2FXA	437·000 to north	Stockton-on-Tees
1015	G3CGD	1·875	Cheltenham
1030	G2FXA	437·000 to south	Stockton-on-Tees
1030	G3NPB	1·875	St Ives, Cornwall
1030	G3ZNW	144·520 to east	West Molesey, Surrey
1030 †	G3YPG / G3XOQ	1·965	Horley, Surrey / Redhill, Surrey
1100	G2FXA	1·900	Stockton-on-Tees
1100	GW3UMB	1·880	Colwyn Bay
1130	G3KKU	1·940	Liverpool
1130	GW3VPL	1·918	Porthcawl, Glam
1130	G3VVP	1·880	Plymouth Devon
1200	G3HVI	1·890	Stoke-on-Trent
1200	G3GNS	1·910	Weston-super-Mare
1330	G3FWW	1·880	Burnham-on-Sea, Soms
1330	G3XDV	1·910	Canterbury, Kent
1330	G3WDS	1·975	Carlisle
1400	G3XWQ	1·975	Canterbury, Kent
1400	G3XGJ	1·830	Huddersfield Yorks
1930	G3YFO	144·19 to south	Burnham, Bucks

† Alternately

Clock time	Callsign	MHz	Town
Mondays			
1800	G3SWR	1·980	Birmingham
1830	G3NCZ	1·920	Blackburn, Lancs
1830	G3RXH	1·910	Skipton, Yorks
1900	G3WGU	1·880	Bispham, Lancs
1900	GC2FMV	3·600	Jersey, CI
1900	G3YJA	1·920	Coventry, Warks
1900 †	G3WFY / G3YEI	1·850	Thornton Cleveleys, Fleetwood, Lancs
1930	G2ABC	144·050 omni-directional	Woodford, Essex
2000	G3XWZ	1·910	Mansfield, Notts.
2000	G3KAN	1·990	Northampton
2000	G3IBJ	1·910	Southampton, Hants
2000 †	G3WDW / G3VTY	1·915	Leeds, Yorks
2015	G3YMH	1·845	Wraysbury, Middlesex
2030 †	G3YEB / G3PRN	1·915	Harlow, Essex
2030	G3JHM	70·050	Worthing, Sussex

† Alternately

Clock time	Callsign	MHz	Town
Tuesdays			
1100	G3EBU	1·952	South Woodham, Essex
1800	G3XDV	1·910	Canterbury, Kent
1900 †	G3UFO / G3XAM	1·980	Wirral, Cheshire
1900	G3XWQ	1·975	Canterbury, Kent
1930	G3SWP	1·850	Doncaster, Yorks
1930	G3WGU	433·500 to south-east	Bispham, Lancs
1930	G3ZUM	144·144 to south	Iver Heath, Bucks
2000	G3TUW	145·200 to south-east	Banbury, Oxon.
2000	G3UPA	1·850	Meriden, Warks
2000 †	G3FAU / G3KSS / G3OVT	1·980	Stevenage, Herts
2000	G3FWW	1·880	Burnham-on-Sea, Soms
2000	G3WGD	1·860	Leicester
2000	GM3PIP	3·590	Mintlaw, Aberdeen
2030	G3HZL	1·845	Isleworth, Middlesex
2030	G3YMJ	1·915	Harlow, Essex
2030	G3RB	1·975	Whitley Bay, Nth'land
2045	GM3CRY	3·590	St. Andrews, Fife
2100	G4RS	1·865	Blandford, Dorset
2200	G3HZM	1·925	Manchester

† Alternately

Clock time	Callsign	MHz	Town
Wednesdays			
1830	G2FXA	1·900	Stockton-on-Tees
1900	G3YPZ	28·700	Harlow, Essex
1930	G3VVP	1 880	Plymouth, Devon
1930	G3WGU	433·500 to south-east	Bispham, Lancs
1930	G3YFO	144·19 to north	Burnham, Bucks
1930	G3UJD	1·825	Farnborough, Hants
2000 †	G3AJX / G3TWP / G3YSK	1·925	Winchester, Hants
2000	G8QU	1·970	London, N22
2000	G3JHM	70·050	Worthing, Sussex
2000	G3XGY	144.054	Weston-super-Mare
2015	G3UNV	1·845	Ashford, Middlesex
2030	G3KGU	1·915	Theydon Bois, Essex
2100	G3HVI	1·890	Stoke-on-Trent

† Alternately

Clock time	Callsign	MHz	Town
Thursdays			
1800	G3SWR	1·980	Birmingham
1830	G3VBP	3·590	Barry, Glam
1830	GW3UMB	1·880	Colwyn Bay
1830	G3NC	1·968	Swindon, Wilts
1900 †	G3WFY / G3YEI	1·850	Thornton Cleveleys, Fleetwood, Lancs
1900	G3WGU	1·880	Bispham, Lancs
1930	G3GNS	1·910	Weston-super-Mare
1930	G2ABC	144·740 omni-directional	Woodford, Essex
1930	G3ZNW	144·520 to north	West Molesey, Surrey
2030 †	G3SJE / G3GC	1·875	Harrow, Middlesex
2030	G3RSF	1·915	Harlow, Essex
2100	G4RS	1·865	Blandford, Dorset
2100	GW3XNI	1·930	Cresskeys, Mon

† Alternately

Clock time	Callsign	MHz	Town
Fridays			
1800	G3XDV	1·910	Canterbury, Kent
1830	G3NCZ	1·920	Blackburn, Lancs
1900	G3NPB	1·875	St Ives Cornwall
1930	G3PQF	1·825	Farnborough, Hants
1930	G3ZUM	144·144 to south	Iver Heath, Bucks
2000	G3EEL	1·980	Peterborough
2000	G3WGD	1·860	Leicester
2000 †	G3KEP / G3UCZ / G3WTF	1·910	Bingley, Yorks / Pudsey, Yorks / Bradford, Yorks
2015	G3SAZ	1·845	Ashford, Middlesex
2030	G3JHM	70·050	Worthing, Sussex

† Alternately

Clock time	Callsign	MHz	Town
Saturdays			
0930	G3UNV	1·935	Ashford, Middlesex
0930	G3YZZ	3·590	Maidenhead, Berks
1000	G3PLE	1·820	Stourbridge, Worcs
1100†	G3ZOQ / G3ZRE	28·350	Leyland, Lancs
1300	G2FXA	1·900	Stockton-on-Tees
1400	GC2FMV	3·600	Jersey, CI
1730	G3TNF	1·980	Gateshead
1930 †	G3ZEN / G3ZRR	1·915	Mitcham, Surrey / Thornton Heath, Surrey
2000	G3KPO	1·980	Peterborough

† Alternately

G3BZU morse proficiency transmissions at 20, 25, 30, 35 and 40wpm are made at 1900 gmt on the first Tuesday of each month on a frequency of 3·520MHz. For 100 per cent copy at 20wpm a certificate is awarded, and endorsement stickers are available for 100 per cent copy at the higher speeds. A charge of 10p or two IRCs is made for the basic certificate, and 2½p or one IRC for each endorsement sticker claimed. All claims should be sent to–The QRQ Manager, RNARS, HMS *Mercury*, Leydene, Petersfield, Hants.

