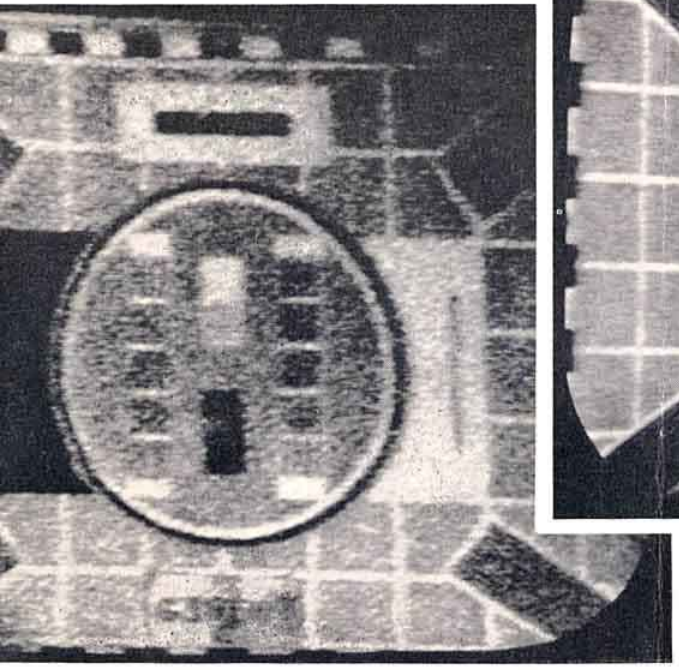
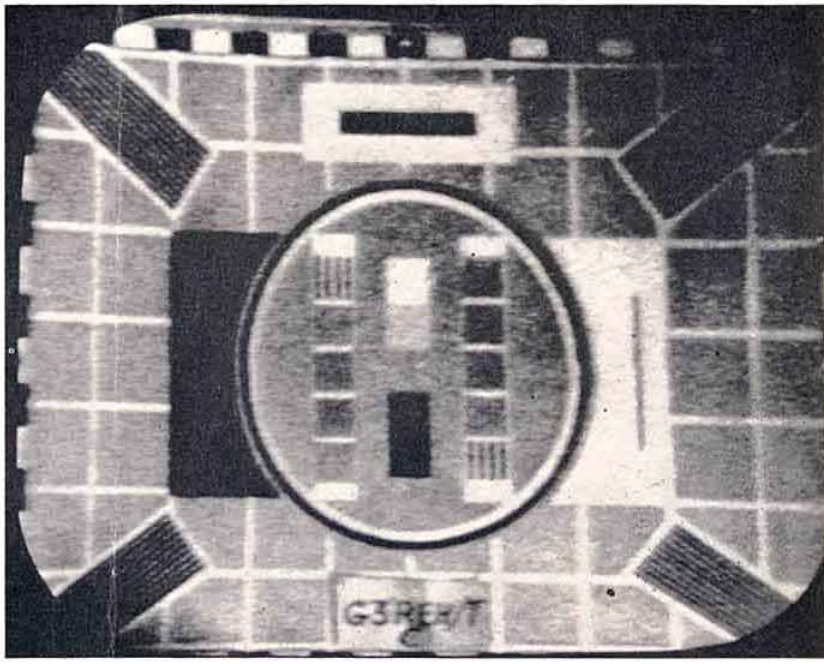
RSGB

BULLETIN

MARCH 1965
VOL. 41, No. 3





JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

Volume 41 No. 3

March 1965

3/- Monthly

RSGB BULLETIN

CONTENTS

Front Cover: The two photographs on this month's front cover give an indication of the improvement in signal-to-noise ratio, and consequently the picture quality, of a 420 Mc/s amateur TV signal that the use of a mast-head preamplifier can give. The preamplifier used to secure the right-hand picture will be the subject of an article in the next issue of the BULLETIN.

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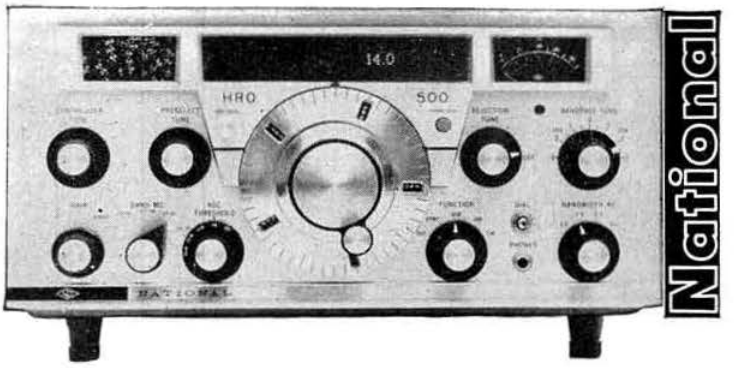
The RSGB Bulletin is published on the first Wednesday in each month by the Radio Society of Great Britain as its official journal and sent to all members.

The closing date for copy for the next issue is March 12.

HRO 500



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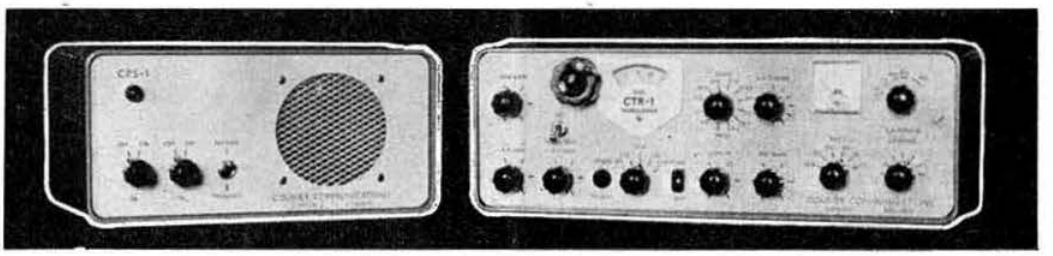

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50mA	..	22/6	100V. DC	..	22/6
100mA	..	22/6	150V. DC	..	22/6
150mA	..	22/6	300V. DC	..	22/6
200mA	..	22/6	500V. DC	..	22/6
300mA	..	22/6	750V. DC	..	22/6
500mA	..	22/6	15V. AC	..	22/6
750mA	..	22/6	50V. AC	..	22/6
1-0-1mA	..	22/6	150V. AC	..	22/6
1A. DC	..	22/6	300V. AC	..	22/6
5A. DC	..	22/6	500V. AC	..	22/6
3V. DC	..	22/6	"S" Meter 1mA		29/6
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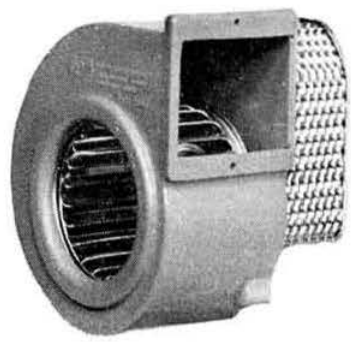

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Current Comment

discusses topics of the day

Have you booked for "The Eleventh"?

LESS than six weeks remain before the Eleventh International V.H.F. Convention opens at London's Kingsley Hotel on April 10.

Yes, April! Earlier than usual—so do not let time catch up on you. Write the date in your diary of course—but do more than this: decide *now* whether you will or will not be able to attend the evening dinner which by tradition follows the exhibition and the lecture sessions of the afternoon.

Get up a party from your local RSGB group or club, not forgetting the ladyfolk who in the past have graced the evening proceedings in such numbers. You can send them out on a shopping foray during the afternoon while you are attending the technical session, the idea being that they join you at The Kingsley at about 6 o'clock in plenty of time for the dinner.

And by the way, lest any should think the latter to be a formal " do ", be assured it is not. No bow ties, not even a table plan: you can sit wherever you like (except at the speakers' table!) with your own folk around you.

A line now (and your cheque) to Frank Green, G3GMY, patient secretary of the V.H.F. Committee and of the convention itself, telling him if you will be going to the afternoon session only, or the " full gallon " of afternoon and evening. You'll have a good value-per-shilling either way. His address is 48 Borough Way, Potters Bar, Middlesex.

The cost: 4/6 for the afternoon session; 30/- the lot.

J. H.

Colour TV in Europe

FOR more than ten years the question of Colour TV standards has been discussed at technical meetings of all kinds and a vast amount of research work has gone on in laboratories throughout the world.

In February 1964 national delegates from 21 European nations* met in London to choose between one of three systems (NTSC-US; SECAM-French; PAL-German) for European use but the meeting ended in stalemate. Nineteen delegations saw no point at that time in making a decision because Colour TV would not be introduced nationally for the next year or so at the earliest. Only two—one the UK—pressed for an immediate decision and both favoured the NTSC system scaled-up to 625 lines.

When no agreement could be reached it was decided to meet again a year hence to review the position and, if possible, put forward a firm recommendation. That meeting has now been fixed to take place in Vienna from March 24 to April 7, 1965.

Those concerned with the development of Colour TV in the UK will be especially interested to hear whether the delegations who a year ago considered insufficient work had been done for a choice to be made, have now carried out the necessary work to enable them to make a decision.

It would indeed be unfortunate if lack of agreement led the UK and one or two other countries in Europe to adopt a colour standard which later was different to that used by the majority of others. The present multiple standards for monochrome television in Europe in Band I and Band III may not be rectified for another ten years. It would be a serious matter if conflicting interests led to a repetition in connection with Colour TV.

J. C.

* *Members of a Colour Sub-Group of CCIR Study Group XI (Television).*

Bulletin Survey

MEMBERS who visited the Society's stand at the 1964 RSGB Radio Communications Exhibition will remember that BULLETIN questionnaire forms were available. A large number of these have now been returned to Headquarters and analysed. The analysis has produced a great deal of information to guide the Editorial staff and the Society's Technical Committee in the future.

Members' voting on the BULLETIN's regular features was particularly interesting. Topping the poll yet again was Pat Hawker's *Technical Topics* with an impressive score of 92 per cent. In second place was *Letters to the Editor* (86 per cent), which came in for some disapproval, however, from those who find some of the letters rather critical at times. *Society News* (now *News from Headquarters*) was a very close third at 81 per cent (this surely gives the lie to suggestions of apathy), followed by equipment reviews (79 per cent), with *Single Sideband* fifth at 67 per cent. *Four Metres and Down*, despite its specialized appeal, is enjoyed by 60 per cent of members, slightly ahead of *The Month on the Air*. *Contest News* was in ninth position with 54 per cent of members voting in favour. Information on new products—*Trade Winds*—is appreciated by more than half the BULLETIN's readers, but there were a number of features which failed to reach the halfway point. *Mobile Column*, for example, is read with interest by 42 per cent: bearing in mind that less than 2000 amateurs are licensed for mobile operation this is nevertheless a very reasonable level of appreciation. *QUA Associates*, clearly intended primarily for younger members, is liked by more than 36 per cent of the readership, a clear indication that there is a demand for technical information presented in an informal manner by members of all age groups.

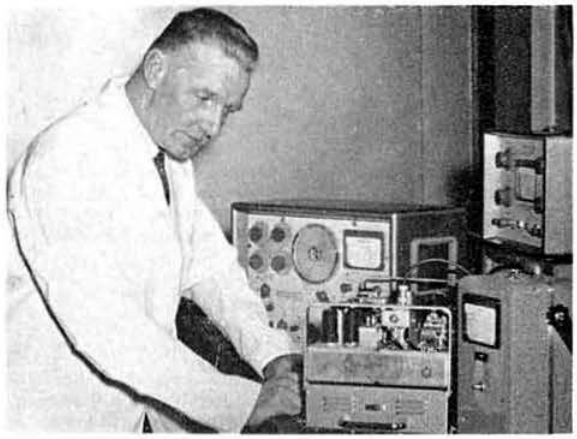
One of the questions asked was, " Has there been any article of which you particularly disapproved? " Only 19 per cent replied and only two mentioned the same article, a humorous one, published about two years ago.

The technical standard of the BULLETIN was considered to be about right by 87 per cent, too low by 11 per cent and too high by 5 per cent. The rest fell into the category of " don't know " and expressed no opinion. More space for technical and theoretical articles is suggested by nearly three-quarters of those replying but a reasonably large minority—14 per cent—thought that less space should be devoted to such subjects. On the other hand, nearly 70 per cent prefer constructional articles to those of a theoretical nature.

In addition to the replies to specific questions, many hundreds of individual suggestions were put forward and these are all being considered. To those members who took the time to complete the questionnaire, our thanks for a wealth of information.

J. A. R.

PROFILE



Edward G. Ingram, GM6IZ

Ted Ingram, GM6IZ, who has been a member of the Society's Council since August 1957, was born in 1906 at Huntly, Aberdeenshire, the home of 2JZ, one of the early pioneering amateurs. He was educated at the Gordon School, Huntly, and at Robert Gordon's Technical College, Aberdeen.

In 1923, he became one of the original shareholders in the British Broadcasting Company before it was a public corporation. At about this time, Ted joined a small radio manufacturing firm where the technical manager was 2VX who taught him radio, both professional and amateur.

For a time, Ted was second operator at 2VX, receiving his own call, GM6IZ, in July, 1925. From then on he took an increasing interest in all aspects of Amateur Radio and in the RSGB, holding office as District Representative during the 1930's. GM6IZ was the first Scottish operator to win a Society trophy in an open contest and took part in a number of the pre-war Loyal Relays. By 1932 he was active on 5m.

In 1935, Mr Ingram became technical adviser to Aberdeen City Police, for whom he developed a duplex communications system. In 1938 he joined the Police as a radio engineer and early in the war had completed a full duplex v.h.f. system, connecting all patrol cars with the police telephone system. He is still with the Police but is also now responsible for important Civil Defence functions including communications in all Scottish counties from Angus to Ross and Cromarty.

After the war GM6IZ was the leading Scottish operator in the ARRL DX C.W. and Phone Contests on a number of occasions. He is currently active on all bands from 1·8 to 144 Mc/s.

Ted became Zonal Representative on the Council for Scotland and Northern Ireland in August, 1957, following the resignation of the late GM2DBX. He became President of the Society in 1962, and at the invitation of the French Society, REF, visited Paris where he met the presidents of other European societies, a practice followed by his successors with great success. In addition to his many other activities on the Society's behalf, he has broadcast on Amateur Radio for the BBC and for Independent Television.

Noted for his forthright approach to life, Ted Ingram is a man of wide interests in addition to Amateur Radio and is considered, for example, to be a connoisseur of his country's best-known product. He lists golf and fishing among his sports.

The European Band Plan

The plan, which is voluntary and supported by all IARU Societies in Europe, is as follows:

Frequency Band Mc/s	Type of Emission
3·5 — 3·6	c.w. only
3·6 — 3·8	phone only
7·0 — 7·05	c.w. only
7·05— 7·1	c.w. and phone
14·0 —14·1	c.w. only
14·1 —14·11	RTTY and c.w.
14·11—14·35	c.w. and phone
21·0 —21·15	c.w. only
21·15—21·45	c.w. and phone
28·0 —28·2	c.w. only
28·2 —29·7	c.w. and phone

Vacancy on Headquarters Staff

There is an immediate vacancy for a keen, preferably licensed, member in his late 'teens to join Headquarters Staff.

The duties of the successful applicant will be concerned primarily with answering enquiries from members and the general public relating to Amateur Radio, but there are excellent prospects of increasing work as a member of the editorial team producing RSGB publications.

The ability to write lucid and informative letters, coupled with enthusiasm for Amateur Radio, is essential.

Applications, giving details of education, should be addressed to the General Manager, Radio Society of Great Britain, 28 Little Russell Street, London, W.C.1.

A recent visitor to Headquarters was JA3BB, seen here, left to right, with G3IIR, G6NZ, G3FZL and GM6IZ.

10 WATT TRANSISTOR TRANSMITTER

BY R. J. LEWIS, G3DXO*

A Design for Top Band using two AUY10s

LIVING as the writer does on a houseboat, Amateur Radio has its own special problems. By far the largest of these is power economy. The power supply at G3DXO is one 4½ h.p. petrol engine that drives two generators—one generator to charge a bank of 24 volt 200 A.h. batteries, the other to give a direct 240 volts d.c. for short term duty such as pumping water and vacuum cleaning.

For one reason or another, Amateur Radio is best carried on in a certain amount of peace and quiet, and so the whole station is run from the storage batteries. The overall efficiency of any 10 watt transmitter using conventional thermionic valves and rotary converters rarely exceeds

Fig. 1. Heat sink for TR2 and TR3.

25 per cent (usually very much less) so that a completely-transistor transmitter having a nil standby power requirement, even though the actual p.a. may be less efficient, has an overall efficiency that makes its valve counterpart look about as wasteful as going shopping in a steamroller!

The transmitter is divided into two parts. The drive unit, consisting of crystal oscillator and two buffer amplifiers, uses silicon transistors type 2S712. The output is taken via link coupling to the p.a. stage, which is made up as a separate assembly. The 2S712 transistor is manufactured by Texas Instruments Ltd. of Bedford, and the price at the time of writing was £1 11s. 2d.

A convenient way to make up the first three stages is to lay out the components, as near as possible to the positions as in the circuit diagram, on a piece of paper about 6 in. × 3 in., then to mark the positions of the ends of all the resistors and capacitors. Transfer the markings to a piece of paxolin sheet of the same dimensions as the paper. Holes may then be drilled, through which the wire ends may be passed, and the circuit wired up on the reverse side of the paxolin sheet. The coil formers, which can be almost any receiver-type bakelite or polystyrene former having the required dimensions, can be mounted on the paxolin board. TR1 may be wired in without a heat sink, but TR2 and TR3, however, should have a heat sink. These can be made up by bending a 2 in. length of ½ in. × 22 s.w.g. copper strip to the form shown in Fig. 1.

* Houseboat "Whimbrel," c/o The Old Ship, Heybridge Basin, Maldon, Essex.

Fig. 2 shows the complete assembly of the drive unit, and it will be seen that the drive is carried to the p.a. stage on two twisted pairs of wire. These may be any length to suit the convenience of the station. In the case of G3DXO the p.a. stage is situated in the window of the deckhouse, adjacent to the aerial feeder, while the drive unit and the receiver are at the operating position on the other side of the deckhouse, some 10 ft. away.

P.A. Transistors

The Mullard AUY10, though a germanium device, was used as a basis for the output stage because of its cheapness. According to the Mullard literature, the AUY10 is a germanium junction transistor of the *p-n-p* alloy-diffused type, intended for use in very high speed core driving applications. The frequency at which $h_{fe} = 1$ is stated as 60 Mc/s min., which means that at 2 Mc/s a useful gain can be obtained. It is possible to reach almost the theoretical maximum of 70 per cent efficiency using a pair of these devices in class B. The dissipation is quoted as 4·5 watts for the case temperature of ≤ 50°C. In practice, however, with a heat sink of 3 in. × 2 in. × 16 s.w.g. copper, the temperature can be kept down to just a few degrees above ambient, running at 10 watts input. On a dummy load the writer's transmitter has maintained 24 watts input for 1 hour without any sign of overheating or thermal runaway.

The p.a. circuit is a conventional class B except that it is turned upside down as it were, to fulfill two purposes: one to make the circuit compatible with the first three stages by using a power supply that is positive with respect to earth, and secondly, since the collector of the AUY10 is connected internally to the case, the case may now be earthed. In this design the heat sinks are bolted to the frame of the p.a. tuning capacitor and form the support bracket for the p.a. coil. The tuning capacitor is a standard 500 pF four-gang receiver-type component, two sections being paralleled together to make a 1000 pF two-gang capacitor.

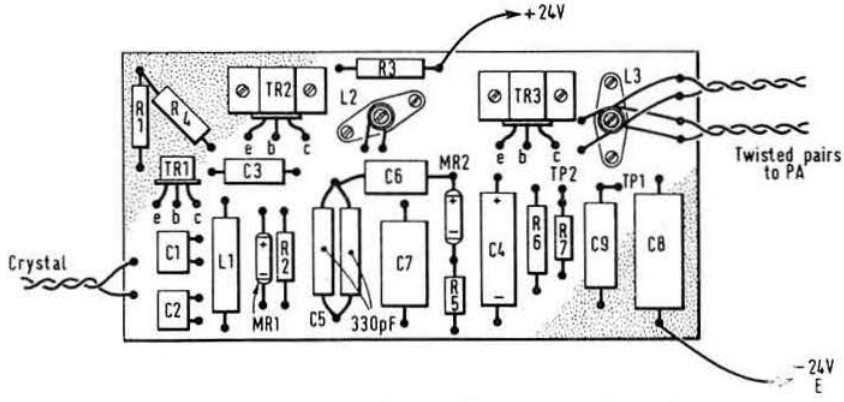


Fig. 2. Suggested layout of components on the paxolin board.

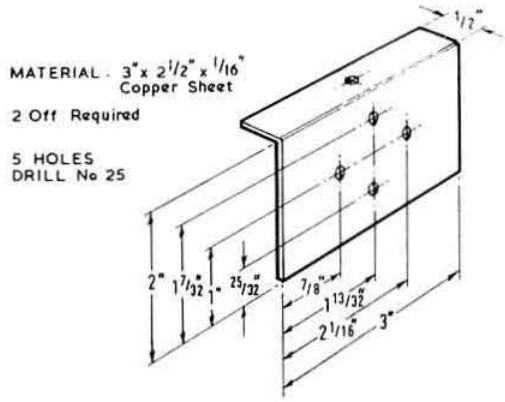


Fig. 3. The larger type of heat sink required for each AUY10.

P.A. Coil

The p.a. coil is made up of 26 turns of 16 s.w.g. tinned copper wire on a 2½ in. diameter former. The winding length is 3½ to 4 in. Short stubs of wire are soldered to each turn to provide taps. The centre tap carries the 24 volt positive supply, the emitters being connected at 3 turns on either side of the centre tap. Make up the two heat sinks for the AUY10's as shown in Fig. 3. Two-way stand-off insulators may be fitted to the 4BA fixing screws on the back of heat sinks to carry the 1 ohm resistors and to carry the twisted pair links to the drive unit. A sketch of the p.a. assembly is shown in Fig. 4.

Modulation

High level modulation is applied to the p.a. by conventional means. At G3DXO, very satisfactory modulation is obtained by utilizing an old 50 c/s heater transformer: three 6·3 volt 5 amp windings were connected in series to provide the secondary, while the primary is a single 6·3 volt winding. A 10K 1 watt resistor is connected across the

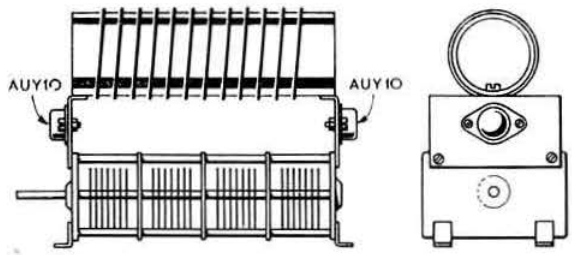


Fig. 4. The p.a. assembly.

original mains primary winding to avoid sparking over on peaks of modulation.

A pair of OC28's as a class B modulator give adequate modulation. The output impedance of two OC28's in class B is 3·75 ohms approximately.

Two AUY10's driven to 400mA at 25 volts = 10W = 60 ohms.

Therefore the correct turns ratio for the modulation transformer is:

$$\sqrt{\frac{60}{3{\cdot}75}} = 4 \text{ to } 1.$$

The complete circuit diagram, Fig. 5, with component notes, should be all the information that the average amateur requires. No details of a modulator or a cabinet are given.

The crystal oscillator does not key well in the G3DXO transmitter, therefore for c.w. use it is suggested that the second stage is keyed in the emitter circuit. Almost any old-fashioned diode may be used for MR1 and MR2; probably a semi-conductor type such as the Mullard OA5 would do. The writer found his on a bit of old printed board that was a bit of a computer or something! However, he would be pleased to give personal assistance to anyone who might find it difficult to get the transmitter going.

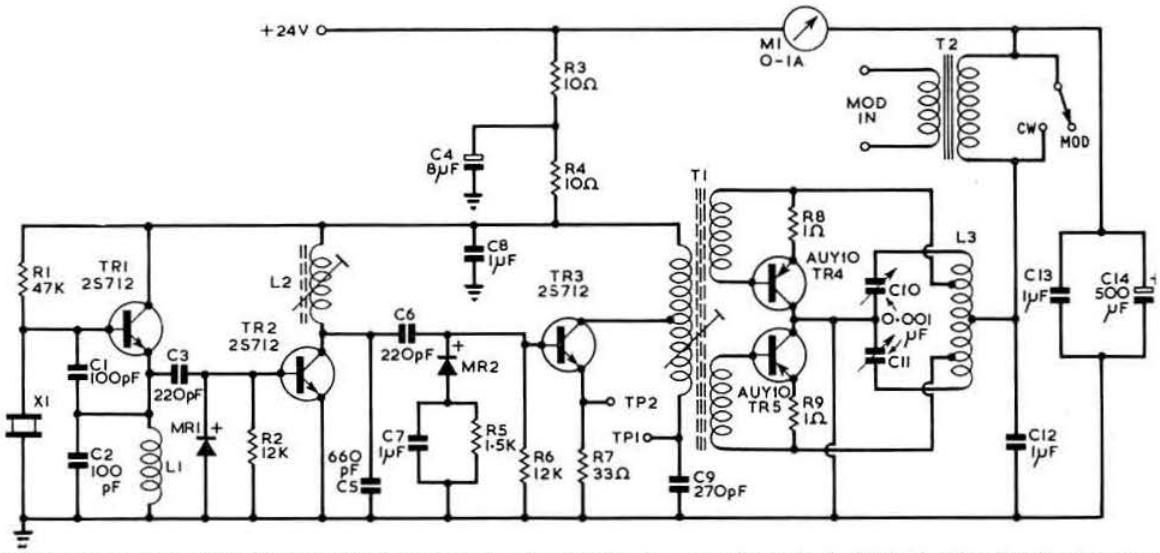


Fig. 5. The complete circuit of the Top Band transmitter. For c.w. operation, the emitter circuit of TR2 should be keyed, rather than the oscillator.

Testing and Tuning

Having assembled the drive unit it is probably best to check it with a dummy load before connecting up the p.a. In fact, by substituting a larger air spaced coil for the final 2S712 and replacing C9 with a variable air spaced capacitor to tune with about 400-500 pF the circuit becomes a useful QRP transmitter, running about 1 watt.

The circuit may be first tuned up on reduced h.t. The crystal oscillator should oscillate with anything upward of 6 volts applied. A small torch bulb of, say, 3·5 volts should be connected across each of the output windings of T1. Tune L2 and T1 cores for maximum output. If no glow is seen on the torch bulbs with 12 volts input, first ascertain that the crystal oscillator stage is working by listening on the station receiver. Slight modifications may be required to L1 for some crystals. The writer has only three Top Band crystals of the Government surplus variety, but they all perform well.

If an oscilloscope is available the circuit is best tuned by looking at TP1, where with 24V input a peak-to-peak sine wave of some 80V should be seen, or at TP2 where approximately 6V peak-to-peak should be seen. Corresponding d.c. measurements should also be made, whether or not an oscilloscope is used, and should be as follows:

(Taken with a high resistance meter such as AVO Model 8.)
Base of TR1 +0·4 volts.
Base of TR2 +1·3 volts.
Base of TR3 +1·7 volts.
TP2 +1·25 volts.

The total input current to all three stages should not exceed 70mA. If it does exceed this figure L2 should be detuned slightly to achieve this. At 12 volts input the current should be approximately 20 mA with a peak-to-peak output of 15 volts at TP1.

(NOTE: The peak-to-peak output voltages depend upon the output load—the figures given represent the no-load condition.)

When the first three stages are working satisfactorily the p.a. may be connected. Before the supply is switched on a 24 volt 12 watt lamp should be connected across three turns of the p.a. coil somewhere about the centre to serve as a load, and the p.a. capacitor set to about half-mesh. The link coupling should at this stage be disconnected.

Switch on the 24 volt supply and check that no current is indicated on M1. Switch off and connect one of the output windings of the drive unit via the link coupling to the p.a. Detune the core of T1 by some three or four turns, then switch on and adjust the core of T1 for an indicated current in M1 of 200mA. Tune p.a. capacitor until lamp glows, and readjust core of T1 for 200mA. Switch off and connect second link from drive unit, switch on, and if brilliance of load lamp decreases the phasing is incorrect and the second pair of the outputs from the drive unit should be reversed. If the phasing is correct, indicated by increased brilliance of load lamp, the p.a. tuning capacitor should be readjusted for maximum dip, and core of T1 adjusted until 10 watts input is obtained. (About 400mA).

After the p.a. has been running for a few minutes a check should be made to ensure that neither of the AUY10's is overheating. They should both be at the same temperature, just warm to the touch, but not sufficiently hot to burn your finger. Do not bother to prod around with a neon tube for signs of r.f. With a crystal of between 1900 and 2000 kc/s the p.a. should tune with almost maximum capacity. The p.a. tuning should now be checked for spurious oscillations—there should be none if you have laid it out well, though with almost minimum capacity it should be possible to detect doubling in the p.a. There should be no confusion, however, as the output at double frequency is much less than on the fundamental.

Modulation may now be applied, and any of the usual means of checking modulation may be used. *WARNING* Do not modulate the p.a. without a load as you may damage the AUY10's.

When the transmitter is working satisfactorily into a dummy load the aerial may be connected. In the G3DXO installation the aerial is 100 ft. end-fed, connected directly to the p.a. tuning coil at two turns from the centre tap, which together with a good straight earth of 16 s.w.g. copper wire direct to the water gives excellent results. Any of the usual methods of coupling an aerial may, however, be used, though it may be difficult to obtain a sufficiently tight coupling to the p.a. A suggested scheme for a whip aerial is given in Fig. 6. This arrangement has also given excellent results.

A 1 amp fuse should always be kept in series with the 24V feed to the transmitter to guard against accidental shorts or thermal runaway.

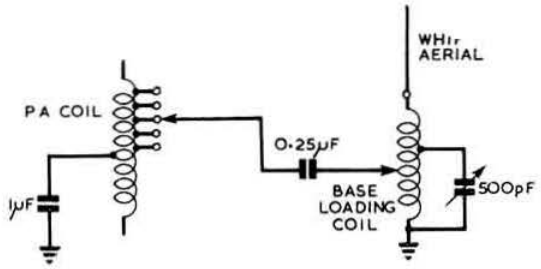


Fig. 6. A satisfactory method of connecting a whip aerial to the p.a.

COMPONENT NOTES

L1, about 100 turns 36 s.w.g. enamelled wire on a ⅜ in. former 1 in. long.
L2, 30 turns 28 s.w.g. enamelled, $\frac{1}{16}$ in. diameter ½ in. long former, dust core tuned.
L3, 26 turns of 16 s.w.g. tinned copper, 2½ in. diameter 4 in. long former.
T1, *primary*, 45 turns 28 s.w.g., tap at 15 turns from cold or h.t. end, former $\frac{1}{16}$ in. diameter ½ in. long, dust core tuned. Secondaries 1 and 2, 2 turns loosely coupled to cold end.
C10, C11, made up by strapping two sections of a four-gang 500 pF receiver-type capacitor. (Should tune Top Band with nearly maximum capacity).
C1, C2, C3, C5, C6, C9 should be mica dielectric.
C7, C8, C12, C13, paper dielectric.
T2, in the prototype, was a heater transformer with four 6·3V secondaries. *Primary* is one 6·3V winding; *secondary* three windings in series giving 3 : 1 to match the modulator output impedance (if a mains transformer is used, the primary winding should have a 10 K ohms resistor wired across to prevent flashing on peaks of modulation).
MR1, MR2 in prototype were CV448. These components together with C7 and R5 may be omitted if sufficient drive is available to drive the AUY10s to 10 watts without them.
R8 and R9, 3 watt wire wound.
R7, ½ watt carbon.
All other resistors may be ½ watt carbon.

Morse Code Proficiency Tests from G3BZU

The Royal Naval Amateur Radio Society is dispensing with its QRQ Morse practice transmission on 1880 kc/s at 19.00 GMT on the first Tuesday in each month, which will be replaced with a qualifying run. This has been done in view of recent skip conditions, which make Top Band easier to copy by UK stations than 80 metres. The 20.00 GMT transmission on 3550 kc/s has not been changed, although it will, of course, consist of different text to the 1900 GMT run. Details of these tests were published in the November, 1962 issue of the RSGB BULLETIN.

POCKET-SIZE CR BRIDGE

By A. S. CARPENTER, G3TYJ*

ALTHOUGH resistor values are normally easily recognized due to colour coding, many capacitors are not, particularly if they have been lying around for some time. When building a new piece of equipment from a proved design it is normally advisable to obtain new and reliable items for use therein, but this is uneconomical to the experimenter who frequently makes use of components already available. Capacitors handled overmuch are apt to lose their legends and a box of " doubtfuls " can result. Doubt can be eliminated, however, by using a measuring bridge,

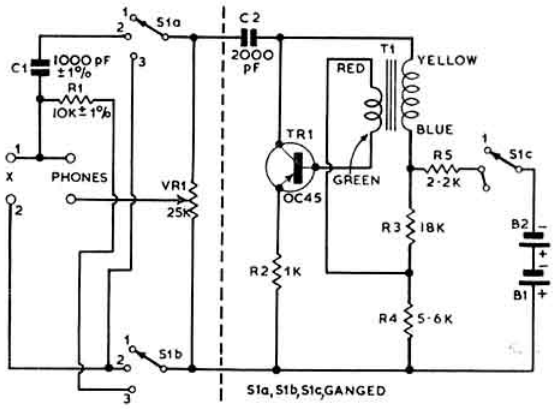


Fig. 1. The circuit of the CR bridge. S1, position 1—OFF, position 2—C, position 3—R.

and such an instrument can be constructed quite cheaply. For the purposes envisaged the device need not be to laboratory standards, reasonable accuracy being adequate.

A Practical Unit

The circuit diagram of a simple CR bridge—and which can be duplicated in about four hours—is given in Fig. 1. The section to the left of the broken line represents the bridge proper, the remainder being the energizing oscillator. Control of the completely self-contained unit is effected by the ganged switch S1a, b and c. Position 1 is OFF, position 2 allows capacitors in the range of 20 pF to 0·1μF to be measured, and in position 3 resistors can be measured over a range of 200 ohms to 1 Megohm. Additional ranges could be incorporated by utilizing a switch with more positions, or alternatively different ranges could be catered for by modifying the value(s) of the capacitance or resistance standards, C1 and R1. If, for example, R1 is reduced to 1 K ohm, the measurable resistance range becomes 20 to 100,000 ohms.

The capacitance range may also be changed by, for instance, a factor of 10, by making C1 10,000 pF. Dividing the value of C1 by 10 in an attempt to obtain a lower capacitance range is hardly practicable, however.

The oscillator will function from a source voltage of 1·5, but double this potential is preferable. Power is best obtained from a pair of Penlight cells in series; although the physically smaller Ever-Ready D22 may be preferred. The current drain—about 150 μA—is negligible. The complete oscillator is, in fact, so small that it can be placed inside a matchbox—3 volt battery included!

Construction

The sub-miniature oscillator is quickly constructed by utilizing a small piece of Veroboard as the base element. Veroboard consists of thin paxolin sheet, plain on one side but covered on the reverse side with parallel strips of thin copper foil, each 0·1 in. wide and spaced 0·1 in. apart. Holes pre-drilled at 0·2 in. intervals in the stripping provide a matrix on which various pseudo-printed circuits may be rapidly assembled. The required Veroboard section is shown in Fig. 2 (a), where five conductor strips, each carrying eight holes, are indicated. Such a piece can be quickly cut from a larger sheet using a hacksaw blade, keeping the conductor side uppermost during the process. A channel is then cut across the board at point X to sever the conductor strips, and a further slit is made at point Y. Holes *3b*, *6b*, *2e* and *7e* are also enlarged slightly.

Referring to Fig. 2(b), as the transformer T1 is supplied complete with a mounting clamp, the lugs are bent over inwards along strip *b*. One end of R4 and R2, plus a thin p.v.c. covered lead are also inserted with the lugs before solder is applied. The other items are mounted as shown,

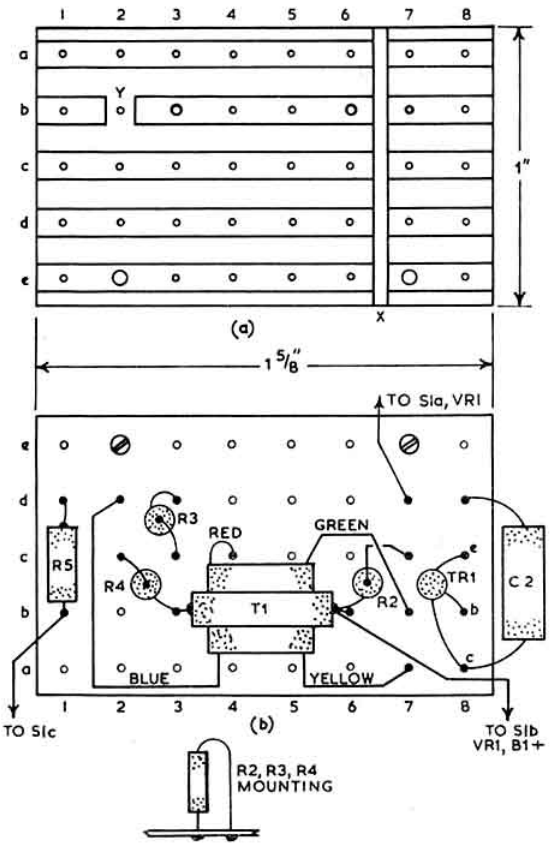


Fig. 2. Details of the audio oscillator.

* 15 Portway, Frome, Somerset.

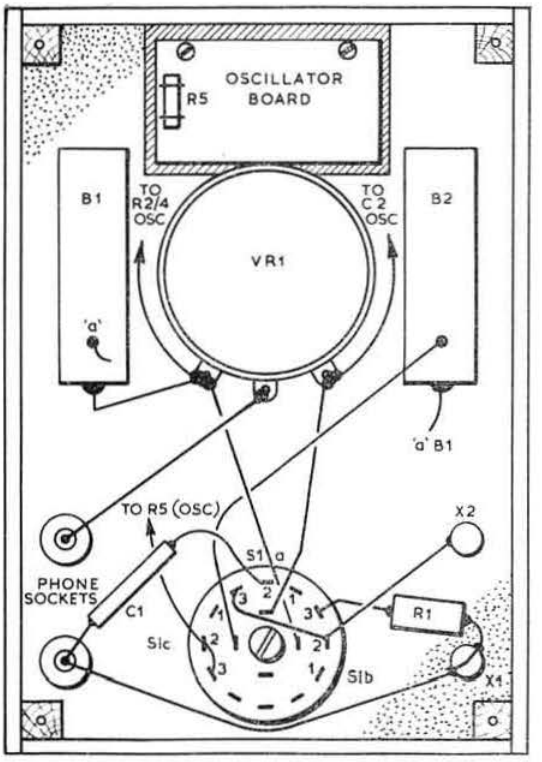


Fig. 3. Interior layout and wiring.

except for C2 which is shown displaced for clarity. Resistors must be sub-miniature types and mounted as indicated.

Most of the construction is carried on a piece of polished paxolin 6 in. × 4¼ in. × $\frac{1}{16}$ in., this material being pleasant to work with. The various connections may be seen in Fig. 3. To avoid defacing the front a rectangle of wood ¼ in. thick is glued to the inside above VR1, and the oscillator board is finally fixed to the wood using small screws. Batteries B1 and B2 are also glued to the inside of the panel using a modern powerful impact adhesive. The 'phone outlet is the conventional twin-socket type, whilst the terminals for X1 and X2 were obtained from a defunct 4·5 volt bell battery.