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

Cossor 1035 scope, with manual, £20 or exch for 2m/M gear. EI7BS, QTHR. Tel Clones 97.

B41 rx 700kHz—15kHz, first class cond, offers. G3VPT, QTHR. Tel St Faiths 715.

Tuneable field strength meter, new. Mullard 5/10 amp and pre-amp, offers. G8DHO, 122 Aylward Road, Merton Park, London SW20. Tel 01-977 8888, extn 128.

KW2000B tx/rx, plus remote vfo 4B, also KW600 amp comp with Shure PTT mic, £275. Will separate. Collins 7553B, ssb filter only, extra xtal, with 240-110V trnsfmr, £240. G3RHM, QTHR. Tel 422 5810.

Bargains for callers. Freq meters TE149, £5. BC221AJ modulated with mains psu, £22. RCA 1·4–6·7MHz 5W xtal/vfo temp stable, £15. Transistor BC108, new, 12 off for £1, post free. G3JGF, 68 Strathcona Avenue, Bookham, Surrey. Tel Bookham 6544.

KW201 rx with xtal calib and Q mult, as new, £85. Todd, 52 Trevor, Crescent, St James, Northampton, NN5 5PF. Tel Northampton 51928 (pm only).

Garex two-mobile tx 12V, £35. EC10 Mk 2 and psu, £62. Both new, Sept 1970. G8DYC, 1 Lonsdale Place, Derby, DE3 3LP. Tel 43056.

Lafayette HA500 amateur bands rx, cond as new, £30. Telephone 041-638 0288.

R107 rx with 14/21/28 convtr + Q mult, £12. G5RV aerial with masts etc, offers. G3VDG, QTHR. Tel 0922 51377.

Ten-tech PM2 trnscvr all solid state as described in *Tech Topics* July-August 1970, unused, £20. GW3ZEC, 4 Breeze Hill, Benllech, Anglesey.

Trio 9R59D, £27. Marconi CR100, £15. Willetts. Telephone 01–432 4628 (office), or Dartford 27999 (evenings).

Xtals 2m: 12075 HC6/U 12·05416 FT243, 62½p. 9·065, 8·040, 10XJ, 50p. HF band convtr xtal 3·5MHz, 37½p. Prices inc post. G8DJQ, QTHR. Tel Ongar 2103.

14in tv tube, designation AW 36–80, purchased 2 mths ago as grntd regunned tube, unused, £3 ono. G3VGN, QTHR.

B40, fb cond with 10in spkr, £25. 62 Mk 2 with ac/dc PSUs, spkr, mic, £15. Xtal cal No 10, £3. 100kHz cal, £2. Variometer, 75p. Rotary invertor, 75p. G8DYF, 39 Kechill Gardens, Hayes, Bromley, Kent. Tel 01–462 2083.

Murphy B40 C, hndbk, spkr, prof re-aligned, vgc, £25. Cleaver, 86 Main Road, Dovercourt, Harwich, Essex. Tel Harwich 2195.

All band rig, Geloso vfo, 813 pa, £15 ono. G3NJU, 3 Rostherne Road, Wilmslow, Cheshire. Tel Wilmslow 24665.

HV psu, paper capacitors, some compact. Heathkit transistor tester IT-27, £3.50. Auto-trans 230–115V. 75–100W, £2 ono. 100TH, £2. 35T, £1.50. RCA mond fm tuner, £8. All pp inc, more O and S, why? GW3HEU, 47 Ruabon Road, Wrexham. Tel 0978 4507.

TCS13 tx/rx with mains psu, £25 plus carr. TCS12 tx, £10. Indicator crt type 26, 9 valves, 6 xtals, 3in tube, £10. Broemar tape recorder 2 track, new, £25. GI3RNY, QTHR. Tel Ballymena 41468.

Hammarlund HXL-1 linear 2X572B Creed 7B printer, 6S auto tx, 240V ac motors, 45/50 Balid governors 44 perforator, model 14 printing reperforator, W2JAV terminal unit, spares, manual, etc, cash or exch, why? G3IGG, QTHR. Tel 051 327 1409.

KW2000 inc ac psu, immac cond, just serviced by KW, £130. Tilt-over tower, 30ft, similar to Versatower, inc rotator and indicator, £60. Tri-band cubical quad inc feeder lines, £15. G3RCU, "Japonica", Abbey Road, Sandbach, Cheshire.

National HRO, wkg, 5 gen coverage coils, ac psu, £10, ono. Cossor 88D and 84D crt, 50p each. Buyer coll. G8AUG, QTHR. Tel Windsor 61167.

KW E-Zee match, Mk 2, as new, £10. TT21 valve, £1. G3HSC morse records—beginners and advanced courses, £2, post extra. Gallium arsenide MSP3A photocell light emitting. MGA100 diode, £3. Phone intercom, £2. G3YTU, QTHR.

Mags: *Practical Wireless* and *SWM*, 1961–67, offers. G3URZ, 5 Finch's Field, Little Eversden, Cambridge.

Joystick de luxe antenna, as new + type 3A atu, £7 ono. G8DYK, 30 Cavendish Way, Mickleover, Derby. Tel Derby 54356.

Going QRT. Heathkit HT16 tower, £10. Heathkit HP13A/M psu (for SB101 etc), £16, with manuals. E-Zee match, £7. Will haggle any price—must go! Also send sae for list of other goodies. G3UZF, QTHR. Tel Hemel Hempstead 59652 (evenings).

Telegraph distortion measuring set tx, type 5B, £20. National HRO 50T1 with switched bandspread coils, £55. NBFM Philips millivoltmeter 1mV to 300V dc, £12. Hall, 22 Maple Drive, Beverley, E Yorks. Tel 0482 885854.