The case consists of a 1¼ in. deep frame which forms the sides, and is also glued in position. The weight is negligible, but rigidity results from fitting wooden corner butts. Complete dimensions of the simple casing are given in Fig. 4. The back is made of paxolin sheet shaped as shown, and is held in place with a ¼ in. wood screw at each corner, whilst the extension at the top enables the device to be hung up out of harm's way when not in use.

B1, 2	1·5 volts Penlight Batteries
C1	1000 pF silver mica, 1%
C2	2000 pF ceramic
R1	10K ohms, 1%
R2	1K ohm, 10%
R3	18K ohms, 10%
R4	5·6K ohms, 10%
R5	2·2K ohms, 10%
S1	Miniature 4 pole 3 way or 3 pole 3 way rotary switch
T1	Sub-miniature transistor transformer, Ardente D1001 (T1079)
TR1	OC45
VR1	25K ohms wirewound

Calibration

A few capacitors of one per cent tolerance are required to enable scale markings to be made, and although various series, series-parallel and parallel combinations can be calculated which will fulfil all requirements, by obtaining two 4000 pF, one 1000 pF, and a few 100 pF close-tolerance capacitors, much tedious work will be avoided.

The initial calibration scale is only required to be accurate, and tidiness is unimportant. Later, it may be removed and placed over a piece of Bristol board or white card when pin-pricks of the original calibrations can be made. Numerals may then be carefully marked on the new scale material using Indian ink and a bow pen as necessary. With the final scale glued firmly to the panel, the pointer knob may be set using a one per cent test capacitor across the *X* terminals. It will be found that the scale tends to become congested on the right hand side, whilst 1000 will be at mid-scale.

Using the Bridge

In practice, VR1 is operated in conjunction with the calibrated scale, high impedance 'phones being connected to the appropriate sockets. VR1 should not be a miniature type, and the potentiometer used in the prototype was an ex-Government item manufactured by Colvern. A capacitor

(Continued on page 185)

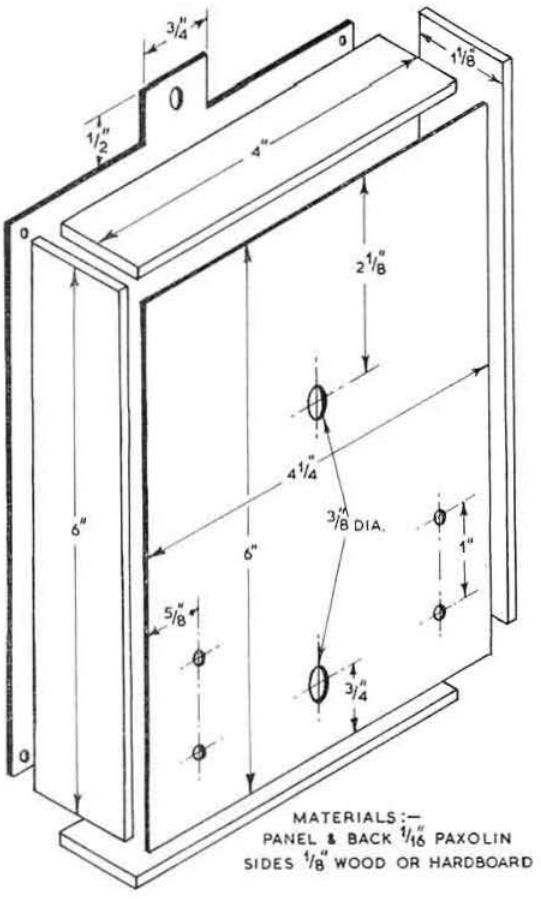


Fig. 4. Mechanics of the casing.

QRA Locatormanship

By R. C. HILLS, G3HRH*

SOME seven or more years have now elapsed since the introduction of the QRA Locator system at the V.H.F. Manager's Conference held in The Hague in October, 1959. Although this has been widely adopted on the Continent, the system has been slow to find favour among UK operators. The preparation of a suitable UK map, albeit with some unfortunate errors attributable to the speed with which it was produced, helped to increase interest, but the system has continued to be viewed with suspicion and lukewarm enthusiasm by most UK v.h.f./u.h.f. stations. The Society's V.H.F. Contests Committee is planning to come into line with the internationally agreed practice, by including the QRA Locator as part of the contest exchange in the National contests held on IARU calendar dates, and the object of this article is to try to dispel any doubts which may exist as to the usefulness or means of using the QRA Locator system.

The Table Top Gazetteer

The QRA Locator system is, exactly as its name implies, a means of specifying or locating an address or geographical position (QRA or QTH) by a uniform coding applicable to a large area of land including many different countries. The keyword is uniformity. Most countries in Western Europe have systems of national maps covering their own country, e.g., the Ordnance Survey (UK), and Michelin (France). These maps are to varying scales and projections and it is very difficult to work out distances involving two such map systems to any degree of accuracy. Certainly there exist also complete maps of Western Europe by various publishers, but these in turn are of too small a scale to show all but the largest towns and cities. Thus it becomes necessary to possess not only the large scale national maps to locate the position of a certain town, but also the international map on which to re-locate the town and thus measure the distance. Even then, due to errors of projection, the distance may appear to vary from map to map.

A further system of geographical location which at least has the advantage of international uniformity is the world system of latitude and longitude based on the equator and Greenwich meridian. From a knowledge of the exact latitude and longitude of two places, an accurate great circle computation of distance is possible by spherical geometry. The disadvantage of the latitude/longitude system for contest work is that the codes to be exchanged are involved, there is too much information (i.e., the position is uniquely specified on the Earth's surface, whereas we know, from the international prefix of the station's call-sign, his approximate position on a world-wide basis), and because of the " polarity " at the Greenwich meridian, there is a distinct possibility of an error due to incorrect copy of the polarity letter " E " or " W."

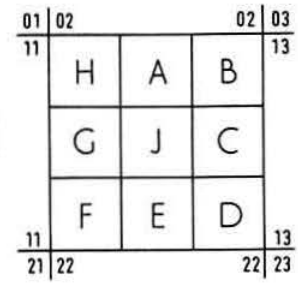


Fig. 2. The QRA Locator System: tertiary division. The illustration refers to secondary square No. 12.

The preferred system is one which acts as an addition to the positional information of the call-sign, uses a simply derived code, and permits the cheap production of a uniform continental map on which all positions can be quickly determined and distances measured. Note that a uniform map is required to overcome the difficulty of incompatible projections. Such a system is the QRA Locator system. Derived from latitude and longitude, a simple five figure code specifies a station position to an accuracy of better than 2·5 km, without ambiguity, and a map can be cheaply produced because basically it does not require a map at all, but merely a grid with a scale. In practice, it suffices to be a map of European countries with principal towns added as a refinement, and the grid superimposed. On this map can be pinpointed any station whose QRA Locator is known, and thus it is truly a table top gazetteer of Europe.

* RSGB V.H.F. Manager, 73 Warren Way, Digswell, Welwyn, Herts.

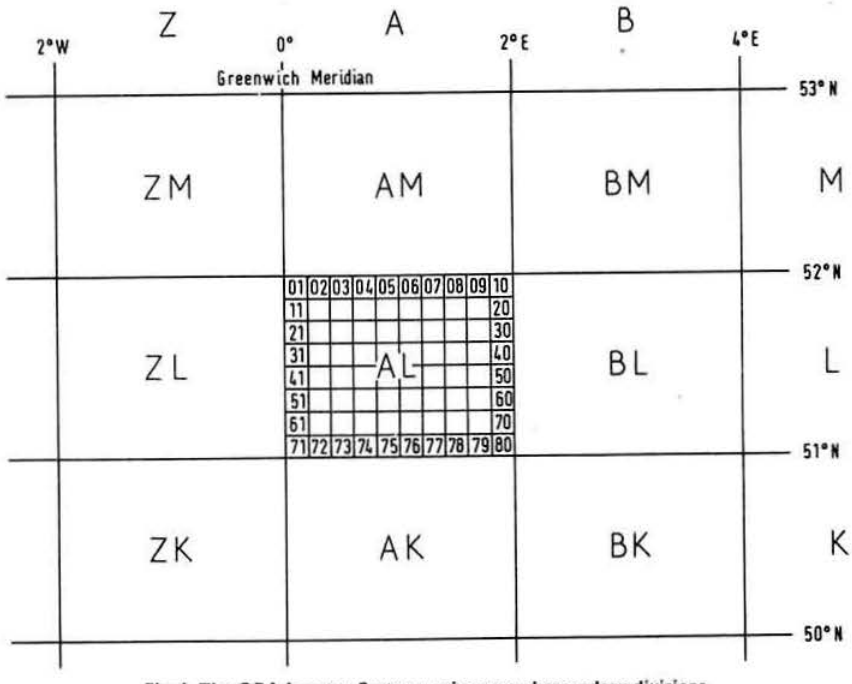


Fig. 1. The QRA Locator System: primary and secondary divisions.

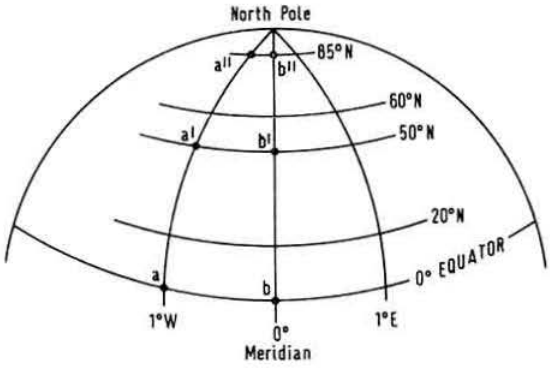


Fig. 3. Variation of scalar length of the arc of 1° of longitude, measured on the earth's surface at varying degrees of latitude.
At the Equator, ab = 60 nautical miles.
At 50° N, a'b' ≏ ab cos 50° = 37·7 nautical miles.
At 85° N, a''b'' ≏ ab cos 85° = 5·2 nautical miles.
At 90° N (North Pole), ab reduces to zero.

Five Kilometre Squares

The QRA Locator is based on a grid, which is similar to the well known Ordnance Survey grid system in that it has a false origin, but is significantly different in that its origin and the divisions of the grid are directly related to latitude and longitude. In the OS case the grid is based on 100 km squares with metrical division.

The basic " square " of the QRA Locator map measures 2° of longitude by 1° of latitude. These basic squares are lettered Z to the west of the Greenwich meridian 0°, and A to the east. Further west, each square is one letter lower in the alphabet and further east one letter higher. Thus 0°–2° W is Z, 2°–4° W is Y, 4°–6° W is X, and so on. Similarly 0°–2° E is A, 2°–4° E is B, and so on. Reading north and starting at latitude 40° N, each basic square (which is 1° tall in this sense) is lettered from A upwards, increasing by one letter for each degree. Thus 40°–41° is A, 41°–42° is B, and so on. Thus the basic square formed between the limits 0°–2° W and 51°–52° N is uniquely described by ZL, and similarly the one 0°–2° E by 51°–52° N is AL.

Each of the basic squares is broken down into 80 smaller squares: ten from east to west by eight from north to south. These squares are numbered in horizontal rows commencing at 01 in the top left hand corner and ending in 80 in the bottom right (Fig. 1). Then each of these smaller squares represents an area of 12 minutes of longitude by 7½ minutes of latitude.

The final subdivision of the small squares is into nine unit squares (3 × 3) (Fig. 2). These are lettered commencing with A for the upper middle and progressing clockwise around the matrix. The centre square is lettered J. By simple arithmetic it can be seen that each of these unit squares measures 4 minutes of longitude by 2·5 minutes of latitude. If these dimensions are converted into distances measured on the Earth's surface, based on an approximate latitude of 52° N, it will be found that they are almost exactly 5 km square. The apparent conversion from unequal to equal side lengths results from the reducing scalar arc of a degree of longitude, as one progresses from a value of 60 nautical miles at the Equator to zero at the poles (Fig. 3). Thus when considered on a plane projection map, the unit division of the QRA Locator Map is indeed a true square.

Then a typical QRA Locator code would be:

This refers to a station located at 51° 48′ 45″ N ± 1′ 15″ and 0° 10′ 0″ W ± 2′ 0″, and determines the position of that station to an accuracy of ± 2·5 km in either sense, if one accepts the locator code as referring specifically to the point in the centre of the smallest subdivision square. In fact, this is the code group for the writer's own QRA at Digswell, Hertfordshire, and the actual error in distance incurred by taking the position as the centre of the smallest square is 2·24 km in a south-easterly direction, or very nearly the maximum possible error of the system. Since the overall spread of large towns is usually greater than 2·5 km anyway, the QRA Locator method can guarantee accuracy equal to the " 5 miles NNE of Luton " method, and better accuracy when it comes to " 35 km SW of Düsseldorf," particularly if the latter is passed over in the vernacular, under conditions of fading or contest QRM!

Where Am I?

Using the QRA Locator falls into two distinct requirements. The first is to determine one's own locator code, which will thereafter not vary for a fixed station. The second is the conversion of received codes into a position for either measurement of distance or geographical location.

Dealing with the " home " end of things, since it is only necessary to compute the code once for a fixed station location, this can be done quite precisely in a few minutes with a 1 in. = 1 mile OS map of one's home position. It is not even necessary to purchase the map—a visit to the local library will suffice together with a five minute reference loan.

The object of this part of the exercise is to determine as accurately as possible the latitude and longitude of the home station. The scale on all edges of the OS sheet is calibrated in degrees and minutes of both latitude and longitude, and a ruler can be used to interpolate to at least 10 seconds. Laying the ruler edge through the QRA position on the map, read off the appropriate figures on the edge scales. In the case of the previous example, the figures obtained for the writer's QRA were 51° 49′ 24″ N and 0° 11′ 38″ W using OS Sheet 147, 7th Edition.

Having obtained this information, the conversion to a QRA Locator code is simply a process of arithmetic using the rules given earlier. Again for the example quoted:

(a) *Basic Square* The position lies within the limits 51°–52° N, and 0°–2° W. Therefore the first group is *ZL*.
(b) *Coarse Division* The position lies within the limits 45–52·5′ N, and 0–12′ W. Therefore the second group is *20*.
(c) *Fine Division* The position lies within 47·5–50′ N and 8–12′ W. Therefore the final letter is *G*.

Having completed this exercise, one half of the code exchange is now established for all time.

Where Are You?

The other half of the exchange will be a similar QRA Locator code in five symbols, and in deciding how to apply this information, one needs to consider the use one wishes to make of it. The most frequent use of the QRA Locator system is in contest work. In such cases the use of the system is aimed at the rapid measurement of distance, on which the points scored for the contact are based. To obtain the distance, it is only necessary to plot the point on the QRA Locator map, and with a suitable ruler scale the distance between that point and one's own point, plotted from the home station QRA Locator code. This gives an answer directly in distance. To do this it is not even necessary to have country borders marked on the map, let alone towns, because the points could be plotted on the QRA Locator grid alone with the addition of a distance scale. This is the real simplicity of the system—it is *not* necessary to know geographically where the other station is, or to search a

map for the name of his town or village. A knowledge of the QRA Locator code alone is all that is needed to fix the distance to an accuracy of better than 5 km.

Why Should I?

The critics of the system will no doubt offer several comments at this stage so let us examine these in turn and see if there is an answer.

Q. " *Map scales vary, and so do the projections used.*"

A. This is true, but equally true of measurements made when positions have been established by a pure geographical reference, which as we have seen has other disadvantages as well. By using the QRA Locator system and a universal map of Europe, everybody will be subject to the same errors, including the Contests Committee who will be using the same map to check the claimed distances. This gives at least a fairer system to all competitors, albeit the actual distances used are not exactly true figures.

Q. " *This is all very well, but could it not be overcome by stipulating a particular map of Europe to be used by all competitors and judges?*"

A. Again true; however a map of Europe giving sufficient detail of towns to locate stations on a geographical basis would be expensive, large, and not necessarily available in, or indeed acceptable politically by all Region I IARU countries. This, of course, assumes that even possessing such a map, one could locate the actual town involved within a reasonable time, and without ambiguity in the case of towns of the same name (how would a Frenchman manage with a QRA given as " Whitchurch " ? There are three listed in the *AA Handbook*!).

In contrast, because of the complete lack of geographical information necessary to its use, and the fact that its open nature has no need of high definition printing, a standard QRA Locator map of Europe can be produced very quickly and cheaply, and made available to all Region I IARU societies.

Q. " *All right then. If I do use the QRA Locator map and system, I stand to lose a possible 5 km on every distance I measure, because distances are taken to the centre of the smallest square, and I shall be at a disadvantage to other competitors. Is this not true?*"

A. Not necessarily. In the case of the possible 2·5 km error at the far end, this will be the same for other stations in your broad area. In the case of the 2·5 km error at your own end, unless you are right on the edge of the activity, your contacts will be made in all directions, the effect of the error will tend to cancel out. In any case you might well lose more points by measuring to the wrong place if the other QRA is at all ambiguous or vague when defined geographically. Bear in mind that the Contests Committee will be measuring on the same map and using the same QRA Locator code groups that you have used.

Q. " *By making an error in the recording of one character in the code group of the other station, I could be wildly out in the distance measurement.*"

A. Perhaps you deserve to be! However the position is not as bad as that. Firstly by consulting other logs the Contests Committee can quickly ascertain the correct code for the other station, and measure and adjust your score. Also, in the face of the usual " 599 " report exchanged in contests, to make the contact a genuine exchange of information a further code group is necessary. The QRA Locator code fulfils this requirement and gives the Contests Committee a simple and uniform means of imposing penalties for incorrect copying of contest exchanges.

Q. " *All this QRA Locator business seems to be geared up to making the checking of contest logs more uniform and faster.*"

A. Yes indeed. And this is to your distinct advantage. It produces a fairer contest, reduces the margin for doubt about measured distances, and slashes the time taken for a log to be checked. The net result is a much faster declaration of results, and the reduction of the arduous part of Contest Committee work, releasing them to give the proper time to the broader matters of contest operations, and perhaps to fit in more contests during the calendar.

Q. " *All right, I am convinced. Where do I get my Universal map?*"

A. From RSGB Headquarters, price 5s. post free. This is the map based on a 1000 km radius on Brussels, produced by the UBA, and which covers all Europe from Eire to Poland, and from Sweden to Spain and Corsica, on a 1: 2,500,000 scale. This map will be used by the RSGB Contests Committee, and also by Region I societies judging the international events.

Dead Reckoning

In addition to contest work, the QRA Locator code simplifies the business of pinning down a location in some distant country. The name of a foreign town may well sound different from the way it is spelt, and even when spelt out, may leave one rather in the wilderness. France is a big place in which to find one particular town and even a general reference to a nearby larger town may not be of much assistance. By adding to the verbal QRA the appropriate QRA Locator code, a great deal of " atlas browsing " can be eliminated. In such cases the QRA Locator code is converted back into latitude and longitude, and then plotted on the detailed map of the country concerned. It is then only necessary to search in an area of approximately 2·5 km radius to find the exact position of the specified town or village.

Thus flexibility of conversion from latitude/longitude to QRA Locator code is a very useful tool, and by adopting the QRA Locator system, much of the argument and doubt about distances and locations can easily be eliminated.

After all, do you know the exact whereabouts of Heidelburg? Could you find Machynlleth on a map in ten seconds? Or Hexham for that matter?

★ ★ ★

The writer wishes to express his thanks to Mr R. G. Flavell, GM3LTP, who provided the explanation of the breakdown to latitude and longitude.

GB2RS SCHEDULE

RSGB News Bulletins are transmitted on Sundays in accordance with the following schedule:

Frequency	Time	Location of Station
3600 kc/s	9.30 a.m.	South East England
	10 a.m.	Severn Area
	10.15 a.m.	Belfast
	10.30 a.m.	North Midlands
	11 a.m.	North West England
	11.30 a.m.	South West Scotland
	12 noon	North East Scotland
145·10 Mc/s	9.30 a.m.	Beaming north from London
	10.00 a.m.	Beaming west from London
145·8 Mc/s	10.15 a.m.	Beaming south from Belfast
145·30 Mc/s	10.30 a.m.	Beaming north west from Sutton Coldfield
	11.00 a.m.	Beaming south west from Sutton Coldfield
145·50 Mc/s	11.30 a.m.	Beaming north from Leeds
	12 noon	Beaming east from Leeds

News items for inclusion in the bulletins should reach Headquarters not later than first post on the Thursday preceding transmission. Reports from Affiliated Societies and from non-affiliated societies in process of formation will be welcome.

IQSY—The Work of the First Year†

By G. M. C. STONE, A.M.I.E.E., A.M.I.E.R.E., G3FZL*

THE primary object of the Society's IQSY programme is to study the nature of radio reflections from aurora borealis on frequencies in the 28-29·7 and 144-146 Mc/s amateur bands. The following aspects are being studied:

(*a*) the date, time and duration of auroral events;
(*b*) the correlation with the earth's magnetic activity;
(*c*) a comparison between the results on h.f. and v.h.f.;
(*d*) the direction from which echoes appear to come;
(*e*) the apparent movement of reflecting areas;
(*f*) fading rates of returned signals.

In addition, investigations are being carried out into sporadic *E* propagation using the same network of observers in the 28-29·7 Mc/s band, as this form of propagation exhibits an anti-correlation to auroral events, and into tropospheric propagation in the 144-146 Mc/s band.

Close collaboration is being maintained with the Deutsche Amateur Radio Club who are conducting a similar programme and a regular exchange of data is maintained. However, the DARC and RSGB appear to be the only national Amateur Radio societies in the world which have organized programmes for the IQSY.

GB3LER at Lerwick

An automatic transmitting station has been operational from The Observatory, Lerwick, since July, 1964, with the following equipment in use:

H.F. A crystal controlled 50 watt output transmitter operating continuously feeding a three element Yagi aerial array beamed to the magnetic north. Frequency 29.005 Mc/s.

V.H.F. A crystal controlled 25 watt output transmitter operating continuously feeding two six-over-six Yagi aerial arrays alternating two minutes to north-north-east and one minute to south. Frequency 145·995 Mc/s.

The reason for switching the v.h.f. aerial is to give a signal source for tropospheric propagation experiments and also to provide reference signals at the nearer receiving stations.

Since GB3LER became operational we have received a request from the Deutsche Bundespost to install another 28 Mc/s three element aerial array beamed on Darmstadt to give them a signal source for their own sporadic *E* and auroral reflection study programme. At the same time it is intended to change the aerial switching sequence to switch both h.f. and v.h.f. aerials simultaneously, five minutes in a northerly direction and five minutes in a southerly direction, synchronized to the Lerwick Observatory master quartz crystal clock.

Application has also been made to the GPO for permission to install another transmitter operating in the 70·1-70·7 Mc/s amateur band to provide information at a frequency between the two present transmissions. We are also planning to install a power amplifier to the 146 Mc/s transmitter to increase the power output to 120 watts for use when magnetic activity or meteorological conditions warrant it.

Receiving Stations

The most important receiving station is installed at the Technical College, Thurso, and is fully automatic, operating continuously on a frequency of 29·005 Mc/s. It has a three element Yagi aerial array beamed north-north-east and the output from the receiver feeds a pen recorder. Another v.h.f. receiver feeding a pen recorder is located at the home of A. J. Oliphant, GM3SFH, in Thurso.

A number of receiving stations have also been set up by members at home, many of whom are equipped to receive on both h.f. and v.h.f. Observers in the British Isles are located principally in Scotland although there are strong elements in Northern Ireland, the Midlands, Worcestershire and the Home Counties. Observers are also located in the Faeroe Islands, Greenland, Sweden, Denmark, West Germany and France as well as two in Central Africa.

It is planned to add additional automatic h.f. receiving stations at North Berwick, Birmingham, Southall, Middlesex, and at Thurso.

Our main effort is being concentrated on results in the 29 Mc/s band as both auroral reflection and sporadic *E* propagation are more common on that band.

Communications Network

To keep observers in touch with one another and to pass Geoalerts, a communications network has been established on a frequency of 3783 kc/s using s.s.b. The control station of the net is GM3LTP at Lerwick, who passes daily at 19.15 local time information concerning magnetic activity, derived from the Lerwick magnetometers, Ursigrammes, Geoalerts, the likelihood of anomalous propagation on v.h.f. and other data of interest to the observers. Those not equipped with transmitters can nevertheless receive this information which keeps their interest stimulated by this direct contact with a very active magnetic observatory. This network has been supplemented by the use of the GPO telephone network to pass urgent information based upon the IQSY geoalert warnings received from the Radio Research Station, Slough.

In addition to the daily IQSY net a monthly newsletter is sent to all observers. Specific instructions are included as necessary in these reports although two basic data sheets, one concerning auroral and the other concerning sporadic *E* propagation, have been sent to all observers.

First Results

A number of pen recordings have been obtained from the automatic receiver at Thurso. These are being studied at present and are being compared with recordings obtained from the magnetometers at Lerwick.

Many other reports have been received from observers, mostly concerning the reception of the 29·005 Mc/s transmissions by auroral or sporadic *E* propagation and also of the 145·995 Mc/s transmission by tropospheric propagation. Only two reports of the reception of the v.h.f. transmission by auroral reflection have been received, compared with the very large number received during the IGY and IGC. This was of course to be expected and this is the reason for concentrating on h.f. observations.

Of particular interest have been reception reports on the h.f. transmissions by auroral reflection in the Faeroe Islands, by probably *F2* ionospheric propagation in Central Africa, and of the v.h.f. transmissions at the extreme range of 1100 miles by tropospheric propagation.

It is hoped to add to the data already being received by data collected at the new automatic receiving stations and especially from the Deutsche Bundespost at Darmstadt.

Apart from these stations the number of active observers is increasing steadily, there being some 67 at present.

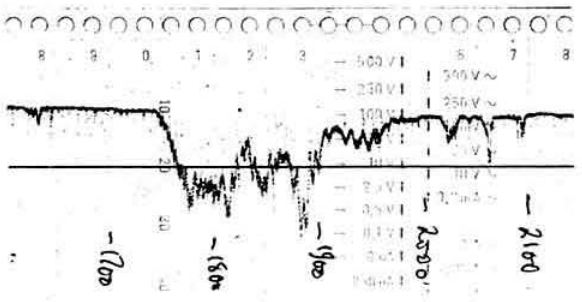
Analysis of Results

The Scientific Studies Committee has appointed two co-ordinators of observational activity. They are R. F. Stevens, G2BVN, *H.F.* and C. E. Newton, G2FKZ, *V.H.F.*

(*Continued on page 166*)

† Based on the first progress report to the Royal Society on the Society's IQSY programme.

* Chairman, Scientific Studies Committee.



A typical pen recording of a signal received during an auroral disturbance.

Two members of the S.S.C. are also experts professionally. The first is R. G. Flavell, F.R.Met.S., GM3LTP, who is a radio meteorologist employed by the DSIR, his particular interest being the study of tropospheric propagation. He is continuing the work on Potential Refractive Index which he started when employed at the Radio Research Station, Slough, prior to his posting to Lerwick. The second is W. D. Oliphant, B.Sc., F.Inst.P., BRS26076, who is a senior lecturer at the Heriot Watt College, Edinburgh. It is hoped* that the Head of his Department at the College, Professor E. Openshaw Taylor, will approve the analysis and study of the ionospheric data as an official college project and an application to this effect has recently been made.

These two members will be responsible for the preparation of detailed reports concerning their particular fields of study. In addition articles of more general interest will be prepared for publication in the RSGB BULLETIN by members of the Committee.

* * *

Progress made during the year has, on reflection, been most encouraging as many major difficulties were encountered before the observational network as described became effective. The network is, however, now fully effective and it is confidently expected that a considerable amount of very useful data will be collected in the coming year. The activities of the observers are being directed according to the experience gained as the work progresses.

Finally, the Society wishes to place on record its appreciation for the support given to its scientific activities by the Royal Society, to the Postmaster General for permitting the special transmitting stations, which are an essential requirement, to be established, and to the Superintendent of The Observatory, Lerwick, for his extensive co-operation which makes the whole programme possible.

* Professor Taylor has since communicated his willingness for the College to undertake the project.

Cyprus Beacon Station

The beacon transmitter operated by the Cyprus and Southern Africa Propagation Study Group has recommenced operation from a site 18 miles east of Limassol on the sea coast. The details are as follows:

Frequency: 29,008 kc/s.

Call-sign: ZC4WR.

Identification: Test de ZC4WR. 15 second carrier break every 75 seconds.

Keying: Continuous, f.s.k., 300 c/s downward shift on mark.

Operation: continuous.

Power output: 50 watts.

Aerial: $\frac{5}{8}$ wavelength vertical driven against a ground plane comprising 120 buried radial wires.

Location: Lat. 34° 43′ N.
Long. 33° 20′ E.

All reception reports will be acknowledged by QSL card, and should be sent to: R. A. Whiting, Secretary CARS, PO Box 219, Limassol, Cyprus Republic.

SECOND LONDON S.S.B. DINNER

Waldorf Hotel, Aldwych, W.C.2

SATURDAY, MAY 29, 1965

There will be a comprehensive trade show by British and American manufacturers in the afternoon, and cabaret and dancing after the dinner. It is anticipated that several amateurs from America and other countries will be present.

Tickets, price 3 guineas per person, are available from Mr N. A. S. Fitch, G3FPK, 79 Murchison Road, London, E.10.

BOOK REVIEWS

SIMPLE RADIO CIRCUITS. By A. T. Collins. A *Practical Wireless* Key Book. 7 in. × 4½ in., 96 pages. Published by George Newnes Ltd., Tower House, Southampton Street, London, W.C.2. Price 3s. 6d.

The 10 chapters in this book each describe a separate design. The majority (seven out of the 10) of the designs are of the simple t.r.f. type, with some criticism possible, perhaps, at the lack of r.f. stages but plenty of reaction to radiate interference! In these days of great pressure on channel space, and availability of coils for r.f. amplifiers and superhets it is thought that more of the designs might have concentrated on selectivity, with perhaps one or two basic reacting detectors for instructional purposes and boys reading the book. The transistor tuner is the standard circuit found everywhere now-a-days, and again it is felt that this could have included an r.f. stage, and perhaps a short wave range to make it more interesting to SWLs and Amateurs. It is possibly suitable as a present for a youngster to carry him off the crystal set stage, and looks attractive in the colourful cover, at the low price of 3s. 6d.

HI-FI AND AUDIO. By A. T. Collins. A *Practical Wireless* Key Book. 7 in. × 4½ in., 96 pages. Published by George Newnes Ltd., Tower House, Southampton Street, London, W.C.2. Price 3s. 6d.

There are five amplifier designs in this book, ranging from a simple two valve record amplifier to a push-pull 7 watt system. Stereo methods are discussed in one of the designs. The presentation is in the form that is typical of *Practical Wireless*, and the cover of this paper back is colourful and glossy. The chapter on bass-reflex cabinets is quite informative and contains information with which an enthusiast could design and build a cabinet to suit a given speaker in his possession, as well as giving him an insight into what goes on in a bass-reflex system. The information about faults occurring in gramophone systems may help to make servicing easier. It was disappointing to see no mention of transistor equipment, especially in the light of recent developments in this field, but the book is good value at 3s. 6d. and future editions may include the transistor designs. K. L. S.

A 14 Mc/s Co-Ax Fed Dipole and TVI

By F. G. RAYER, Assoc.I.E.R.E., G3OGR*

AS bad TVI arose with the home television receiver when transmitting on 14 Mc/s with a co-ax fed dipole, experiments were made to find what influence the aerial system had on this trouble. It was thought that any unbalanced aerial system would cause r.f. to flow in the mains wiring common to transmitter and TV receiver, and in the transmitter earth circuit, thereby intensifying TVI, while a perfectly balanced aerial system would virtually eliminate r.f. in such circuits, and thus help avoid TVI.

The ordinary dipole, cut for one band and operated with a centre co-axial feeder, is sometimes regarded as a balanced aerial, unlikely to cause the troubles associated with end-fed and other obviously unbalanced systems. But it is clearly not a balanced aerial and is also often fed directly from the transmitter pi-tank. As TVI was less severe with a co-axial fed dipole than with an end-fed aerial (probably to be expected) it was decided to find if benefit arose from using a dipole balanced to earth. Results were very encouraging.

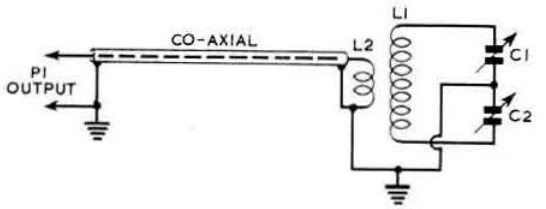


Fig. 1. Aerial tuning unit for coupling the pi-output circuit of a transmitter to a balanced feeder. The feeder coupling coil is similar to L2—see text.

The aim of the balanced system is to secure equal but opposite r.f. currents in each conductor of the feeder, and to have equal stray capacitance between each conductor and earth, and each conductor and the dipole elements. This is to reduce or avoid r.f. in earth returns to the transmitter or aerial tuning unit. Though the co-ax can be plugged directly into the pi-output of popular transmitters, it was felt that this method of feeding should be avoided, as a first step to obtaining a balanced system.

Details of the situation where TVI was removed may be helpful. The television receiver was in the same house as the transmitter, about 15 ft. away in another room, and the mains power circuit was common to both. The set uses Channels 4 and 8, and its downlead ran outside the house about 2 ft. from the table occupied by the transmitter. Television and transmitter aerials were separated by about 20 ft., the latter being cut for 14 Mc/s. The transmitter was used with 100 watts input, high level modulated, and had suppressor chokes in the mains leads, but no harmonic suppression other than furnished by the usual pi-output tank.

In these circumstances, and using a dipole with co-axial feeder directly from the pi-output, interference on sound was nearly as loud as the TV programme and the picture was completely broken. When the balanced system was installed, there was no visible interference with the picture. No sound breakthrough was noted with ordinary listening but the transmitter could be heard weakly if the TV volume control was adjusted for maximum, between programme items. This setting was impossibly loud for normal reception. It was thus possible to operate on 14 Mc/s without a viewer being aware that the transmitter was in use.

Before describing the balanced system, it should be noted that there are many causes of TVI, so that in other circumstances the trouble might remain, even with a balanced aerial and feeder. The preference for the balanced system is theoretically sound, but it is not a cure for all TVI. It may be worth trying when other reasonable precautions have already been taken without too much success.

To obtain the balanced system, two requirements have to be met: the pi-output of the transmitter has to be transformed for balanced feeders, and untuned or tuned twin feeders used to replace the co-axial feeder.

Output Coupling

Coupling from the unbalanced transmitter pi-output to balanced feeder could be by a cable balun, coil balun, or aerial tuning unit. The cable balun was felt to be awkward. An untuned bifilar coil balun was not expected to give much harmonic suppression. So a.t.u. type coupling was adopted as being most convenient, easily made, and providing reasonable harmonic suppression.

Fig. 1 shows the a.t.u. circuit used. L1 resembles the transmitter tank coil for the band in question. For 14 Mc/s and with a 2½ in. diamater former, 7 turns were used for L1, and 2 turns for L2, the latter being of insulated wire overwound on the centre of L1. C1 and C2 were a two gang 100 pF per section capacitor with spacing equal to the transmitter pi-circuit anode tuning capacitor. The transmitter is connected to L2 by a short piece of co-axial cable (the length depends on the location of transmitter and tuner). If a s.w.r. indicator is used, it may be connected initially in this co-ax, but may need removing later if its diodes generate harmonics. Experiments were made with the centre of L1 earthed, and a single capacitor replacing C1 and C2, as at (a) in Fig. 2. The single capacitor was clear of earthed objects which might cause unbalanced stray capacity, and was operated with a long extension spindle. Results seemed the same as with the arrangement shown in Fig. 1.

Low Impedance Feeder

The balanced line can be 75 ohm or similar twin wire feeder and runs from the a.t.u. to the dipole, which is cut for one band. To obtain an impedance match, unity ratio is wanted from L2 to the feeder, if the pi-output impedance is 75 ohms. This can be provided by using a further 2 turn coil, located inside the centre of L1. This is L3 in Fig. 2(b).

It is feasible to try tapping the feeder ends on L1, provisionally placing each clip 1 turn each side of the centre of L1. Loading and tuning will be considerably influenced by the positions of the clips and the adjustments are quite critical.

High Impedance and Tuned Feeder

It was decided to try an open wire feeder, so that the same aerial could be used on several bands. The feeder consisted of 14 s.w.g. wire, with ceramic spacers at about 2 ft. intervals. The wire gauge and spacing govern the impedance of the line, but as such lines work efficiently over a considerable impedance range, wire of 14-18 s.w.g., spaced some 4 in. to 6 in. may be adopted. Typically, 14 s.w.g. wires separated 4 in. have a characteristic impedance of about 600 ohms, rising towards 650 ohms at 6 in. The line should be reasonably tight and have enough spacers to keep the wires uniformly spaced. Soft drawn wire is more easily handled than hard, springy aerial wire.

If the dipole were folded, 300 ohm ribbon might be used. Such ribbon was tried experimentally. Though efficient when used to operate into an aerial of similar impedance, it was not found to be very satisfactory when operating as a tuned line. So the open wire is recommended for the latter.

* "Reddings," Longdon Heath, Upton-on-Severn, Worcs.

The same a.t.u. (Fig. 1) is used with the open line. The way in which the line is connected to the tuner depends on the aerial length, band, and feeder length.

If the aerial top is a half-wave in all, its centre will be low impedance on its fundamental frequency. The open wire line will thus be terminated in a low impedance. In these circumstances, if the feeder is a quarter-wave long, or near an odd multiple of quarter-waves, the impedance at the tuner will be high. But if the feeder is near a half-wave or multiple of half-waves, the impedance at the tuner will be low.

The high impedance can be coupled by clipping the feeder wires on to L1 at or near the outer ends of the coil, C in Fig. 2. By moving the clips (keeping them equally each side of the centre of the coil) almost any impedance can be matched, until correct loading of the transmitter is obtained.

If the tuner end of the line is low impedance, series tuning is preferable. For this, the parallel tuning capacitor is removed, and a single capacitor is used between each wire of the line and one end of the coil, as in Fig. 2(d). These capacitors must be separate, but can be ganged by an insulated extension.

The a.t.u. end of the feeder will have reactance, but the tuner can normally accommodate this, and there should be no real need to prune the line length.

With the open wire tuned line, no difference in results could be found by having the centre of L1 earthed (Fig. 2(a)) or by earthing the rotor of the gang capacitor instead, as in Fig. 1. When L1 was series tuned to obtain equal feeder currents, earthing the centre of L1 had no apparent effect. In Fig. 2(c) the two sections of the capacitor in series naturally results in the total capacitance across the coil being halved.

If the aerial is operated on twice its fundamental frequency, the termination of the line with the aerial will be high impedance. If the line is near a half-wave or multiple of half-waves in length, the impedance at the tuner will then be high. But if the length is near an odd number of quarter-waves, the impedance at the tuner will be low. It may thus be necessary to change the tuning arrangements when operating the aerial on a different band. The coil L1 must be tapped, or changed, to suit the new band.

The capacitor and coil in the a.t.u. can be adjusted by using it with a receiver and observing the signal strength meter, assuming the tuner is in circuit for both transmitting and receiving, and that a 75 ohm or similar input is used on the receiver. Stray reactances may give some disparity between settings of the aerial tuning unit for receiver and transmitter. Similar results were obtained with a range of coil inductance and capacitor values, provided resonance was possible. Some 25 pF to 75 pF or so actually in use for 14 Mc/s seemed reasonable. A wide spaced two gang 50 pF capacitor was variously tried as 100 pF (sections in parallel), 50 pF, and 25 pF (sections in series).