KW Viceroy, exc tx, £50, can del within 100 miles. G3YBR, 8 The Green, Lolworth, Cambs. Tel Elsworth 312.

Panda tx 150W cw 120W phn, £25. RA1 rx, £20. Semi-auto bug key, £3. G3YBL, 14 Box Lane, Boxmoor, Hemel Hempstead. Tel Hemel Hempstead 56286.

Heathkit DX40U and VF1U, slight mod to tx, £25 ono. Some spare valves. G3ZEI, QTHR. Tel Nottingham 54701 (8am-5pm).

2 dashmount Pye Rangers, both on 2m, £9 ea. 2m fet convtr, £5. B44 on 4m tunable rx, £7. All ono, all gd cond. Why? G8EEJ, 51 Bridge Court, Edgewood Close, Old Hill, Warley, Worcs.

Combined spkr, S-meter for Eddystone 888A, 750 etc, £4. Rayer, Reddings, Longdon Heath, Upton on Severn, Worcs. Tel Upton on Severn 2244.

Xtals: 7·75278, 9·48333, 10·839286, 11·3625, 12·1625 (5), 12·72214, 12·93333, 14·3625, 18·16875 (2), 18·24375 (2), 40p ea. Lafayette rx HE30, 550kHz-30MHz, 4 bands and 7 bandspread ranges, £18. HRO xtal filt, £2. Compnts going cheap for callers. G3VUT, QTHR. Tel 01–550 9300.

Orig manuals: txs Collins 32V-1, Hammarlund HX-50, ET-4339; rxs Collins 75A-1, recorder models 79–80, £1 ea, post paid or all eight 50p each. EI2W, QTHR. Tel Dublin 977879.

Tx case, black crackle, 21in by 15in by 10½in panel, 19½in by 10½in opening top, £2. Beardow, 34 Ashley Drive, Whitton, Middx. Tel 01–894 1892.

KW2000 with ac psu modified aligned by KW, used daily, three (as new) PL504 valves, 15 Electroniques coils from dismantled RA1 rx, offers, any or all above. G2FMR, QTHR.

Heathkit RG1, normal cond, factory made with hdnbk, £25. Also xtal calibrator, not wkg order. Bowen, 15 Warnham Road, Horsham, Sussex. Tel 0403 62571.

Hallicrafters SX122 rx with xtal calib, mint cond, £98. Baker, 132 Limpsfield Road, Sanderstead, Surrey. Tel 01–657 0430.

FT250 Sommerkamp, perf, with psu, ldspkr, first £130, no offers. Will del 60 miles radius London, otherwise buyer insp and coll. Toby, 13 Wood Lane, Isleworth, Middx.

B40B S-meter added local osc mod to give bandspread as in B40C, gd wkg order, £17. Will del up to 30 miles. Stewart, 118 Hailsham Avenue, Streatham Hill, London SW2. Tel. 01-769 4162,

6ft rack, fully enclosed with rear door, no reasonable offer refused but buyer must coll. Some 19in panels available for rack. G8AKA, 29 Rectory Avenue, Corfe Mullen, Wimborne, Dorset.

Viceroy latest Mk 4 model with extra filt and built-in relay, mint cond, + manual, £95. G2UZ, 2 Cliff Road Gardens, Leeds 6.

Selling new stick type xtal mic, £2. Base for 813, 75p. Microwave silicon coaxial diodes also 32MHz wideband i.f. strip. Wanted: coaxial c/o switch, new 4CX250B. G3KH, 133 Station Road, Cropston, Leicester LE7 7HH.

Filament trnsfmr for 813, —10V 10A tapped primary 220–250V ac, £1·50. 4 pair of selsyns, £2. Eddystone 888A, exc cond, with S-meter, £60.

Lafayette aircraft rx HA55, 108–136 MHz, as new, £9·50. Pye Reporter low band (79·8MHz), gd cond, no handset, £4. Variable trnsfmr 0–260V 2·5A, £1·50. Will exch for 2m gear. G8EUD, 82 High Street, Burnham, Bucks. Tel Burnham 2922.

Codar CR70A, PR30 preselector, gd cond, with matching spkr in cab, £18. Pref buyer coll. Brockett, 141 Adeyfield Road, Hemel Hempstead, Herts. Tel Hemel Hempstead 51977.

R107 rx, fairly gd cond, £10 ono. Pref buyer coll. A7234, 5 Gaysley House, Ethelred Estate, London SE11.

CR300 rx, £12. Also other bits and pieces, sae list. Karklins, 132 Dunvant Road, Dunvant, Swansea, SA2 7NW.

Several morse courses—0 to 14wpm on two C90 cassettes, full instructions prov, £3·50 ea, pp. Taylor, 37 Pickerill Road, Greasby, Upton, Cheshire. Tel. 051–677 1818.

B40 rx, gd cond, £14. Homebrew 50W cw tx covering 40m-10m, in cab with psu chassis, £10. G3VGU, QTHR. Tel Grays Thurrock 5677.

Hazeltine sig gen OAP-1 144 236MHz, LG50 Hudson FM208 High Band QTY-2 trnsfmrs 230V-20-0-20 at 40A qty 3. Offers. G3KLK, QTHR. Tel 01–579 0234.

Marconi "fishfone" tx-rx, 160–20m, 60W a.m./cw, int psu, ext vfo, £15. Will deliv 50 miles. Handsen, Merton College, Oxford. Tel 0734 475801.

144MHz tx Plessey PT15A sister Wrotham beacon GB3VHF. 100W 6 switched xtals, spare 5763s. Two 829Bs, pp 807 mod. 3pps Command rx 4-6MHz and 144MHz valve convtr, circ data, offers. G6WU, QTHR. Tel 01-886 8858.

SB101 with HP23 psu, only 10 mths use, prof built and as new, £170. G3NLY, 20 Bridge Cross Road, Chase Terrace, Walsall.

HRO modified to miniature valves to G2DAF type rx with Kokusai filt and xtal-cont convtr for hf bands, £40, ono. Consider swop for Heathkit or other solid state rx. G3ZNY, 11 Kingston Avenue, Stony Stratford, Bucks. Tel Stony Stratford 2382.

Model 7 AVO meter in vgc, £7 ono. G3UYM, QTHR.