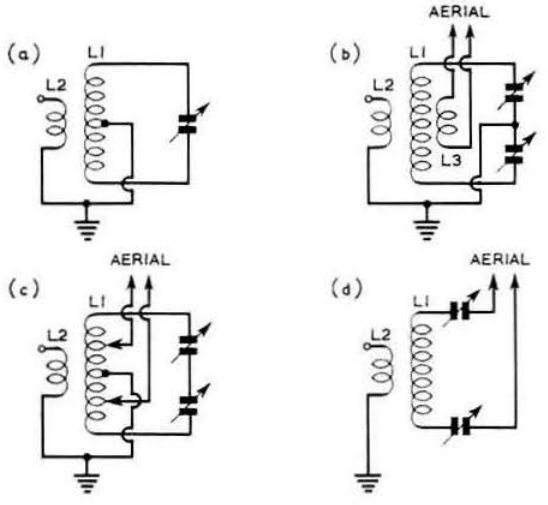


Fig. 2. Alternative methods of coupling to the aerial feeder.

Harmonic Suppression

As a half-wave dipole is three half-waves on its third harmonic, and can thus be fed at the centre with a low impedance line (e.g., 7 Mc/s dipole used on 21 Mc/s) it is apparent that a 21 Mc/s dipole will be effective at 63 Mc/s. This is undesirable with TV channel frequencies adjacent to 63 Mc/s.

Assuming that there may be some third harmonic present in the 21 Mc/s transmitter output, it seems preferable to use a tuning unit, which will reduce harmonic output to the feeder.

The dipole with a low impedance feeder will not be effective at two or four times its fundamental frequency, as it will then be two or four half-waves, and thus require a high impedance feed. In view of this, the use of a tuning unit merely to aid harmonic suppression is less likely to be of importance when the offending harmonics are even multiples of the fundamental.

When using the a.t.u. with an open wire line, stray capacity coupling between transmitter link and aerial feeder needs to be avoided as much as possible, and the centre of the tuned coil can be earthed. A low pass filter or harmonic suppressor in the co-axial lead from transmitter to tuner would be advisable when harmonics are causing trouble. The pi-output must be adjusted so that the filter is working at its correct impedance. It is not proposed to describe filters here, as they are dealt with in the RSGB *Amateur Radio Handbook*. Details of single band half-wave filters are given on page 41 of the *Radio Data Reference Book*.

Summary

It is not easy to evaluate results in such a way as to indicate what may happen in other circumstances. In the particular circumstances which have been described, TVI was extremely bad on the home receiver when operating the transmitter on 14 Mc/s with a dipole fed with co-axial cable from the pi-tank. When using the transmitter with the aerial tuning unit and an end-fed half-wave, TVI was equally bad. (This was an attempt to find if the harmonic suppression of the tuner was useful with such an aerial.) On changing to a dipole with balanced feeder, the TVI was reduced to the extent previously described, so that operation on 14 Mc/s did not disturb users of the television receiver at all. A 7 Mc/s dipole operated with an open wire line was equally free from TVI troubles on 14 Mc/s. In all cases the aerials were sited in the same position, and no other changes were made to transmitter or TV receiver.

Stolen Property—£100 Reward

Belling and Lee Ltd. is offering a £100 reward, subject to the usual conditions, for information leading to the recovery of property stolen from their test hut at Crews Hill, Herts., on the night of November 24/25. The equipment comprises a Rohde and Schwartz calibrated measuring receiver No. 1282/26, and two aerial rotators.

Anyone with information should contact the Personnel Manager, Belling & Lee Ltd., Great Cambridge Road, Enfield, Middlesex. Telephone: Enfield 5393.

TECHNICAL TOPICS By PAT HAWKER, G3VA

Class D Amplification · High Gain Field Strength Meter · Balanced Mixers
Screen-grid Modulation · BK Keying System · VR Tubes and Zener Diodes
Transistor V.F.O. and Modulation Meter · Phase Locked Oscillators
A.M./C.W./S.S.B. Detector · Audio Clipper/Filter · 14 Mc/s Ground-Plane

TO provide an introduction to new techniques currently attracting interest in other branches of radio and electronics, as well as presenting circuits and ideas of immediate application has always been the aim of *Technical Topics*. So we make no apology for including this month several subjects whose value to amateur radio appears promising but has yet to be proved—though this will not stop us from squeezing in several circuits and hints for today's equipment.

Class D Amplification

A term which is gradually spreading through the world of hi-fi, and which could well become equally significant for other types of a.f. amplifiers including modulators, is class D with pulse-width-modulation. The name class D was proposed by P. Baxandall (of tone-control fame) for this new type of semiconductor amplifier in which the amount of energy wasted or dissipated in the output stage is reduced to an extremely small amount. Theoretically, this type of output stage can approach 100 per cent efficiency; in practice with low-cost components somewhere around 95 per cent is achieved.

This high efficiency means that the transistors can be operated with a much smaller heat sink (or none at all up to about 10 watts) than would be needed for the conventional class B output stage; alternatively much more audio output can be obtained from low power transistors. On the other hand, such transistors must be capable of operating at higher frequencies than would be needed with conventional audio circuits, and the circuits themselves tend to appear rather more complex.

Current interest in this system stems from a detailed article by D. R. Birt in *Wireless World* (February 1963) and the appearance last year of a kit amplifier for hi-fi applications—the grapevine also suggests that other class D amplifiers will be appearing before long. The basic technique was, however, outlined in a patent taken out by B. D. Bedford of Schnectady and BT-H as long ago as 1931 and intended to permit a.f. amplification with "vapour electric discharge valves." However it appears that the techniques never proved economic with valves or thyratrons (gas-filled triodes) and we have had to await the development of semiconductors with good h.f. performance for their practical application.

Briefly, the system uses a modulated pulse to allow the output devices (which are not necessarily transistors) to act simply as high-speed switches—that is to say either fully conducting or fully turned off. The astute reader may already have recalled that this is how we operate transistors in the highly efficient d.c.-to-d.c. inverters used for mobile operation, and that a valve r.f. amplifier using a near square wave input waveform and capable of efficiencies of 90-95 per cent was developed by a Marconi engineer some years ago (see *TT*, April 1959).

In the class D a.f. amplifier a continuous train of pulses is generated at a pulse repetition rate well above audibility, typically about 50 kc/s. These pulses are then modulated by the audio signal which we wish to amplify, usually in the form of *pulse width modulation* (more often known in the States as *pulse duration modulation*). This is one of the standard methods of modulating pulses, with the modulating signal increasing or decreasing the precise duration of the pulses about their standard value; put in another way this produces a change in the mark-to-space ratio.

There are several ways in which such modulation can be carried out fairly simply, the most common being to start with a sawtooth or triangular waveform (e.g., from a blocking oscillator) and then to use this wave in combination with the applied audio signal to turn a voltage-sensitive stage on and off. Such a stage might consist of a Schmidt trigger or long-tailed pair, or some of the other circuits more often used in radar and industrial electronics than in radio.

Once we have obtained a p.w.m. signal it can be amplified by a stage in which the semiconductors are biased to act solely as switches; the audio information can subsequently be recovered, for example by passing the output through a low-pass filter into a loudspeaker or, alternatively, a transmitter.

At first sight, it may seem surprising that an on-off switch can act as an amplifier, but this is now established practice in many branches of electronics. Think of any circuit containing a relay; here a small amount of power can be used to control a much larger current, and this by definition is a form of amplifier.

For a.f. work, we could not easily use a conventional mechanical relay with its fairly sluggish action, but electronic switches can readily handle the speeds involved. So by providing a pair of transistors as a high-speed switch (as in d.c./d.c. inverters) we can amplify our pulsed waveform without destroying or distorting the a.f. information it contains, and arrange to recover this a.f. by using the mark/space ratio changes. Little power is dissipated in the transistors since, in effect, they are acting as a pair of switch contacts.

Since such a circuit—with one or other of the output transistors always switched "on"—has an extremely low source resistance, various forms of distortion which are troublesome in conventional amplifiers can, in theory, be greatly reduced.

Here, then, are all the elements of a high quality audio amplifier with the output stage drawing from the supply very little more power than is delivered as output, making it economical to run equipment from dry batteries. In practice, we gather, it is not as simple as it sounds from the above outline to design class D amplifiers with low distortion, as there are various troubles involved in preventing the sidebands produced during the pulse modulation process from extending downwards into the audio band.

Within the basic framework, there are clearly many different ways of arranging the circuits. A practical circuit by K. C. Johnson was published in *Wireless World* (March 1963).

An interesting point is that the use of these pulse techniques opens up the way for the application of other semi-

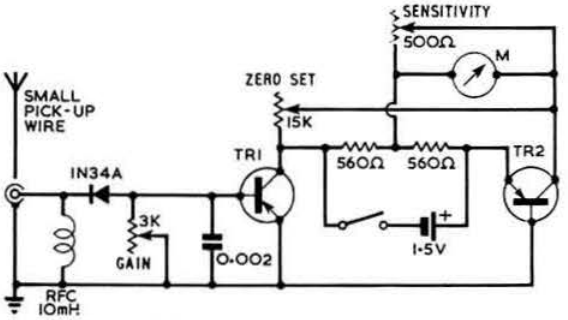


Fig. 1. High gain field strength meter by WA4DXP. TR1 and TR2 may be any type of general purpose a.f. transistor.

conductor devices for a.f. amplification, including silicon-controlled rectifiers, *p-n-p-n* switches, avalanche transistors etc.

It is still too early to say whether class D will ever be used widely for public address or for Amateur Radio modulators, but clearly there are interesting possibilities opening up.

Apart from the original *Wireless World* article, there have been several series of articles on class D in the US journal *Audio*.

High Gain Field Strength Meter

Most sensitive field strength meters use a tuned circuit with its attendant need for plug-in or switched coils. Alternatively untuned diode circuits are used but need a lot of r.f. to give good readings. In *CQ* (January, 1965) WA4DXP describes an untuned unit in which high sensitivity is achieved by incorporating a transistor amplifier operating from a 1·5-volt cell: see Fig. 1. Although the original model uses a 500 μA f.s.d. meter, it is stated that an 1 mA f.s.d. meter could be used. High impedance headphones in place of the meter allow the unit to function as an a.m. monitor.

Balanced Mixers

Many of the techniques which are commonly associated with s.s.b. are gradually filtering into equipment for all modes. We were interested to see in G2DAF's January column his account of the General Electric double-balanced mixer, as we have recently come across increasing evidence that various forms of balanced mixers may play an important role in reducing susceptibility of h.f. and v.h.f. receivers to cross-modulation.

The W2PUL circuit using a 7360 beam deflection valve (*TT*, December 1963) has started many people thinking about this subject afresh—and this interest is paralleled in professional equipment, particularly as a means of improving cross-modulation characteristics with semiconductor receivers.

For example, we recently noted (*Electrical Communications*, Vol. 39, No. 3, 1964) that a new all-semiconductor mobile v.h.f. two-way radio developed in Europe uses a diode ring modulator (a circuit well-known to s.s.b. enthusiasts) as the first mixer. It is claimed that " the careful design

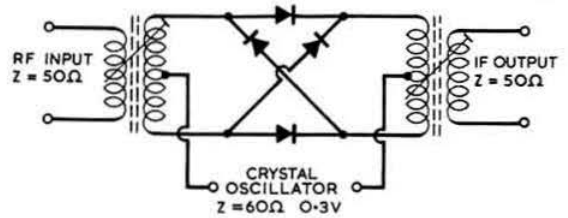


Fig. 2. Ring modulator used as the first mixer in the receiver section of a v.h.f. all-transistor two-way radio.

of receiver input circuits, particularly the use of a ring balanced modulator instead of a transistor has considerably improved the spurious response, the intermodulation and the blocking characteristics." This particular circuit (Fig. 2) uses wideband transformers with ferrite cores and having very low leakage inductance to cover the full range of 55-180 Mc/s without tuning the stage.

The authors provide a graph showing substantial improvement of cross-modulation with the diode ring as compared with a drift transistor mixer—blocking is reduced to less than one-half of that of the transistor.

An h.f. semiconductor receiver described in *Philips Telecommunication Review* (August 1964) reduces cross-modulation by incorporating a novel gain control stage immediately after the first r.f. amplifier and then using a balanced mixer comprising two transistors. A balanced mixer was used in the special low cross-modulation h.f. receiver described at the IEE in 1963 by GEC (see RSGB BULLETIN, September 1963, page 165).

We also happened to come across an old but still valid article on mixers in *Proc. IRE* (December, 1946) in which it is claimed that the noise generated in push-pull mixer stages is lower than when using single valves of the same type—and we believe this idea was later argued with considerable heat by v.h.f. enthusiasts. There is however little doubt that they can handle stronger signals before cross-modulation becomes troublesome. This particular article also contained a thought-provoking statement that it is possible by correct

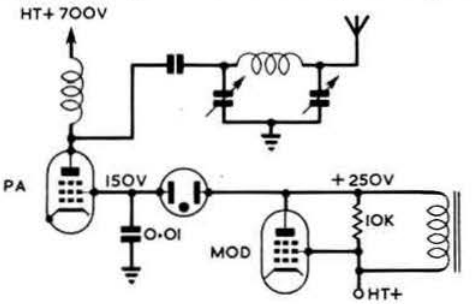


Fig. 3. Screen-grid modulation using a neon tube, by DL6KS/DJ8ZU.

application of feedback to much reduce the equivalent noise resistance value of multigrid mixers (quoting from 80,000 to around 3,000 ohms) by putting suitable impedance in the cathode lead. We wonder if any work on these lines—which suggest the possibility of low noise h.f. multigrid mixers—has been done in the intervening twenty years?

Screen-grid Modulation

The use of VR-tubes or neon bulbs to provide voltage dropping for screen-grid circuits has been referred to several times in *TT* (e.g. August 1961, April 1961) and two further applications of this type appear in *DL-QTC* (October 1964).

DL6KS and DJ8ZU use the idea as a means of taking the bugs out of screen grid modulation (generally regarded as tricky to adjust for optimum results) and to provide a form of controlled-carrier effect. Fig. 3 shows the circuit as given in the German journal, although there is no indication of the type of p.a. valve in use. On modulation peaks the screen voltage on the p.a. rises to that used for c.w. operation.

If our dictionary-aided reading of the original article is correct, we gather that DJ8ZU points out that although the system worked very satisfactorily with a particular type of neon switching tube (a type GR21 made by Cerberus of Switzerland) which happened to be at hand, it has not been tested with any of the usual types of VR tube.

It is thus possible that some experimenting with various types of neon or VR tubes may be needed, although there

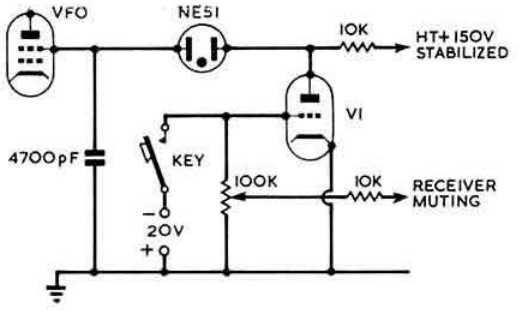


Fig. 4. Break-in keying system described by HB9QO in *DL-QTC*. Any type of miniature triode can be used for V1.

would seem to be no fundamental reason why almost any type should not work. Perhaps any member who gets good results with the system will drop a line on the type of neon, etc., so that this can be passed on to other readers.

Break-in Keying System

The use of a VR-tube to provide clickless and spacer-less screen keying was described in *TT* of April 1961, and the same basic idea turns up in the same issue of *DL-QTC* from HB9QO to provide a simple BK system with receiver muting: see Fig. 4. A negative supply of about 20-30 volts is required, but this can often be obtained from the transmitter bias. The neon tube can be a small NE51, NE2, etc. for screen currents below 2 mA and an 85-volt VR tube for greater currents. With the key up the current through V1, and hence R1, is sufficient to lower the voltage on the anode of V1 below the striking voltage of the neon: when down, V1 is biased back and the neon strikes, putting voltage on to the v.f.o. screen, with an adjustable muting voltage applied to the receiver.

We have the feeling that some care may be needed with this arrangement if chirp and clicks are to be avoided, since subsequent class C stages in the transmitter can sharpen up the waveform and re-introduce clicks (this and related problems and solutions were discussed in *TT*, April 1961) and if the p.a. has appreciable standing current there will be noise radiation. Provided all these points are kept in mind, however, such an arrangement could prove a very convenient operating aid.

Voltage Regulation

Most of us have long acted on the assumption that an easy way of improving the stability of an oscillator is simply to operate it from a supply stabilised by a VR-tube for valve circuits or the corresponding Zener diode for transistors. The actual characteristics of these devices are usually taken pretty much for granted.

But in *QST* (October 1964) W6UGA shows there is a good deal more to VR-tube characteristics than one often thinks, and that one can run into unexpected troubles. He shows that the characteristics can take the form of a hysteresis loop, appreciably reducing the degree of voltage stabilisation if the tube is made to operate over too wide a current range. This can also lead to a form of relaxation oscillation if capacitances greater than about 0·1 μF are connected in parallel with the tube.

Some unexpected problems can similarly arise with Zener diodes and this is underlined in a note from Reg Hammans, G2IG, who writes:

"An effect which puzzled me for a few hours some months ago concerns the *worsening* of the voltage/frequency co-efficient of a v.f.o. due to the introduction of a Zener diode. I had constructed a 1·7 Mc/s transistor v.f.o. and had succeeded in getting this to function within 200-300 c/s with a variable voltage power supply from 16V all the way down to 2V. Thus the addition of a Zener diode represented a bit of lily painting but was thought worthwhile for mobile operation.

" You can imagine my surprise when I found that the situation got violently worse with the Zener. A check showed that the voltage was remaining constant at −9V (the Zener diode voltage) when the supply varied from −16 to −11V, but the frequency was changing by several kc/s.

" After some thought I came to the conclusion that the Zener diode, whose impedance is both quite low and distinctly variable with voltage, was acting as a variable shunt across the 0·1 μF by-pass capacitor used to complete the r.f. return path from collector to emitter via ground. There may also have been some variable capacitance with change of current but this would have been quite small compared with the 0·1 μF. But the reactance of 0·1 μF on 1·7 Mc/s is about 1 ohm which is not by any means low enough to allow one to ignore the impedance of the Zener diode which can be as low as 5 ohms.

" My solution was to separate the diode from the bypass capacitor by a small r.f. choke which thus holds off the variable Zener impedance from the r.f. path."

Transistor Transmitter

Following on the various notes on transistor transmitters in *TT*, R. C. Marshall, G3SBA recently sent along the circuit

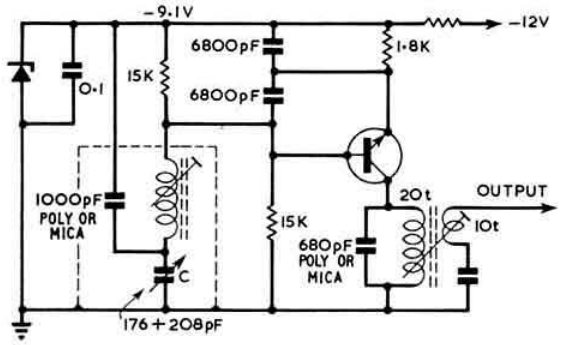


Fig. 5. Series-tuned transistor oscillator used by G3SBA. A crystal oscillator can be substituted for L-C.

diagram of the 10-watt all-transistor phone/c.w. unit which he has been using on 1·8 Mc/s during the past year. There are a number of useful features in this rig, and we are sure that many readers would like to see a full-length article on it (How about it G3SBA?—EDITOR). The p.a. uses three *n-p-n* transistors in the common emitter, earthed collector arrangement of the type described in *TT* (November 1964); a super-alpha pair in the first a.f. stage to permit direct coupling to a crystal microphone; a v.f.o. (Fig. 5) with a series-tuned circuit that can be directly replaced by a crystal and an ingenious modulation indicator using a peak rectifier (CR1) which turns off a transistor at approximately 95 per cent modulation causing the transmitter ON pilot light to be

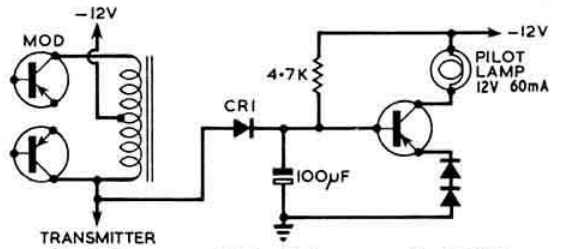


Fig. 6. An overmodulation indicator used by G3SBA.

temporarily extinguished (see Fig. 6). Both p.a. and buffer stages are modulated.

Phase Locked Oscillators

G. E. Cripps, G3DWW draws attention to a recent National advertisement in *QST* describing the phase lock frequency synthesizer used in the new HRO-500 and wonders whether this technique could be used to stabilize a v.f.o. The short answer is that this can certainly be done (the principle is used in several British commercial synthesizers) but it should not be forgotten that one still has to provide a stable reference signal to which the v.f.o. can be locked. If fairly small discrete steps are required, this spectrum generator is inevitably fairly complex and results in a frequency synthesizer which, though perhaps less complicated than the type where all output frequencies are directly derived from a single high-stability quartz oscillator, is still not a particularly simple type of device.

A phase lock circuit is basically the same type of arrangement used for many years for automatic frequency control and for television " flywheel " synchronisation using an error signal from a discriminator to provide correction of a local oscillator (in the HRO by means of a variable-capacitance diode). With phase rather than frequency discriminators the synchronization can be extremely accurate, though as indicated a phase discriminator needs a local reference signal to compare with the controlled signal. We have a feeling that phase-locked frequency synthesizers will in fact find some use in amateur transmitters, receivers and particularly transceivers, but it would be wrong to suggest that this is an easy way of obtaining a stable signal.

On the subject of frequency synthesizers, we saw recently the compact module used in the new Redifon GR345 transistorized s.s.b./a.m. pack-set. This has about 40 crystals and provides an output at 1 kc/s intervals from 2 to 12 Mc/s with a stability of about $\pm$ 25 c/s, using a temperature-compensated reference oscillator for zero-beat setting. But the synthesizer, we were told, accounts for more than half the total cost of around £1,500. It has been developed by Redifon to replace a phase-lock type synthesizer used in the original Hughes version of this pack-set (see *TT*, June, 1963).

Another application of phase locking, which may also prove of great value, is described in *QST* (September, 1964), where it is shown how a receiver i.f. strip can be " locked " on to the carrier of an incoming signal, making it possible to use extremely narrow-band filters even at v.h.f. and above. This phase-lock-detector system has so far found its main use in space communications, since it allows the reception of extremely weak signals due to the improved noise performance of the narrow passband. For amateurs it could be applied to moonbounce.

The particular " polylock " system described by W8FKC is claimed to be capable of detector bandwidths much smaller than 10 c/s, with sensitivities better than 0·01 μV.

But, at least in the form described, the technique is not suitable for general use in crowded amateur bands, since the receiver would tend to lock on to interfering signals. There is however scope for considerable experimental work in this field.

The receiver is in effect continuously servo-tuned to the strongest signal within its main passband in order to compensate for any frequency changes in the signal (e.g., Doppler effect) or in the receiver. The three basic elements are a phase detector, a loop filter and a voltage-controlled oscillator (usually with a variable capacitance diode). A further general introductory article " Primer on Phase-locked Loops " appeared in *Electronic Design* (July 20, 1964).

Combined A.M./C.W./S.S.B. Detector

The new a.m./s.s.b. detector published in *TT* (January 1965) certainly attracted considerable attention, but also illustrated one of the problems in compiling *TT*—how to avoid errors in the original publication. In practice we do sometimes manage to catch self-evident errors of this type, but some inevitably slip through.

We must therefore mention that the January 1965 issue of *Radio-Electronics* contains a letter from the originator of the circuit—J. E. Steup—pointing out that the i.f. filter choke should be 1 millihenry and not 1 microhenry (we should have spotted this one) and the capacitor for slow a.g.c. should be 0·1 μF and not 1 μF. He also states that the 1 K ohms resistors in the anode and screen circuits are for isolation. Exact values will depend on supply voltage, other circuits etc.

The use of a 1N91 diode has also been queried; we can only say that this is the type specified in the original article and that nothing is said on this point by the inventor. However, we see no reason why any reasonably similar type of diode should not be used.

Audio Clipper/Filter

From time to time several add-on speech compression units have been included in *TT*, but we cannot recollect having provided any similar details of clipper units. To put this right, Fig. 7 comes from *Funk-Technik* (No. 2, 1965) and in the original design included a compact power supply so that the whole unit was self-contained. Provision is made for adjustment of the clipping levels on both negative and positive peaks. The low pass filter in the output removes the splatter components and also restricts the main a.f. passband to about 300-3,000 c/s. If the unit is to be placed ahead of the main speech amplifier some care may be needed to prevent hum pick-up; in the original power pack the 6·3-volt heater

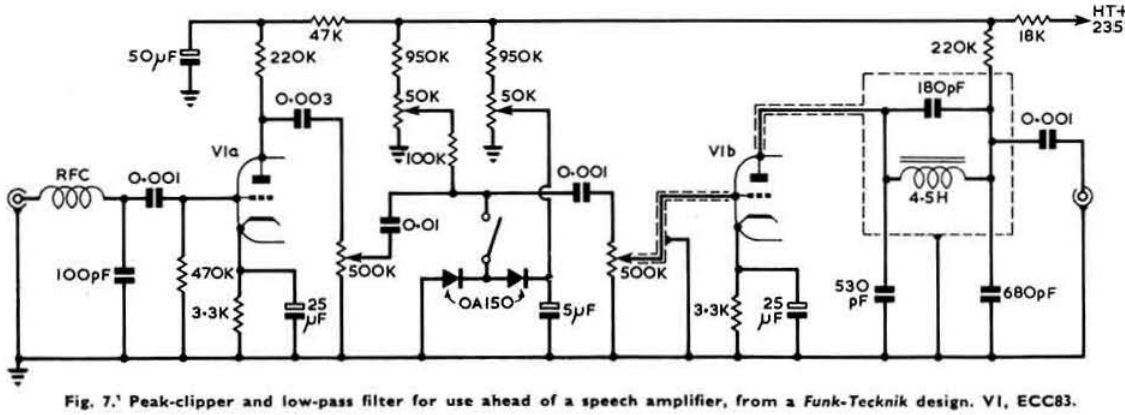


Fig. 7.' Peak-clipper and low-pass filter for use ahead of a speech amplifier, from a *Funk-Tecknik* design. V1, ECC83.

winding is grounded by the rotor of a 100-ohm variable resistor across the winding, as is commonly done in hi-fi practice.

14 Mc/s Ground-Plane

Some time ago OZ5S in Copenhagen kindly sent along a note on the 14 Mc/s ground plane which he warmly recommends as a simple aerial particularly suitable for c.w. DX working and which he points out has never been mentioned in *TT*. This omission has been because this type of aerial can be found in the various handbooks including the RSGB *Amateur Radio Handbook*. However it is quite likely that there are some readers who are a bit hazy on constructional aspects so we are reproducing some points from OZ5S's letter.

The radiator is self-supporting and made from aluminium tubing, length 5·1 metres (16 ft. 11 in.) for 14 Mc/s. The four

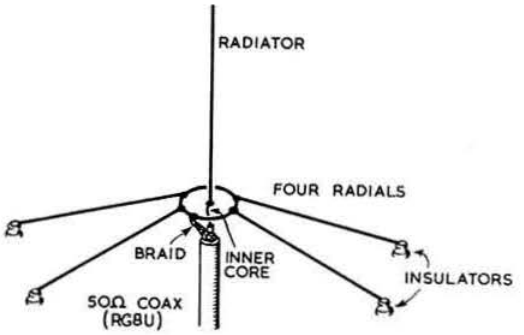


Fig. 8. Ground-plane aerial recommended by OZ5S. The radials are roughly at 90° spacing.

radials are made from hard drawn copper wire each 5·25 metres (17 ft. 2½ in.) long, with insulators at the ends, and guy wires to support points. The radiator is insulated from the fixing mount with the inner core of the 50-ohm co-ax soldered or bolted to the end. The radials are soldered to a copper ring together with the braid of the co-ax and kept well apart from the vertical element and the inner core of the co-ax. Usually the vertical element is mounted on a chimney stack with the radials sloping down to the roof corners of the house, at a tilt depending upon the angle of the roof. However, it should be noted that the feedpoint impedance increases with the slope of the radials but matches 50 ohms very well when they are at an angle of about 120° to the radiator. If mounted on a flat roof, some matching device may be needed since the feedpoint impedance will be only about 20-30 ohms. Dimensions can be scaled up or down for other bands. OZ5S has worked over 150 countries using 100 watts with this type of aerial.

At G3VA we have always noticed that 14 Mc/s signals from European stations using ground planes come in during those hazy summer daytime weak-signal conditions with a much louder thump than other stations, although we use a horizontally polarized receiving aerial. One theory is that they have high angle radiation off the radials as well as low angle radiation off the element, but this theory is not altogether satisfying, since in that case why are they louder than stations using low horizontal dipoles—and why is the effect noticed only under certain conditions?

Claims for RSGB Certificates

Members are reminded that claims for RSGB Certificates should be sent direct to Headquarters. Claims are acknowledged on arrival and passed to the Honorary Certificates Manager for attention.

Easing Coaxial Connectors

Many amateurs will no doubt have found that from time to time concentric plugs and sockets such as the well-known Belling-Lee type get stiff and difficult to remove, particularly if they have been undisturbed for a long time in slightly damp surroundings, such as are often experienced in a typical garden shack during the winter months. The nickel-plated sleeve becomes rough and tarnished, making it quite a task to withdraw the plug without straining the socket, particularly if as so often seems to be the case, it is located in an inaccessible position at the rear of a rack or chassis.

The plug must be a firm fit to ensure good contact, and oil hardly seems to be the right thing, as it either disappears quite quickly, or if more generously applied is apt to collect dirt and form a gummy mess! At G6GR plugs are used for the quick change of aerial arrays, and a variety of lubricants have been tried to overcome this difficulty. An excellent remedy appears to be the use of a very small quantity of the molybdenum disulphide lubricants now becoming popular for car engines, such as Molyslip, Molyspeed, etc, or the corresponding greases. The effect is magical, and seems to last indefinitely without mess, perhaps because the molybdenum compounds are claimed to combine with or plate the surface of the metal, so that a film remains permanently deposited upon the mating surfaces of the plug and socket. Careful tests with a low-reading ohmeter fail to show any appreciable resistance, which is in fact far lower than it can be from a dry tarnished plug, when quite a high and very variable resistance can often be measured. It would be interesting to know whether other readers have found an even better material for this purpose.

—Ernest Gardiner, G6GR

Contact Required

Paddy Gunasekera, 4S7PB, would welcome a sked with a London amateur, particularly someone living in the area of Palace Road, London, N.8. He operates at present on c.w., running 40 watts on 14 Mc/s, but expects to be equipped for s.s.b. shortly. Anyone who would like to arrange a contact should write to 4S7PB at 9/1 Claessen Place, Colombo 5, Ceylon.

SAID LONG AGO

"In (September), 1913, the Wireless Society of London came into being and Mr Campbell Swinton became its first President. A great historic meeting was held in this building shortly afterwards (January, 1914) when a special message which was being received from the Eiffel Tower was interrupted by one from the Admiralty. Mr Campbell Swinton told us that he had tried to arrange that this message should not be jammed and he was promised that it would not be interfered with unless there was some message of importance to be issued. In view of the interruption, he said he could only conclude that either Mr Winston Churchill had resigned or that War had broken out. Unfortunately this prophecy was only too true for the War did break out shortly afterwards."

Henry Bevan Swift, 'AMIEE, G2TI (President 1931-33). In his Presidential Address to Members at the Institution of Electrical Engineers, London, January 30, 1931.

J. C.

Up the Pole

with ALEC D. VANCE

DEFINITELY giving up mobile. Dead dicey in Daisey. Funny thing—police car now permanently parked at end of street.

Going v.h.f. and join Technical Types. Old 3YYY reckons my sigs sure will cause a stir on 2. Says there'll be a big clamour for my green and purple hand drawn QSL's. Will get some more ink. Wasn't a Boy Scout for nothing.

Must have a beam. Order 32 element " Long John " array from Ezeebild Kits, complete with special super de-luxe spring loaded self erecting lightweight pole in rubberized low loss plastic incorporating patented " Deffiant " self-locking joints. 30 in. when collapsed. 35 ft. when open. Guaranteed fully open in 1·5 secs. Complete with profusely illustrated instruction manual of 240 pages. Can be built in a couple of hours. Lots of testimonials from well known bods like: S. Tuckfast, B. L. Ownover, and that genius, Sydney W. Earingard.

Where do I park it? Got to be real high. Idea ! ! ! Nip round and chat up old dutch next door. Can lash it to chimney. Will run co-ax down flue to shack. Dead clever this. Can see it now. All fixed. Press button and . . . Bingo ! ! . . . there it is—35 ft. above roof.

Lug out ladders. Nip up to chimney. Now let me see . . . six pots in a line. Which goes to shack? Brainwave! Nip down. Tie brick to long string. Tell XYL to watch shack fireplace for brick. When seen, yank string. Nip up. Heave brick down most likely pot. Lower away. Brick gets stuck. Up-down. Up-down. Up-down. Loud crunch—balance of string smartly disappears accompanied by rumbling noise like thunder. No tug on string. Pull back brick. Gets stuck again. Pull like mad—Ping ! ! String exits chimney like greased lightning but no brick. One helluva clatter from inside chimney followed by a faint scream. Nip down. Arrive at ground level as old dutch next door rockets out of house yelling and hollering blue murder and smothered from head to foot in soot.

Wraps her copious body all round me. I get the gen. Dozing. Funny noise like rats. Fireplace belches soot. Odd sight. Brick swinging gently in fireplace. Suddenly it disappears. Noise like busted piano string and . . . Wham ! ! . . . soot and a shower of bricks roar out of fireplace.

Redecorations—cleaning carpets, curtains and upholstery plus new outfit and hair-do. £98 16s. 7d.

Saturday morning. Having a crafty jar. Bell rings. Peep through curtains. Not PO or Mr. TVI. Safe to open door. Pint sized BR man with whacking great cardboard box every bit of 20 ft. long and 3 ft. square proclaiming: " EZEEBILD—the last word in Aerials."

" Sign 12." I do.

" Cor lummey mate—don't want no more o' em ! ! "

" Why, is it heavy? "

" Cor lummey no ! ! Took free perishing days to work 'art 'ow to get it 'art 'orf railway wagon. Like to meet perisher wot got it in — — — Cor mate ! ! — — Foreman wuz took sick after a couple o' days — — Cor mate ! ! — — — — Cor ! ! ! ! "

Departs still mumbling.

Lumber it up sideway. Excitedly open lid. Promptly get smothered in wood wool. Rummage around wierd metal bits for manual. Half street decorated in wood wool. Find it. Some manual. 55 pages advertising. 180 pages of praise for Ezeebild. Five pages instructions—three clipped in upside down. Looks easy.

Fill dustbin with wood wool. Amount in box looks unchanged. Fill buckets, bowls, carriers, paper bags, shopping baskets, rucksack, coal bunker, sink, bath, saucepans and bread bin.

Find smallish package marked—" Danger—Open with the greatest care—Treat like explosive." Cautiously lift it out. See another label " PRONTO SUPER SPEED POLE—another Ezeebild first." Gingerly put it down. Delicately remove lid. Big red notice—" Due to a number of unfortunate accidents do not unpack this pole indoors." Oh Crikey ! !

Slap aerial together. Odd design. Not like picture. Obviously modified. Rods alternate between vertical and horizontal. Radiator got squashed in packing. Looked like a trombone. Soon had it back in a circle. Bit kinky—more of an octagon really.

Nip up and fix chimney lashing. S . . l . . o . . w . . l . . y take up and fit Pronto Pole. Get in a right old tangle with aerial. Twice elements shot up trouser legs. End of boom got wedged in rainwater pipe. Big fight to get it out. Belted with rain. Soaked to skin. When fitted, sun shone.

All systems go!—Count down—Blast off ! ! and all that jazz. Press button at base of pole. Aerial whizzes up to 35 ft. —then straight down again. Nearly got a right old smack on the nut. Push button again. Zipp-unzipp. Zipp-unzipp. Cor lummey, as my BR friend would say, more like a perishing Yo-Yo. Discover tiny notice near button. " Push and release smartly." Now they tell me! Do this. Clunk. There it is up at 35 ft. gently swaying in the breeze. A real technical type aerial installation.

Two metres—Here I come ! !

P.S. For a change, there is no moral to this tale.

BOOK REVIEWS

ELECTRONIC CIRCUITS HANDBOOK. By T. Kneital, WB2AAI. Published by Cowan Publishing Corp. 126 pages, 6 in. × 9 in. Available from RSGB Publications. Price 23s. 6d. post paid.

This book contains a collection of many types of circuits, for which the basic electrical details have been provided, but generally there is no theoretical explanation or mechanical layout. The chapter headings are: Construction; Modulation Circuits; Transmitters; Power Supplies; Frequency Control; C.W.; Receivers/Converters; Receiver Accessories; Test Gear and Indicators; Interference Eliminators and Experimental Circuits. Some of the components used are identified only by a US manufacturer's reference which may occasionally cause difficulty, but notwithstanding this and the few circuits dealing with Citizens' Band or 11m equipment and high power finals, the volume contains a great deal of useful information in a readily digestible form.

ANTENNA ROUNDUP. Edited by Art Seidman, K2BUS. Published by Cowan Publishing Corp. 160 pages, 6 in. × 9 in. Available from RSGB Publications. Price 23s. 6d. post paid.

The discerning reader may have noticed that the chapter headings of the second volume of *CQ Anthology* do not include aerials. It is explained that the number of first class aerial articles appearing in *CQ Magazine* during the period covered by the *Anthology* was sufficient to warrant the preparation of a separate book containing the best of *CQ* on aerials during the years 1950 to 1961. Chapter headings are: Antenna Theory; V.H.F. Antennas; Beams, Quads and Horizontals; Vertical and Mobile Antennas and Accessories. The article dealing with a full size three element beam on 7 Mc/s is unlikely to have many readers, but there is a considerable amount of worthwhile information appearing under such headings as " Understanding V.H.F. Antennas;" "Three Band Minibeam" and " Antennascope-54." This volume is attractively produced and durably bound. **R.F.S.**

Single Sideband

By G. R. B. THORNLEY, G2DAF*

NOTWITHSTANDING the fact that the use of commercially manufactured amateur equipment is on the increase—and there may be good reasons for this such as living in digs, the lack of workshop facilities, or even genuine lack of spare time—many real amateurs in the full meaning of the word, still prefer to build their own. For this reason BULLETIN readers are still particularly interested in hearing about the other man's efforts.

Some time ago GM3CIX was kind enough to forward details of his new h.f. filter sideband transmitter. This design has a number of features that make it attractive to the newcomer to s.s.b. who would like to have a go at an " all band " transmitter but is put off by the apparent complexity of the multiple frequency translation processes in designs such as the G2DAF.

The GM3CIX S.S.B. Transmitter

The block diagram is shown in Fig. 1, and it will be seen that, (i) there are a total of seven valves only, (ii) there is only one mixing process to cover five amateur bands, (iii) the sideband filter is simple to construct and makes use of surplus FT243 crystals, (iv) the v.f.o. uses one triode valve envelope as oscillator plus cathode follower and an ingenious switched " tank " circuit covering the required four ranges with equal bandspread on each.

A straightforward resistance-capacity coupled audio amplifier, V1 and the first half of V2 feed audio in push-pull via a small a.f. transformer to the balanced modulator V3. This is followed by a two half-lattice filter using FT243 crystals on a nominal frequency of 8·5 Mc/s.

The balanced modulator and filter circuitry is shown in Fig. 2(a). T1 is a modified 9·72 Mc/s surplus v.h.f. i.f. transformer with the original windings removed and replaced by a primary of 14 turns + 14 turns centre tapped of 26 s.w.g. enamelled wire close wound with a gap in the centre of $\frac{3}{8}$ in. to accommodate the secondary of 12 turns of 36 s.w.g. enamelled wire.