QST January 1948 to April 1954. *SWM* Sept 1946 to May 1955, offers. PCR1 with int psu, £2·50. Unused chassis panel brackets, 11 × 13 × 2, 50p. Motor generator, 12V–480V 400mA, £1. Chorley, 6 Calton Road, New Barnet, Herts.

Heathkit SB101 cw HP32A and SB600, immac appearance, any test, latest Heathkit mods, spare valves, professionally built, £150 ono. GW3KAJ, 27 Penmaen Walk, Culverhouse Cross, Cardiff. Tel Wenvoe 454.

Three 4X150As, dirty but OK, £1·50. Three QQV06-40A, £1·25. Six ECC81, 50p. 45 new unused silicon transistors, £1. All inc post, pse inc sae in case already sold. G3VAG, QTHR.

Heathkit GR64, rx, vgc, £15 ono. Joystick deluxe and 3A tuner, gd cond, £4·50, ono. The lot for £18 ono. Carriage extra. Black, 63 Denewood Avenue, Birmingham, Warks. B20 2AF.

Rtty, computer, white parchment reperforator tape ⅞in wide, 30p per roll, 20 rolls for £3, carr pd UK. Wanted: 2m convtr, 28-30MHz i.f.; petrol charging set 12V dc or 220–240V ac, about 1kW. GW3UBV 33 St Martins Park, Haverfordwest. Tel Haverfordwest 2409.

Hudson l/b /Ms, wkg, comp, part transistor, 12V, ideal for 4m, £10. Communicator /M 4m, as new, £25. TF144G sig gen, 85kHz–25MHz, £15. G3HKV, QTHR.

EMI EPU100 stereo p/u arm, recent comp factory overhaul, £10. G3RQX, QTHR. Tel 0903 38131.

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

Lafayette HA600, boxed, with manual, almost unused, £5. Pheasant 43 Station Road, Great Wyrley, Walsall, Staffs. WS6 6LH.

Tiger TR100 tx 100w am/cw 10m–80m + 160m, £25 or offers. G3XSO, QTHR. Tel Slough 24760

Orig HTA rx, prof appearance and construction, £35. T28, £11. 4m Pye base station, £8. 4m convtr, £5. G3YBG, Quarries Bungalow, Barley Lane Exeter. Tel Exeter 74607.

Vanguard Tx, vgc, 160–10, £37·50 ono. Pref buyer coll. GW2FBG, QTHR. Tel Swansea 25352.

QRO linear 10–80m and 2m, trnsvtr built in, as described *SWM* July 1964 but switched tanks. Also 1 new 4X150A and bases. Several DET22 QQV02-6. G3OCB, QTHR. Tel Stithians 480.

KW2000A ssb trnscvr with ac psu, exc cond, £100. G3NIM, QTHR. Tel Hamble 2025.

60W a.m. tx, 80–10m, 5B3254m pa, 12V transistor modr removable unit, pi-output, £15. Psu, £5. Both fully metered. 160m minimitter /M whip, £1·50. 12V rotary gen 275V 100mA, 30p carr extra. Orchard, G3TTC, Devonshire House, Gold Street, Stalbridge, Sturminster Newton, Dorset.

Codar AT5, £12 + T28, £11, or £22 for both. Also Sommerkamp 28·5MHz tx/rx, £8·25. Two 4X150A fet cnvtr, £16, as new. GW3UUS, QTHR. Tel 0633-65572.

BCC base station 25W tx + rx, hi band and unmod with mic, £17·50. (Can supply 12MHz xtals). G8CPB, Rutherford College, The University, Canterbury, Kent.

KW Vespa Mk 1 and ac psu, gd cond, £75 ono. Pref buyer coll. G3YED, QTHR. Tel Leeds 681753.

BC348, £15. TCS12 tx, £10. LG300 rf unit, £15. Last two with psu comps. Willing to haggle or will del 50 miles of Coventry. Wanted: 12 AVQ ant. G3JAG, QTHR. Tel 0203-88771, ext 972 (office hours).

4m 832 rx, valve convtr, psu for tx-rx + convtr, £12 the lot. 6V car radio b/s sw b/cast exch vhf rx or others. Rusty AR88 chassis, wkg, suit 28 MHz i.f., £5. G3NBU, QTHR. Tel 073 529 Burghfield Common 2257.

AR88D, vgc, £30. PR30X preselector, as new cond, £6. Revill, 19 Shepherds Walk, Farnborough, Hampshire. Tel Camberley 26092.

CR100/7 rx, fully serviced and aligned, £17·50. TF144G sig gen, £19 New 813s, £1·50. TZ40, 90p. E88CC, ECC88, 30p. 8MHz scope, Philips GM5654X, £25. Furzehill VTVM 378B/2, £8. Wavemeter 20–300MHz, £7. Homer, 32 Ironmill Lane, Crayford, Kent. Tel Crayford 29065.

DL6SW convtrs, 2m and 4m, comp with xtal case etc., 28–30MHz i.f., £10 ea. G8DBW, 10 North Road, Gloucester, GL1 3JX. Tel Gloucester 20462.

Two B44 Mk 2, one mains, one 12V dc (solid state psu) full mod, 4m with xtals, £25 the pair. G3PLL, 11 Burley Road, Cottesmore, Rutland. LE15 7BZ. Tel Cottesmore 513.

2m tx Pye F27 a.m. and GEC BRT400 rx. 8MHz vfo with SL6/36 dial comp in diecast box, one 36in and one 24in 19in rack cabinet. Offers. G8EDN, 24 Sunnybank Avenue, Whitley, Coventry. Tel Coventry 301494.

KW match 75 Ω, £7·50. Class D wavemeter, phones and manual, £5. Heathkit RF10 sig gen, new, makers aligned, manual, £10. Wanted: rx suitable for all ham bands, must be in gd cond. G3WXT 36 Hart Road, Byfleet, Surrey.

Home brew top band tx with mod scope, built in psu, £5. Trnsfmr 700-0-700 400-0-400 twice at about 500+ mA, £2 ono. G8CZW, QTHR. Tel 061 439 4084.

EC10 Mk 1 (Aug 70), £40. Sentinel 2m convtr i.f. 4–6MHz, £7. Amateur Radio, Rayer Foundation of Wireless, 50p ea. Hawkins, 249 Herries Road, Sheffield, S5 7AX, Yorks. Tel 0742–386574.

Rx 216 psu and manual, as new, £50. 4 mts tx Pye, plus TW convtr, £10. G3WRD, 32 Elliott Road, Chiswick, W4. Tel 01 994 6976.