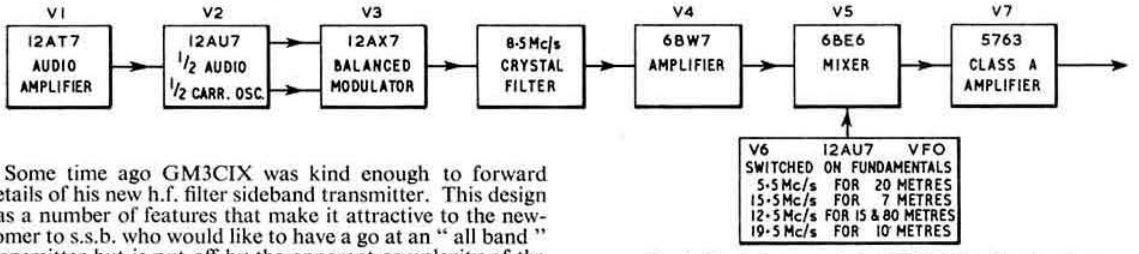


Fig. 1. Block diagram of the GM3CIX five band exciter.

The FT243 crystals are matched in frequency—in two pairs—by etching with ammonium bifluoride with a spacing (between pairs) of 1·6 kc/s. GM3CIX states that the choice of 8·5 Mc/s for the filter nominal frequency was made mainly from the harmonic point of view: that is, harmonics of the v.f.o. sweeping across the television i.f. of 34-38 Mc/s or the local transmitting channel of 53-57 Mc/s.

As shown in Fig. 2(b) the v.f.o. uses a 12AU7 valve, the first half of which is a Hartley oscillator and the second half a cathode follower feeding into the 6BE6 mixer. For the sake of circuit clarity, two coils only are shown. Each coil has a

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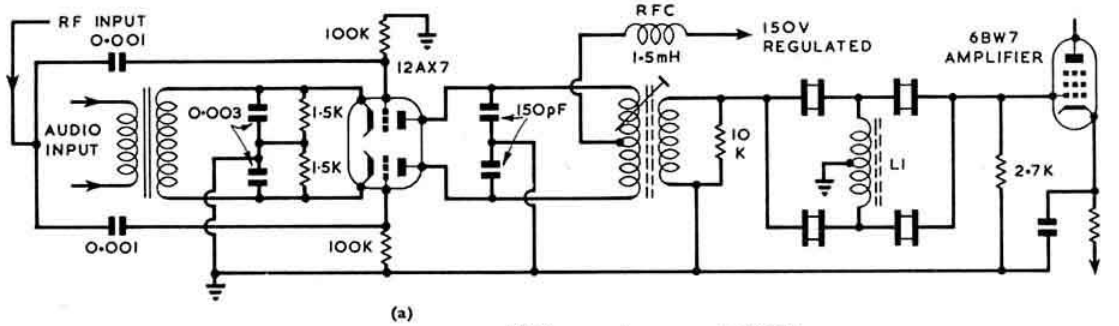

Fig. 2(a). Circuit of the 12AX7 balanced modulator, showing the method of coupling into the h.f. crystal filter. L1 is bifilar wound, with 26 double turns of 28 s.w.g. enam. wire on a ferrite toroidal core of 1 in. internal diameter. See text for details of the r.f. transformer (T1).

Fig. 2(b). V.f.o. circuit showing the method of switching to obtain the desired four ranges. For clarity, only two coils are shown. S1, 2 and 3 are Yaxley 1 pole, 4 way wafers ganged on a common shaft.

temperature compensating capacitor C_T, a band setting capacitor C1 and a series padder capacity C_P. The padder function is to spread and compensate the tracking so that each band covers the same sweep of the main v.f.o. tuning. No attempt has been made to make the scales coincide exactly, although the ranges all start together at the l.f. edge of each band.

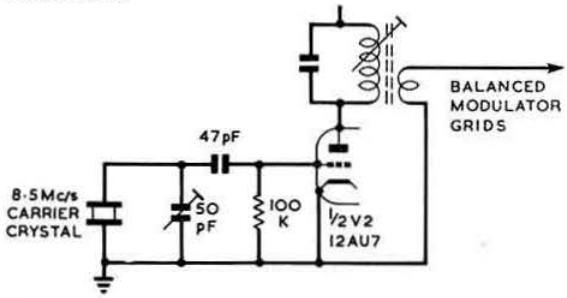

Fig. 3. Carrier oscillator. The 50 pF air spaced variable capacitor allows the crystal to be " pulled " on to the correct frequency.

The carrier oscillator shown in Fig. 3 is a straightforward Miller circuit with a small pre-set trimmer in shunt with the crystal to allow the crystal to be " pulled " slightly for final positioning in relation to the filter passband. A tightly coupled link winding of medium/high impedance couples the oscillator output into the balanced modulator grids via two 0·001 μF capacitors.

Power supply circuitry is conventional with 150 volts stabilized to feed the v.f.o., the carrier oscillator and the balanced modulator and 300 volts on the main h.t. rail and 400 volts for the anode of the 5763 output valve.

GM3CIX states that the filter passband was measured and plotted by feeding a variable audio signal generator into the microphone socket and measuring the output at the anode of the 6BW7 with a valve voltmeter. He also considers that the 12AX7 valve is a more stable modulator than either the 12AU7 or the 12AT7 in his own exciter.

The final amplifier normally used is a pair of TT21s with 850 volts on the anodes and 300 volts stabilized on the screens and the exciter has ample output to fully drive these valves.

It will be appreciated that the circuit notes given are intended only as a guide and to stimulate interest in a relatively simple method of generating an s.s.b. signal on five bands. Any amateur with a little past constructional experience and equipped with a grid dip oscillator will have no difficulty in constructing suitable coils. Additionally, suitable h.f. filter crystals and a matching carrier crystal can be obtained from the Quartz Crystal Co. Ltd. If any difficulty in construction should arise, GM3CIX would be only too willing to help if you write to him direct, but please remember to include the customary stamped addressed envelope if you want a written reply.

The transmitter can be heard regularly on the 80m band and will be noted for the natural voice quality, good stability and excellent unwanted sideband suppression. GM3CIX worthily upholds the true amateur tradition of home construction and is to be congratulated for a very fine effort.

Mobile Column

By E. ARNOLD MATTHEWS, G3FZW*

THE last month or so has, we hope, seen the annual nadir of mobile activity. The writer, G3FZW, has found the long skip on 3·5 Mc/s, coupled with his central location, ill conducive to G contacts. Added to this, the cold weather seems to have kept several morning regulars out of their shacks, so that the majority of QSOs have been with DLs. Several continental and transatlantic mobiles have been heard on this band, however, and **G3BID** (Hampstead) sends in the following list of DX worked on 3·5 Mc/s s.s.b. during the first half of January. VE1IE, VE1AHJ, OX3JV, and VK2AVA, which is a /M " first " on this band (worked on a KW 2000); W1FRR, W2ZPO, W4NQM, W4SQV, W0MPQ and W3PHL (worked on a Drake TR3).

During a trip from Dorset on December 14, G3BID worked, on 14 Mc/s, DJ0BU, UW3BV, WA1FL, K1FHJ, W1JKX, K1UDP, WA2SFP, VK3AM, F9RY, W1DBM, VK3UQ, 5Z4AA, VQ1GDW, and W2HTT. The TR3 was used on this occasion. A similar trip on January 5, using the KW2000, yielded OE1HJ, W1AZP, W2KPQ, W1ZW, K6JX0/MM, W9ETP, UD6KAR, UW3BV and W0RGT.

On 3·5 Mc/s he uses a " Master Mobile " aerial, modified by the addition of a capacity hat, while on 14, 21 and 28 Mc/s he prefers the " Mark Mobile " HW3 .

By the time this appears in print G3BID will have returned from a trip to Morocco, where he planned to operate as G3BID/CN/M on all bands.

Turning now to v.h.f., **G3BAC** (Ramsgate) enquires whether the advent of the mini-halo will prolong the polarization battle on 4m? One feels that the stakes are weighted in favour of horizontal, since this plane is used by the fixed stations using beams. Raynet operators are probably the ones most affected, but they can get together and agree to use the plane most suited to their needs. In the long run the plane which gives the better results will win because construction and mounting problems are not serious in either case.

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Rally News

Talk-in arrangements now being made for the North Midlands Rally at **Trentham Gardens** on April 11 will follow the successful pattern adopted last year of a ring of stations sited around the venue operating on different frequencies. Full details will be published next month.

Thanet RS will hold their Sixth Mobile Rally on Sunday, May 9. It is hoped that the cliff-top site at Pegwell Bay will again be used.

RSGB NATIONAL MOBILE RALLY

Texas Instruments Ltd., Manton Lane, Bedford

SUNDAY, APRIL 4, 1965

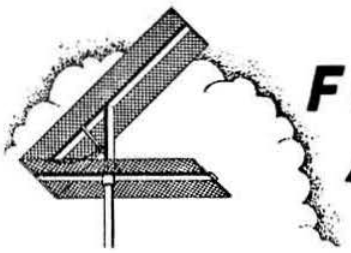
* Raffle and Lucky Dip
* Special attractions for the ladies
* Trade exhibition
* Mobile competition

Other attractions will be announced in the April issue of the RSGB BULLETIN and on GB2RS.

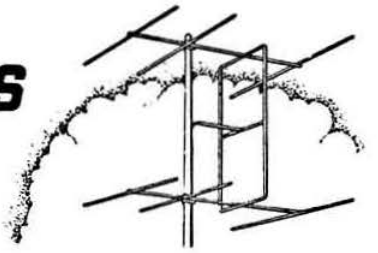
Adequate under-cover accommodation and car-parking facilities will be provided.

GB3RS will be in operration as a talk-in station on 160m and 80m s.s.b., and GB2VHF will be on 2m.

Organized by the RSGB Mobile Committee



FOUR METRES AND DOWN



OSCAR III now scheduled for March 12

By F. G. LAMBETH, G2AIW*

THERE is always something new in v.h.f./u.h.f., and the latest variation, although it does not immediately concern us, is noteworthy because it again brings into the picture CT1CO of Lisbon, who has succeeded in working EA4AO (Madrid) during the Quadrantids, January 2/4. After a fruitless day on the 2nd, the QSO was made on the 3rd. A photograph of CT1CO's aerial was published in the RSGB BULLETIN of May, 1962, page 544. This QSO opens the way to the long awaited QSO with a British station and the fact that CT1CO is still very active will doubtless whet the appetites of meteor scatter stalwarts. CT1CO heard a station on October 19 last year at 04.04 GMT, transmitting repeatedly " de G5VY," apparently using an automatic keyer, but as no such call appears in our records, we are wondering if this was not G5YV after all, although CT1CO, perfectly aware of Harold's fine v.h.f. record, thinks this was not so. CT1CO is open for schedules for the next major meteor showers and can transmit on several frequencies from 144·005 up to about 145·925 Mc/s (crystal controlled). Transmission is usually, however, on about 144·126 Mc/s (8007 kc/s crystal).

G3JKO (at present 5N2AAF in Nigeria) is coming home on leave from the end of March until the end of May, and will be in the UK, including Wales, Scotland and Northern Ireland for portable work on 2m. He will be operating from as many rare counties as possible. The main base for operations will probably be the top of the South Downs.

All the DX Hunters will be interested to hear that the **GB2GC** Group will be going to Alderney in the Channel Islands for three weeks this summer. This will be from August 17 to September 7, the last weekend being the V.H.F. National Field Day and IARU Region I European Open Contest. The operators will include G3HBW, G3OUF, G3POI, G3PSH, G3SHK, G3SHZ, G3SIT, and G3TUX. The location on Alderney will be Fort Albert, a disused castle on the North Coast, which should prove a superior location to the previous one. The main reason for this trip is to endeavour to test the 70cm and 23cm possibilities of the island and some fairly sophisticated gear is being taken for these bands. Equipment for 2m and 4m is also being taken. The operators are very anxious to work more continental stations and will be very pleased to hear from any who wish to make skeds. This year the sked arrangements are being handled by G3SHZ and proposals should be sent to GB2GC, c/o G3SHZ, 19 Dorset Road, Harrow, Middx.

The Coventry V.H.F. Group is holding an informal meeting on March 17 at the " Hawthorn Tree," Broad Lane, Coventry. Those wishing to attend who are not on the circulation list are asked to contact G3KEF or G3NBQ.

Oscar III

It is most unlikely that Oscar III will have been launched during February, for a few days before it was due to be put into orbit, news came through from California that it would be delayed for about a month. The package is apparently ready at the launching site and should therefore be put into orbit just as soon as a vehicle is available—there should not be any major delays or mishaps as were experienced last year. Any later information on the launch date, and orbital data if available, will be announced on the GB2RS News Bulletins.

Skeds for Oscar III

Dick Turrin W2IMU, Box 45, RR2, Colts Neck, NJ, USA, on behalf of the Crawford Hill V.H.F. Group, K2MWA/2, is looking for 2m skeds, with possible 20m liaison, during the forthcoming Oscar III experiments. Applications should be made as soon as possible.

Two Metre News and Views

G8LN (Plumstead) has made a re-appearance on the band, and agrees with G2CUZ's remark about 2m, his part of the world (North Kent) being seemingly deserted. An attempt at the First 144 Mc/s Contest (c.w.) on January 30-31, resulted in only five QSOs in four hours which was very much too slow for G8LN. It is thought that N. Kent is a depressed area, because stations tend to beam North and West and thus miss calls from that area.

Two metre signals from Switzerland were heard in Holland on January 30 and 31. PA0ADS was regrettably unable to reply on the Monday morning, February 1. PA0LB heard HB9MY (Canton-Zurich) around 144·9 Mc/s but was unable to raise him (From VERON *V.H.F. Newsletter*).

For RTTY enthusiasts, we learn from VERON *V.H.F. Bulletin* that the PAs are holding an RTTY Contest on Saturday, March 20, from 18.00 to 24.00 GMT and on Sunday, March 21, from 12.00 to 18.00 GMT. All amateurs in Region I are invited to participate. Logs should be sent to PA0YZ, and the prize will be a cup.

G3RND-G6AAR/T (Pontefract) is surprised at the lack of activity lately, although conditions have been below the average. Nevertheless, enjoyable things do sometimes happen, and February 1 and 2 brought a large number of stations to the band, hoping to work DX, but there was no DX! A week later there was no sign of these stations, who only seem to appear when pressure is high. G3RND listens every night on the band, and works all his stations without turning the beam. He further refers to a lack of QSL recipro-

* 21 Bridge Way, Whitton, Twickenham, Middlesex. Please send all reports for the **April** issue to arrive by **March 12**, and for the **May** issue by **April 9**.

cation, especially from rare counties and especially when stamps are sent to the " offenders." This is very important to some people and promises made should be kept.

G2CUZ (Ainsdale) found the main activity during the C.W. Contest, but this did not seem too well supported locally. The best DX was heard around 17.00-18.00 GMT when G3NJF (Grimsby) was 569. However, neither G3PIY nor G2CUZ could raise him. G3BA and G5JU, both 569, were also heard. G3FNQ and G3FXI are active locally on 2m.

G2CUZ hopes we will continue to press for " run of the mill " activity and not play up too much to the DX fraternity. Well, our policy is fair " dos " for all, so we are always willing to oblige! During a recent Sunday, in five hours' listening (16.00/21.00 GMT) only two stations were heard, one at 45 miles and one at 5 miles. A need for improvement would certainly seem to be indicated!

G2JF (Ashford) reports that **G8OU** (Ashtead) is now operational again after a lapse of 10 years and notes changes in the general sound of 2m activity. He has equipped himself with a very high gain aerial system in the form of a four-six element Yagi configuration; this, together with an input of 150 watts gives him a very good signal coverage.

G3SWB (South Oxfordshire) can be heard radiating a good signal from his 8-over-8 slot fed Yagi at 55 ft. with an input of 90 watts to a QQV06-40A.

F3JN (Paris) reports very ordinary conditions over the past few weeks and has in the meantime built a high aerial system of four-eight element long Yagi radiators. His signal into the United Kingdom is always audible in the south.

G3RMB (Coventry) runs an input of 55 watts and reports that GB3CTC is a fairly consistent signal to him. He goes on to say that he finds 70cm very interesting; on that band he runs a QQV02-6 to 8 watts.

G5HA (Hull) is radiating a very good signal from home-built gear. He uses a QQV06-40A p.a. stage modulated by a TZ 40 in class B. He has been off the air while rebuilding operations have been taking place, but he is looking forward to more contacts and an improvement in propagation.

G3MKG (near Norwich) who recently made his first appearance on 2m is running an input of 10 watts to a 4-over-4 aerial system 12 ft. high. However, it appears that his QTH will shortly be moved to Kinloss in the far north, from where he hopes to make another start. Activity on 2m in these remote regions is restricted to a few keen individuals, but however, we look forward to hearing from him again.

G2FO (Stockton-on-Tees) who, incidentally, is one of the old timers on 2m, is also located in a part of the country which has a low v.h.f./u.h.f. active population. He informs us that during the recent c.w. contest he worked seven of the eight stations that he heard, the one he missed being G2JF.

6 WEEKS

! TO THAT !

LAST JOINT

Is that item of home-constructed equipment ready for the exhibition at the International V.H.F./U.H.F. Convention on April 10?

Get those last joints soldered up soon, and the device tested ready to show at the Kingsley in less than six weeks' time. You may win the cup!

Details of how to enter will appear next month

Compare this with the 80-odd contacts made in the contest by G3NOH/P located in the south and one can then appreciate the quietness of the band up north. Usually, however, he does maintain regular c.w. contacts with G2JF (Kent).

G3FYX (Bristol) is running 70 watts to a 5-over-5 system in the roof space and reports that his best QSO was with a station in Kent.

PA0FB informs us that he hopes to attend the International V.H.F./U.H.F. Convention in London on April 10 and looks forward to meeting old friends.

The period of February 1 to 6 proved to be very interesting and was, no doubt, due to the extremely high barometric pressure which prevailed over the United Kingdom. **G3BHW** (Margate) recorded an S9 contact with GM3HLQ (Dunfermline), on February 1 and it is understood that other stations also worked this station. **PA0FB** (The Hague) reports excellent TV pictures from the Irish Republic, and also signals from GI5AJ and EI2A. **G2JF** worked GM3NZI, GM3FYB, GM6XW, and GM3HLQ.

GI3SLI (Down Patrick, Co. Down) reports an excellent contact with LX1CW on the evening of February 3. The contact represents excellent extended tropospheric propagation exceeding 500 miles, his input being 10 watts! The aerial was a 6 element Yagi.

Tuesday is a special V.H.F. Activity Night in Switzerland. The calling frequency is 145·95 Mc/s.

Radio Club Budapest will be operating on 144·08, 144·91 and 145·44 Mc/s during the IARU Sub-regional Contest of March 7/8. The operators will be HG5KDQ, HG5CA, HG5EG and HG5CR. HG5KDQ will also be operating on the lower frequency bands.

Holland—British Isles on 2m

GI5AJ and EI2A were being worked and/or heard in Holland on the night of February 2. EI2A was worked by PA0JSK, and during the evening the PA had a good QSO with GW2HIY. PA0JSK was later called by GI3SLI, and GI3GXP was also in the picture. (*Veron V.H.F. Bulletin*).

Seventy Centimetres

G8AEN (Bury, Lancs.) is going portable in Central and Northern Scotland during the Easter holidays (Friday to Monday) on 432·80 Mc/s and would welcome calls and/or skeds: " calls after midnight, skeds anytime." Anyone who is interested may write to 90 Horne Street, Bury.

G6NWA/T/G8AEX (Wolverton) with **G3GWL,** and **G8ABB** (Bletchley) are active nightly between 18.00/22.00. **G3NOC** (Old Stratford) is also fairly active. They would like more stations to have a look in their direction, as the activity there is steadily increasing, and there are other stations building for the band.