40ft fold-over Versatower, galvanized. Winches, cables, sock, comp, £95. G3XHV, QTHR.

Eddystone 888A S-meter, ldspkr, perf wkg order, part exch metal detector or sell, £50. Reynard, Blaye House, Alderney, CI. Tel 0481-82 2368.

Teleton TF181 transistor /P rx, 8 w bands, lw/mw, vhf aircraft, 2 × sw, 2 × psb, bfo, afc, S-meter, f/tuner, squelch, tone, mains/batt, superb cond, £50. Bigley, 89 Rocheway, Wellingborough, Northants. Tel Wellingborough 4530.

160m tw top /M trnscvr, int 12V pos earth ps, £30. 2m Pye Cambridge, no mods, with hndbk, £20. G3KSW, QTHR. Tel Waltham Cross 23452.

Codar CR70A rx also matching PR30 preselector unit, mint cond, £17.50. Labgear E5145 swr meter, £6. Grid dip meter, USA manufacture, 115V ac, 1·7–300MHz in 7 coil ranges, 4 coils missing, £8.50. Barker, "Sidcot", 33 Dartmouth Road, Paignton, Devon.

RA17 rx units main tuning section comp with film strip dial also i.f. unit, offers. G3ION, QTHR.

Airmec millivoltmeter type 784, £10. Pye pocket phone rx, £15. Poulton, 932 Maesyrhandir, Newtown, Montgomery, Mid Wales. Tel Newtown 6153.

Linear Heathkit SB200, as new, £90. 70MHz tx, £10. Part-built gen cov rx, £10. 10W audio amp, £5. Part-built 2m /M tx, £5. DL6SW 2m convtr £4. Sae for full det. G3LAS, 7 Barclay Close, Hertford Heath, Hertford. Tel Hertford 6122.

50Ω cable, 50yd, UR67, £6. G8BDO, 64 Castle Hill, East Leake, Loughborough, Leics. Tel E. Leake 2458.

KW2000B with ac and dc packs, offers. G3PNQ, QTHR. Tel Parbold 2797.

840C, 6 mnths old, in orig packing with manual, £40. Heath V-7AU vvm with 309-CU rf probe, £15. All above as new cond, del free. Exchanges welcome. Wanted: AR8156L. GW3UCJ, QTHR. Tel Briton Ferry 2376.

Woden power trnsfmr 750-0-750V 250mA, £2.50. Weight for carr 22lb. G6RF, Farm Cottage, Callestick, Truro, Cornwall. Tel Perranporth 2047.

Class D wavemeter No 1, Mk 2, unmodified, £5. Collins vfo ultra-linear, 2·375-3·375MHz in 10 turns of the spindle, comp with Collins gen + 6·35MHz xtal to make 2m vfo, £6 ono. G3YM, QTHR. Tel Staines 53765.

Heathkit HW30. Twoer trnscvr auto trns, mic etc, £15. Morse records, beginners and advanced + test record, £2. G3YOU, QTHR. Tel Tonbridge 61656.

Mullard DG7-6 3in, crt, £2. 2 Ericsson GC10B high speed Dekatrons, cost £3.75, as new, £1.50 ea. Wanted: cheap comms rx (£10.75), CR100, HRO etc for impoverished school ARS. Owen, The Beeches, Lower Heyford, Oxford, OX5 3PD. Tel Steeple Aston 467.

American navy rx with psu, sep matching spkr, full hndbk and joy-match tuner 1·5–12MHz, £14. Pyatt, 23 Arundel Drive, Orpington, Kent. Tel Orpington 20281.

Marine radiotelephone Redifon International and private trnscvrs, 28 channels, exc cond, £75. 150MHz Heathkit educational electronic analog computer EC1, £25. 4CX250Bs, offers. Many spare xtals, send sae for list. G3MHC, Evergreen, Rawreth Lane, Rayleigh, Essex. Tel Rayleigh 72444.

40ft sectional dural mast, 1·5in diam with 3 guy plates, £10 ono. Ambassador 17in tv, perf wkg order, £5. G3ZUM, 116 Pinewood Green, Iver Heath, Bucks. SLO 0QH. Tel Iver 1409.

Lafayette HA500 rx with calib and manual, 80–10m 6m mod to bandspread 160m, no other mods, spotless, £32.50. Codar AT5 + mains psu, vgc, £18. Wallis, 17 Meadowside, Walton on Thames, Surrey. Tel Walton on Thames 23228.

Hi-band radiotelephone with valves + diag, £5. Command tx with valves, £2.50. Trnsfmrs, chokes, vhf valves, cheap. G5CM, QTHR. Tel Selsey 2876.

Hallicrafters SX101A, mint cond, £75. Leak 15W amp, pre-amp and a.m. tuner, offers. BC453 Q5er, £4. BC454 (3–6MHz) with pp and spkr, £7. Transistor 2m convtr 4–6MHz i.f., £4. G6XY, QTHR. Tel Kenilworth 52679.

1049 Mk 2 Cossor double-beam scope, fair wkg cond, £15. Carr extra. G8DLC, 12 Park Lane, Swindon, Wilts.

Scope No 11, TB 50Hz-1kHz with modifications for tx monitoring £10 ono. New HC6U 1MHz xtals 50p, many other frequencies from 12p. G3NXT, QTHR.

SB401, £130. EA12, £110. G6KQ, QTHR.

Xtals 3755, 3721·67, 7010, 5875, 7850kHz, 25p ea. 7181·25kHz, 20p. 6125, 3843·25, 5940, 9527·7kHz, 10p. FT241A, 21·7-36·4MHz 5p. G8EUC, Parsonage Farm, Stansted, Sevenoaks, Kent.

AR77E, £12.50, Marconi 4m /M boot mounting with tray, £5. Buyer coll. Pair 4CX250K, £5. G3PGN, QTHR. Tel Basildon 43274.

Petrol electric gen, 250V-350W, £15. G4WJW. QTHR.

Hammarlund rx, comp in new cond. HQ14OX with RME preselector and AVO sig gen. The lot for quick sale, £60. Posen, G3NVD, 26 Cadogan Gdns, Chelsea, London S.W.3. Tel 01-730-2460.

FL1000 Linear, mint cond, hardly used. Offers? G3VGM QTHR. Tel Gt Oxney 352.

R107T rx in vgc. S meter etc, £12.50. Wanted: power tetrodes, 4-65A or QY3-65. G3XMW, 64 Woodcote Grove Rd, Coulsdon, Surrey. Tel: 660 0959.

Emigrating! Total contents shack, all types components, worth over £600 present 2nd-hand price. Contents inc Vespa II, Hammerlund 170A, BC221 aerialmatch, watt-meters, Z-match noise bridge, variacs, £300. G3ARJ QTHR. Tel Hitchin 2381.

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Heterodyne frequ meter, 125-2000kHz, part model 14, also telemax type 75, 85-100MHz, both with books. Solarscope, type AD557. Offers please, Upton, 14 Trafford Rd, Wilmslow, Cheshire. Tel Wilmslow 31628.

R107/A rx, gd cond with circuit info, £9 or exch 2m gear. Could del Manchester area. Kettlety, 106 Denton Rd, Audenshaw, Manchester M34 5BD. Tel 061-336-7640.

Shure 444T, 1 mth old, offers around £12, mic as new, Viceroy latest model. Mk4 with Extra ½ lattice filter, new cond. Offers around £90, G2UZ QTHR.

Pa trnsistors Texas 2G240. Reliable 10W am on Top-Band (not higher), 50p ea (new) with data. Dobie, G3XWP, 1 Tudor Close, Chessington, Surrey. Tel 01-397-5562.

18AVQ, almost new, £25. TA32 SR, gd cond. Gd offer will be accepted. G3XQC, 46 Gresham Rd, London E.16. Tel 01-476 8197.

EMI measuring scope (type WMS) minus psu, wrkng and with manual. Offers? swop for 2m gear, sae pse. G3ZTS, Worthing Schools Radio Society, 68 Grand Ave, Worthing, Sussex. Tel Worthing 45010.

Xtal ovens with base. 6/12V, 80°C for type HC6U. Xtals, 50p ea, post free. Jeapes, G2XV, 165 Cambridge Rd, Great Shelford, Cambridge.

KW2000A, dc for /M; Tiger TR2 OOX, 80-10m am/cw tx, offers? R220 rx, £4, TR1986 less dynamotor, £4, RT34-APS13, £3. G3TTV QTHR.

DX40 tx, £16. C52 rx, faulty on 160m, mains/dc psu, £6.50. GM3YYY QTHR. Tel 041-776 4833.

ARRL Radio Amateur's Hndbk 1969, and ARRL Ant Book, both mint cond, £2 post paid, G2GM QTHR. Tel Freshwater 2709.

GEC BRT400E, mtchg spkr, spare valves, mint cond, £75 ono. 2m tx, prof built, QQVO6-40A pa. KT88's mod in Imhoff's case, heavy duty psu, 75-90W pa in use, £30 ono. Ellis, G3JNY, 2 St Mary's Close, Garforth, Yorks. Tel Garforth 3058.

Heathkit RA1, exc cond, little used, with manual, £30 ono. Nutt, 3 Cawdon Grove, Manor Rd, Dorridge, Solihull, Warks. Tel Knowle 4559.

Heathkit SB401, SB200, SB300, all perfect, £210 the 3. G3MXQ QTHR. Tel 01-360 4644.

Hudson 4m tx/rx/P with aerial and hdset, 90/1·5V, £7 pair. Pye main rx, 160kHz-12·5MHz with df facilities, 24V, £9. Wavemeter GLT No 3, 60-100MHz, 240V mains, £3.50, carr extra. G3RBY QTHR. Tel St. Albans 54009.

Hy-gain TH3, el beam 10/15/20 senior model. 2kW rating, exc cond, £22. Carr extra. G3UCV, 5 Manston Gdns, Leeds LS 158ey. Tel 643788.

KW swr meter, £5. G2DRT QTHR.

HRO MX 6 general coverage coils, modded for l/s output and has had facelift, needs psu, £13. HRO dial and gearing, late model, exc cond, £3. Pref buyer coll. G8CDK QTHR. Tel Southwell 3418 (weekends).

HRO model 5T comp with coils, psu and spkr, £10. Class D wavemeter with psu, £4. G3PLJ QTHR. Tel 01-907 4037.

Morse 9-42 lp (G3HSC), £2 or exch for xtals,! suitable ssb, why? G3XKM QTHR. Tel Stourbridge 5546.

Heathkit HW30, £15 carr pd. Panda PR120V, 150W, a.m./cw, £15. Buyer coll. GM3UTH, 22 Langholm Crescent, Glenrothes, Fife.

2m 3-20A tx, strip cw valves, 15W transistor mod kit, no psu but 400V trnsfrmr. 10-7 i.f-mixer-455 i.f. strips. all 2×9×8 £2. G8BPK QTHR. Tel Aston Clinton 600.

In gd wrkng cond, R107 rx + instn man and hdphns, £12. 38 set, wkg cond, £2. Buyer coll. Cape, 108 Old Church Lane, Stanmore, Middx. Tel 01-954 2967.

Amateur Radio Handbook (Old Testament), £1. BC221-AF with calbn book (recal 1957), circuits and mains in wooden transit case, £10 + carr. G3RPJ QTHR.

KW2000A with 2×6146B in pa + ac psu, vgc, £140. Inspn invited evngs or wknd. G3HIW QTHR.

Instn books for S-27D and S-27C rxs, 60p. ea. G3HB QTHR.

HW32A, HP23, immac, £65. Prof blt 2m trnsvertr and mtchng linear QQVO6-4OA, offers? KW LPFCH4, £3. McAlister, G3YFK, 10 Woodfield Rd, Shrewsbury SY55673.

TRIO SP5D, spkr, £2 ono, 2N3708/9, 2½p ea plus sae. Tuttlebee, 87 Wardo Ave London SW6.

RXs: DST100 R1132a, R1147. Wavemeter W143Z 160-260MHz. VCR97. Grundig TK20. Gates, 158 Robertson St, Clapham, London SW8 3AU.

Joymast 20ft /P, £3. Sig gen TF 144G, £15, Trnsfrmr 550-0-550 at 200mA, 350-0-350 at 250mA. Ant vert RV4C 40-20-15-10, £15 ono. All buyers coll. G3OUX QTHR. Tel Crawley 23890.

Comp /M fixed stn Codar AT5, ac psu, control unit. Homebrew dc psu, transistorized rx for 160m and /M whip, the lot £22. G3KAF, Cobham Cottage, 34 Ladythorn Rd., Bramhall, nr Stockport, Cheshire. Tel 061-439 4952.

TW2 tx, £15. Hudson FM 208 transcvr, unmodded hiband, £18, or wd exch for gd rx and adjustment as necess. G3WPX QTHR. Tel High Wycombe 34143.

FRDX500 rx with 2m coverage etc. FLDX500 tx immac cond, cost £305, selling £220. G3KZC QTHR. Tel Bristol 673026.

10-80m cw tx in case, Geloso vfo plus 2×807, htrs but no ht, metered, £12. 110/240V auto-transformer, 200W, £1. Ex WD trnsfrmr 450-0-450 at 200mA, £1. Buyers coll. G3SAX QTHR. Tel Holmer Green 2105.

Used 813 and base, 40p. Untested EF80s, 15p per doz. Wanted: working barograph. Dalgleish, 5 Craiglockhart Park, Edinburgh EH14 1ER. Tel 031-443 3381.

Klystron 723AB, 20mW output at X-band, £4, post free. Mann, 45 Old School Lane, Milton, Cambs CB4 4BS. Tel 0223 824150.

TR 1578B (SCR 522) 100-156MHz, psu, comp ground stn less xtals, offers. 35ft tubular masts comp, new, £25. AVO universal 47A, £8.

Petrol gen 35V max 1260W, offers. VHF tx/rx 12V, comp, £4 ea. GM3BQA QTHR. Tel North Berwick 2519.

Heath HW17A 2m trnscvr, factory aligned and tested, comp with 4 xtals and mic, mint cond, £50 ono. Dobson, G3XFM, 29 Hobgate, York. YO2 4HE. Tel 0904 78409 after 6pm.

WANTED

9R59DE, Mohican or EC10. Will buy or exch for HRO. Robertson, 31 Greenways, Bow Brickhill, Bletchley, Bucks.

Hy-gain TH3 jnr beam. Fair price for comp example in 1st class cond G3KGB. Tel Blagdon Hill 655.

Valves; types DA41 or T240, also 4X150A and 6AM4. Wadsworth, G3NPF, 130 Ashington Rd, Rochford, Essex 554 IRR. Tel Southend-on-Sea 544096.

Eddystone EA12 rx and AR22 rotator. G8DYY, 106 Goldthorn Hill, Wolverhampton.

Batt-op vintage rx, also horn l/s, period 1922-9, and valves. Neale, 11 Pine Drive, Wokingham, Berks. Tel Eversley 2626.

Small communications rx, RA1. Poss £20-£25. G8DMS QTHR. Tel Wellington 55846.

Wireless World, 1915-22, £1 per vol + postage pd for any vols 3-10. *QST* July, Aug, Sept, Nov, Dec 1921, 50p pd per copy + 2nd class postage. G3IDG, 96 George St, Basingstoke, Hants.

/M psu and /M ant for Heathkit 32A. G3WVW QTHR.

GC coil packs for HRO. State ranges, price, postage. G13UFH QTHR. Tel Belfast 747558.

Student requ 2m rig. Tx with 20W output? Consider swop for EMI measuring scope (type WMS) minus psu. Wrkng and with manual. Offers? Sae pse. G8DWW, 68 Grand Ave, Worthing, Sussex. Tel Worthing 45010.

2 4CX250B bases and chimneys with or w'out valves. 2000V 500mA trnsfrmer, 80ft of Aerialite 363 co-ax. G8BGQ, 25 Church Lane, Sarratt, Rickmansworth, Herts.

Exch Top-Band tx and command rx fed by minimitter five band cnvtr with blt-in stabilized ps for reasnbly sized general coverge rx. G3CDR, 157 Dartford Rd, Dartford, Kent.

PS 230AC table for 4RO mx. GAGJ, 36 Wagon Lane, Bingley, Yorks BD16 1LT. Tel Bingley 2965.

Electroniques HB166T or GC166T trnstr quoilpax. Must be wrkng and in gd cond. Also wrkng aerial rotator. Will answer all letters. Price, Greenbanks, Cuckney, Nr Mansfield, Notts.

TW. Communicator 2, 144-146MHz, in gd cond. All offers answered G2HAR QTHR. Tel Hemel Hempstead 2817.

Ex-army mine detector wntd cheap. Also 10m cnvtr. A7598, 2 Field Lane, Letchworth, Herts SG6 3LE.

23cm cnvtr, gd price pd for efficient instrument. Write or phone details to G8AQZ. QTHR. Tel Bristol 77348.

Hard-up 6th-former wants cheap 2m tx pref with modulator. Ray, G8DZH, 9 Albion Hill, Loughton, Essex. Tel 01-508 3434.

HRO Jnr general coverage coils for 7-14.4MHz and 900-2050kHz. Poxon, 178 Branstree Rd, Blackpool, Lancs FY4 4TD.

3 ele 20m beam, tribander or similar, must be cheap. Spreadbury, The Nook, Wetherden, Stowmarket, Suffolk. Tel Elmswell 710.

Psu for 19 set, also any info—handbk, mods etc. BRS31037, 14 North Down Road, Chalfont St Peter, Gerrards Cross, Bucks. Tel Chalfont St Giles 3458.

2m /M rx in gd cond or wkg, tunable rx section of rx/tx /M. G8CVI, QTHR.

Bandspread coils for HRO-M, 160-80-20-15-10m. Bradley, 45 The Vale, Kirk Ella, Hull, HU10 7PR. Tel 658105.

Front panel with fitting screws and meters Collins TCS(9) tx. G2AHB, QTHR. Tel 01-653 2596.

Circ or manual for radio rx BC 348Q. G3UIE, QTHR. Tel Locksheath 5647.

Four "Velvet Vernier" National Co's heavy duty reduction drives from, and cases of TU series tuning units, or comp units. G3WW, 2 Church Street, Wimblington, March. Tel Doddington (Cambs) 255.

Heathkit HW32 or HW32A or G2DAF Mk 2 exciter. G3TEP, 3 East Cawledge Park Farm, Alnwick, Northumberland.

HW17A with psu if poss. For sale or exch: AR88, £20. 600V psu, 2 at £5 ono. Uhf sig gen 300-600MHz, £20 ono. EMI scope, £10 ono. G8EBH, Stable Flat, Grove School, Tel Hindhead 4414.

SB200 linear, GEC G989 fm stereo tuner. G3JMO, QTHR.

Cathode ray tube type VCR 139A, must be in perf cond. Haynes, 347 Shenley Lane, Birmingham, B29 4JJ. Tel 021-475 4841.

HB166T; Valiant plus dc psu, petrol charger; marine depth sounder; marine df; B2 circ; swr meter; gear and comps of 'twenties. Verrinder, Woolland, Blandford, Dorset.

Any early components/valves, data etc to enable rebuilding of Marconi rx circa 1919, and Telsen rx of 'twenties plus ldspkr/hdphns, also any Baird 30-line tv parts. Williams, 107 Riverview Road, Ewell, Surrey. Tel 01-337 0367.

Any kind of info urgently wanted on wireless Set 31 Mk 2, willing to buy or borrow a manual but every little bit would help. Woollons, 12 Meadow Way, Letchworth, Herts. Tel Letchworth 5535.

Modulation trnsfmr Woden Type UM3, Gardner MS7218 or equiv, price inc carr pse. GM3JHL, 128 Sheephousehill, Fauldhouse, West Lothian, Scotland. Tel Fauldhouse 433.

Cheap R1475 required. Carpenter, Grassmount, Taymount Rise, Forest Hill, London, SE23. Tel 01-699 2667.

Buy or borrow for copying article on construction of fm tuner in March 1969 issue of *Practical Wireless*. Stewart, 17 Levylsdene, Guildford, Surrey. Tel Guildford 69223.

Circ and/or hndbk on Halicrafters SX71, buy or borrow. G3VAH, QTHR. Tel North Shields 72379.

Tape deck, any age, must be up to hi-fi standards and of reliable manufacture and design, pref but not essentially stereo, no reasonable offer refused. Wardle, 13 Lynn Street, Chester-le-Street, Co Durham.

Electroniques high stab QSC unit, HSO 350. GW3VLU, 30 Beechwood Drive, Penarth, Glamorgan.

Swl would like to borrow circ diag etc for R209 Mk 2 communications rx, post paid. Martin, 21 Wordsworth Drive, Balderton, Newark, Notts. Tel Newark (0636) 3172.

Xtal 455kHz for AR88D. G3XJO, QTHR.

General coverage rx AR88, Trio or similar (not Heathkit), full det pse. G8CYN, QTHR.

HW17A plus dc psu in exch for 888A. G8CDP, 8 North Drive, Ormesby, Middlesbrough, Teesside. Tel 0642 38237.

Sideband filter xtal or mech 450-470kHz, 144MHz tx, 320 or 640 final. Grid dip oscillator, wkg or not. EI5CD, Ballylynch, Carrick on Suir, Ireland.

Electroniques transistor hamband coilpack 898 dial. For sale: Green & Davies 2m convtr, offers. Garlock, 135 Rookhill Road, Pontefract, Yorkshire.

EC10, any condition. G8BVP, QTHR.

Info on GEC 30W amp, model No BCS/HJL31. For sale: CR100 rx, £10 ono. Pref buyer coll. G3UXH, 99 Bells Lane, Hoo St Werburgh, Rochester, Kent.

3in scope tube, Mullard DG7-32 (CV2431/CV8959). G3MXV, QTHR. Tel 061-445 5675.

Heathkit K/GDA model control tx/rx half price. G3MIS, QTHR. Tel 025-882 209.

Modern trnscvr in gd cond, reasonable price in cash. G8DFS, QTHR. Tel 021-354 7769.

Labgear pi-tank E5033, also Mosley beam TA33JR, Mustang or similar. For sale: Mosley vertical RV4 self-supporting 80-10m 2000W pep, £10. (new price £24). Groundplane mounting RV4RK with radials, £5. Stone, 39 Purrett Road, Plumstead, London SE18. Tel 01-854 6646.

Hndbk for Taylor 33A scope, borrow or buy. G3AXK, 3 Meverall Avenue, Cliffsend, Ramsgate, Kent. Tel Thanet 53546.

CSE, 2AR, transistor rx or other small /M rx covering 160m. Linear amp as Heath miniature NCX5 without psu, have NCX3 with 240V psu and mobile transistor supply. G3EMW, 108 Breakspear Road South, Ruislip, Tel Ruislip 37810.

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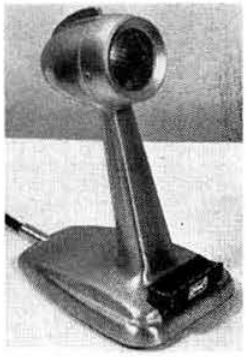

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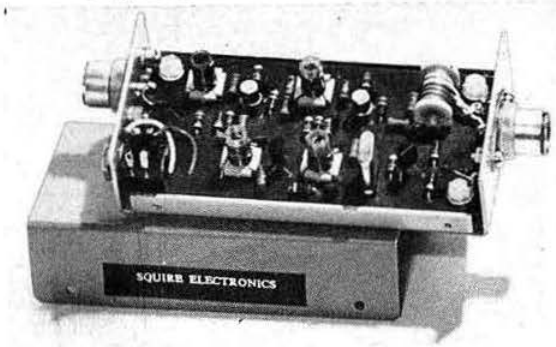

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★ Employs an all new very stable balanced modulator circuit.
★ A sound basis for your SSB transmitter.
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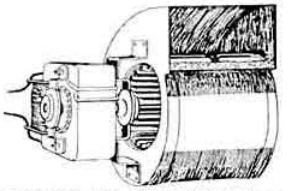

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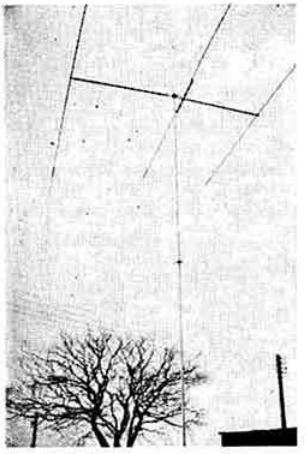

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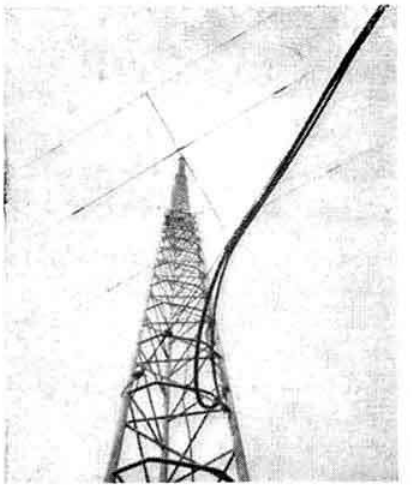

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