G3NBQ (Keresley, Coventry) has now moved his gear to the new QTH and is again active on 70cm. At present the aerial is located in the shack (the back bedroom), but nevertheless GB3GEC can be heard most evenings. " Midland Night on the Air " was blessed with a minor opening on February 4 when G8AFY, G3BNL, G3LHA, G3KEF, G3PTM, G2FNW, G8AL were worked and G2CIW, G3NOX/T, GB3GEC (S9), G3BKQ, G3RMB, G2HCG and G3RYB/T were heard. Many of the contacts were made by beaming at a large gasometer on the horizon, the signals being inaudible from their true direction due to local screening. In view of the popularity of the " Thursday Night on the Air " in the Midlands, some of them think it is a pity that the Mid-Herts. net was arranged for Mondays, but nevertheless they hope Mid-Herts. will beam north sometimes as there is usually a reasonable level of activity there on Monday nights too.

As G3KEF and G3NBQ have often heard bitter complaints from stations to the east of the Midlands that nobody ever beams towards them, these two stations will endeavour (from March 1) to be on every evening for a month between

19.30/20.00 GMT beaming east, both calling and listening. A report of activity will be submitted for the May issue of the BULLETIN. Frequencies are: G3KEF, 433·9 Mc/s, and G3NBQ, 434·2 Mc/s.

G3KEF (Coventry) worked G3NOX/T on November 4 and heard G8AL, but no QSO resulted. GB3GEC was S8/9 most of the evening. G3NAP (Coventry) is forecasting an early appearance on 70cm.

Saturday night is 70cm activity night among the PAs. They would like British stations to make a sked or call CQ.

G3LHA (Coventry) finds activity on the increase, particularly on Thursday nights. February 4 was no exception, 14 stations being heard in 1½ hours operation. Six of these were worked. Conditions were slightly above average, but only two DX stations were heard: G8AL (Chingford) and G3NOX/T (Saffron Walden), both of these being worked. New G8 - - - calls continue to arrive, bringing enthusiasm and more activity. Lately the following have been worked: G8ADC (Luton), G8AEX (Stony Stratford) and G8AFY (Hinckley, Leics.). The AF139 transistor preamplifier seems to be pulling in all manner of readable weak signals, previously uncopied. G3LHA is rebuilding, and after a pause will re-appear with more power and a better aerial. Strange, we had heard that G3LHA was quitting 70cm!

G3FNQ (Southport) is operative and hopefully looking for contacts.

Casting the Net Wide

Last month's news that the Welwyn Garden City Group had started a net on 70cm alerted numerous operators in the Home Counties to the opportunity for additional contacts on an otherwise all-too-quiet band.

The result has been that this new Mid Herts Net has been attracting operators—most notably numerous G8-plus-threes—from Kent, Surrey, Middlesex, Beds and Bucks. In fact, just as on the now 10-year-old 2m Mid Herts Net, " overs " have had to be kept short in order to let in all would-be participants.

Those wishing to work into the new u.h.f. Mid Herts Net do not necessarily need to appear on the spot frequency of 433·1 Mc/s: the band is regularly searched for callers on other channels.

The net operates on Mondays, to follow the 2m net, and on Saturdays, as a follow-up to " Saturday Night Activity Night on Seventy," in both cases at 9 p.m. clock time.

Twenty-three Centimetres

G3NBQ reports that G2FNW and G3BKQ are almost ready for this band, and tests may be started at any time. G3BNL is building and G3KEF is proposing to connect his gear up again.

2350 Mc/s

Having studied a *QST* article on pulse equipment for this band, it is quite possible that G3KEF and G3NBQ will be building pulse equipment, though without using crystal control. They would like to hear from anyone else who is contemplating operation on 2350 Mc/s.

Four Metres

GM3MXN (Larkhall, Lanarks.) is operating on the band most nights, but definitely on Thursday evenings at 22.30/23.00 GMT pointing the beam south and operating on c.w. The rig is a B44 Mark III, an RF27 unit into an RA1, a B46 with a 3 element beam, and a 4m quad. The QTH is reasonably well sited for working to the south.

G3LHA (Coventry) has been active on Sunday mornings lately as TVI suspends any evening operation. Many stations have been worked and heard including G3ENY (Bridgnorth), a very potent signal and G3SKR (Wembley) seems to be very consistent. Mobile stations are much in evidence. In fact, 4m appears to be getting like an l.f. band with so much activity on a Sunday morning, but TVI is a problem in the Midlands and there seems to be no way round it. Any suggestions?

G2CUZ (Ainsdale) reports some club members' activities on the band. They now have G2DQX, G3PVL, G3FNQ and G3OEI.

Continental Round-up

This is the first appearance of this feature, intended to be a regular section of the column. It is hoped that some readers may find items worth following up, and that others will be interested to know what is the current thought in other societies. The information was compiled by R. C. Hills, G3HRH, RSGB V.H.F. Manager, from various continental journals. If any reader is unable to obtain a particular issue for a specific reference, it can be borrowed from G3HRH on receipt of an s.a.e. (6d postage needed.). Any comments on the usefulness or otherwise of this feature will be welcome.

OEM (*Austria*), *January 1965*. A technical article on a 24 Mc/s v.f.o. of high stability using an AF134 transistor. The v.h.f. news contains a round-up of the various current e.m.e., satellite, and balloon projects, with names of people and clubs participating.

DL-QTC (*W. Germany*), *January 1965*. A technical article on 1296 Mc/s signal generator using transistors and a BA110 varactor final multiplier. Full construction details are included. The v.h.f. column deals with the full rules for the *UKW-DLD* operating awards, and individual station activities.

CQ-QSO (*Belgium*), *January 1965*. Brief technical article on a 144 Mc/s mixer using an ECF80. Station activity reports, including references to some G-DX contacts. Also a short note on a stable v.h.f. oscillator using an ECC82 in a Hartley circuit.

Amatør Radio (*Norway*), *January 1965*. A survey of LA v.h.f. beacon stations with details. Notes on use of a mobile calling frequency, and reports on recent Scandinavian DX activity by OH2OK.

Electron (*Holland*), *February 1965*. Article on the geometry of " over-the-horizon " v.h.f. propagation. Contest rules for Region I. Illustrated write-up on the station at G3NOX/T. Notes on stations in PA ready for *Oscar III*.

Revista de Radio (*Spain*), *January 1965*. Station activity from EA5AF (F, EA and I stations worked on 144 Mc/s). News of DX-TV reception by EA3PF and EA3-1005U. Notes on 144 Mc/s m.s. contacts by CT1CO and EA4AO, with references to G3LTF and G5YV.

Radio-REF (*France*), *February 1965*. Major article on *Oscar III*. Article on a 144 Mc/s pre-amplifier using two 417A valves. Article on a 1 watt transistorized 145 Mc/s transmitter with a 2SC32 p.a. Assembly details for BNC co-axial plugs and sockets. In the v.h.f. news, notes of the HB9RG/W1BU 1296 Mc/s e.m.e. contact, and the tropospheric contacts by G2CIW and G3MPS on the same band. Details of the first F-UP2 m.s. contact. A short description of mobile/portable operations by F1AM/M (humorous but with useful tips), and the usual three pages of band activity by regions (note: this latter is always a very useful guide to the currently active French v.h.f./u.h.f. stations and includes many call-signs).

SCOTTISH V.H.F. CONVENTION

Saturday, May 8

CITY HOTEL, DUNFERMLINE

NEWS . . .

Collated by John Clarricoats, O.B.E., G6CL

Maxim Medal. Established by the ARRL Board of Directors at its Annual Meeting last May, the first Hiram Percy Maxim Gold Medal was awarded to John Reinartz, K6BJ, inventor of the Reinartz tuner (the standard amateur receiving circuit of the 1920's) and one of the men most responsible for the opening-up of the short-wave territory below 200m. Unfortunately John passed away only three weeks after he received the Medal from ARRL President, Herbert Hoover. Reinartz helped to make history on November 27, 1923, when he and Fred Schnell effected the first two-way contacts on short-waves with a European amateur—Leon Deloy, F8AB of Nice.

True Trenton Tale! Old Timer Ed. Hopper, W2GT, of Rochelle Park, New Jersey, who contributes the USA-CA Programme feature to *CQ Magazine*, tells a wonderful tale in the January issue about the amateur who received a QSL card confirming a contact he had had with a station in Trenton, New Jersey, and how that one card helped the lucky amateur towards claiming upwards of 20 certificates and awards! Recommended for reading by the DX fraternity . . . with a pinch of salt on the side.

European Colour TV. A meeting of the Colour TV Sub-Group of Study Group XI (Television) will open in Vienna on March 24 to try and reach agreement on a common transmission system for Colour TV in Europe. UK Postmaster General the Rt. Hon. Anthony Wedgwood Benn, MP, informed Parliament last month that developments over the last few months had served to strengthen the Government's view that the NTSC (US) system should be adopted in preference to the SECAM (French) and PAL (German) systems. BREMA have summed-up the advantages of NTSC in a comprehensive survey explaining why British industry prefers NTSC.

"The '65 Show" is the short title by which the 1965 International Radio and Television Exhibition at Earls Court (August 25 to September 4) will be known. For the first time overseas manufacturers will be participating alongside British companies. The intention is to make the '65 Show one of the major international exhibitions in its field. Promoters are Industrial & Trades Fairs Ltd., Commonwealth House, 1-19 New Oxford Street, London, W.C.1.

Transistor Patent. Reserved judgment was given in the High Court recently against a claim by three prominent US electronic concerns that a basic transistor patent held by one of them (Western Electric) should be extended by a further 10 years. The companies concerned (Western Electric, American Telephone & Telegraph and Bell Telephone Laboratories) were opposed by Pye of Cambridge and by more than another dozen British electronic companies headed by Avo. Opposition also came from the Post Office and other Government Departments. The judgment could lead to cheaper transistors and equipment that uses them.

Gas Lenses for DX! Lenses made of gas, rather than of glass, are being tested in the United States to guide beams of light from a laser through long pipes which curve and bend. It is thought that laser beams guided in this way will, eventually, be developed as long-distance communication systems. Gas lenses do not reflect or absorb light nearly as much as optical lenses. Chance soon to work all planets by laser!

Useful Market. According to the latest Retail Business Quarterly Survey published by the Economic Intelligence Unit, 27 St James's Place, London, the UK market for radio sets is now worth about £63 million annually at retail selling prices. Four and a half million sets were sold in 1963 compared with 1·8 million in 1959. Imports accounted for 36 per cent of all sets sold in 1963 compared with only 3 per cent in 1959. Much of the increase came from the import of transistor sets.

Extending the Coverage. The BBC is to build another 19 low power relay stations to widen the coverage of its 405-line television (BBC 1) and v.h.f. sound services. The new stations, which will range from the Scilly Isles and Bodmin in the South West to Campbeltown and Kingussie in the North, will extend and improve the coverage of both services virtually to the whole of the population of the British Isles.

Mullard Film Shows will be held at Caxton Hall, London, S.W.1 (March 4), Co-operative Hall, Leicester (March 9), Technical College, Newport, Isle of Wight (March 17), Hawthorns Hotel, Bournemouth (March 18), The Guildhall, Cambridge (March 23), Town Hall, Peterborough (March 24), Cornwall Technical College, Redruth (March 30) and Continental Hotel, Plymouth (March 31). All meetings will commence at 7.45 p.m. Those wishing to attend any particular meeting should write to Mr Ian Nicholson, Films & Lectures Organization, Mullard House, Torrington Place, London, W.C.1, mentioning the RSGB.

Ideal Home Exhibition which opened at Olympia, London, on March 2, features a large BBC studio and an ITA exhibit. About 30 programmes are to be broadcast from Studio Olympia, as it is called, during the period of the Exhibition. In the Empire Hall there is a display of exhibits from firms marketing TV, radio, recorders and records. The ITA exhibit includes a dozen rear-projection cinema screens each showing a short film on various aspects of independent television programmes.

BBC Colour Tests. The schedule of colour television test transmissions on Channel 33 has been revised. Mondays, no transmissions; Tuesdays to Fridays, 16.00-16.30 GMT daily; Tuesdays and Thursdays, for about one hour after BBC2 closes down but not beyond midnight. The NTSC system is used for these transmissions.

Microwave Long Hop. Extending from Boston, New York, and Washington in the East to San Francisco and Los Angeles in the West and serving major population centres in 23 States and the District of Columbia, Western Union's new 12670 km microwave system is the longest single microwave project ever undertaken. The network consists of 267 microwave stations spaced 40 to 50 km apart.

"Northern Lights." A windowless channel electron multiplier has been developed by Mullard Research Laboratories for applications in space research. No longer than a paper clip, the device will be used in experiments planned by the DSIR Radio Research Station to map the electron density during an aurora ("Northern Lights"). A rocket carrying the multipliers into space for the first experiments was launched from northern Norway during the middle of February. Although rocket-borne for the current experiments the multiplier is the first known practical device of its kind which is also suitable for satellite applications. Power consumption is only 0·2 milliwatts—more than 100 times less than that of any comparable multiplier—and it would make little demand on a satellite's solar batteries. It is essentially a fine glass tube open at one end with a high resistance coating on its inner surface. When a voltage is applied between the ends of the tube the coating becomes a continuous dynode. The device is much simpler and smaller than a conventional electron multiplier, which has separate dynodes, all needing different voltage supplies. RSGB lecture later; perhaps?

Dates for the Diary. Audio Festival and Fair, Hotel Russell, London, W.C.1, April 22-25; RECMF Components Exhibition, Olympia, London, May 18-21; Radio Show, Earls Court, London, August 25-September 4.

THE MONTH ON THE AIR

A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

By R. F. STEVENS, G2BVN*

AT this time of the year the tendency is to look forward to the spring rather than to the cold remnants of the winter. What do the coming months hold for us dx'wise? The sunspot minimum is past and solar activity is rising and the *Propagation Predictions* reveal increasing opportunities of evening DX for the daily toilers. The DXpedition front seems a little bare but whilst Gus, W4BPD, remains in Asia who can foretell what activity may suddenly develop. One cannot help but feel sometimes that the superb operating of W4BPD could well be emulated by other DXpeditioners, thus avoiding a sudden world-wide rise of blood pressure whilst the DX operator tunes 14,200 to 14,320 kc/s!

As certificate chasers will be well aware there is a tendency nowadays for award sponsors to ask only for a certified check list rather than to demand large numbers of QSL cards which may have to be sent considerable distances. In order that this system may work it is necessary that the utmost good faith should be observed by both the applicant and also the person(s) checking the claim. One of the conditions of acceptance of a certified check list is that the award sponsor may call for any or all of the listed QSLs, if so desired. To the knowledge of the writer this condition was invoked on two occasions recently when applicants were asked to forward certain listed QSLs. This they could not do and the claims were therefore rejected. This behaviour is somewhat akin to the falsification of QSL cards and it is most strongly felt that any operator found guilty of a wilfully incorrect certificate application by this method should thereafter be barred from applying for *any* award whatsoever.

One of the sought-after stations during recent months has been **CR4AJ** in the Cape Verde Islands. He has been worked by many who have sent their QSLs (with IRCs no doubt) to the address given over the air by the operator. It now transpires that the CR4AJ QSL chores are to be undertaken by W2VCZ and it is hoped that cards already in the system will be dealt with and not posted missing. This has unfortunately happened several times during recent months, much to the disappointment and annoyance of many operators. No one denies that QSL managers have performed outstanding duties for the amateur fraternity, W2CTN is perhaps the most obvious example of how the job should be done, but others have unfortunately not always followed this high example.

News from Overseas

News from **Nigeria** comes via 5N2AAF: Ray Brown, **5N2RFB** has moved to Port Harcourt and his new address will be found in *QTH Corner*: John Wilson, **5N2AAC** leaves Nigeria on June 8 and will reappear as G3PCY in Accrington, Lancs: Bob Osborne, **5N2RJO** has returned to Kaduna from UK leave and is again on the air with a KW2000. **5N2AAF** flies home on leave on March 23 but in the meantime has been active on 28 Mc/s after announcing his intentions previously on 21 Mc/s. The activity results in QSOs with G3GAW, DL7AA and G3HDA on s.s.b. and 11EFA on c.w., all around 13.40-14.30. Mike will be active on 28 Mc/s every Sunday afternoon until he leaves, listening on the hour between 12.00 and 15.00, either on 28·6 Mc/s if there is not a c.w. contest taking place or on 28·1 Mc/s if a c.w. contest is in progress. **5N2AAF** also reports that the 21 Mc/s band is staying open as late as 20.00-21.00 for the USA and South America.

From **9M4LX** via G3PCI comes information that **9M6AA** is now at Ipoh, Malaysia, from where he will be operating with the call **9M2TS.** The QTH is the school from which 9M2JJ operated before leaving for the USA. 9M4LX hopes to operate as **9M6LX** for two weeks at the end of March or the beginning of April. It is still hoped to obtain permission to go to Nicobar, but at the time of writing there has been no further progress.

G3SZC was licensed during 1951 as **VS9MA** from the Quahati State of Makulla and Shirrh in South Arabia, but apparently a number of outward bound QSLs did not reach their destinations. If any operator who contacted VS9MA and would now like a QSL will he please write, with QSO details, to I. G. West, 17 Wife of Bath Hill, Canterbury, Kent. Please enclose a s.a.e. for direct replies.

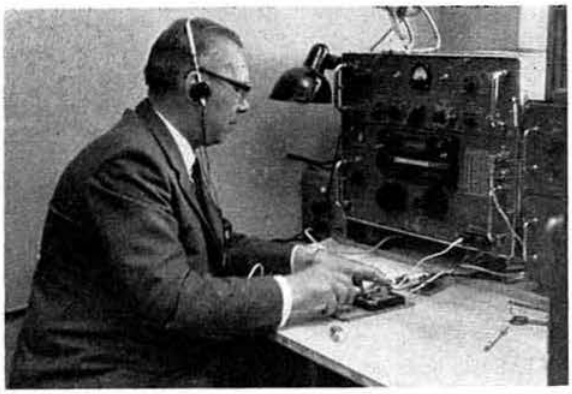
MP4TBK is now active on 7 Mc/s as **VS9ADQ** and will be available until he returns to the UK in July. Anyone requiring a QSL for a MP4 or VS9 QSO will find the present address in *QTH Corner*.

6Y5FH is on the air every Sunday around noon GMT on 14,080 or 14,100 kc/s c.w. particularly looking for UK contacts. 6Y5FH also uses the 21 Mc/s band when this is open, usually around 14.00 on a frequency of 21,120 kc/s. The home-built tx runs 35-40 watts input and there are separate aerial arrays for each band from 3·5 to 144 Mc/s. The receiver is a modernized HRO5.

ZC4WR is the new call of the beacon transmitter operating on 29,008 kc/s in connection with the **Cyprus and South Africa Propagation Study Group.** Using a vertical aerial the beacon is in continuous operation with the call-sign being transmitted on f.s.k., with a 15-second break in the carrier every 75 seconds. All reports will be acknowledged by a QSL card and should be sent to PO Box 219, Limassol, Cyprus Republic.

From **BERS195** via G3AAE comes the following information on stations in the Antarctica area which will be available during the coming winter (S. Hemisphere type): Macquarie Is. **VK0TO;** Wilkes Land **VK0s MC** and **KH;** Mawson Base **VK0GW.** There is a new licensing policy in that in future applicants for VK0 calls will have to satisfy the issuing authority as to qualifications, rather than obtain the licence as a formality. This state of affairs may be expected to lessen the amount of VK Antarctica activity as in some cases the operators have not always previously held

* Please send all news items and reports to RSGB Headquarters to arrive not later than **March 17** for the **April** issue and **April 8** for the **May** issue.



SM5WI operating the Pioneer Palace Radio Club's station UR2KAN during a visit last year.

amateur licences. It was hoped that **VK9WP** would be active on c.w. from **Nauru** by February but so far nothing has been heard, although conditions are far from optimum for this part of the world.

Top Band News

From **VO1FB** at St. John's, Newfoundland comes the following comments: the earliest crossing so far noted came on January 24 with a QSO with **G3PU** at 19.50 (16.30 local time), whilst during the Affiliated Societies Contest G3SRC and G3GRS were heard as early as 19.10 with 559 signals. Several new countries have been worked recently, i.e. VP2AV, 6Y5XG, 9L1HX and 9L1TL, and VO1FB would like to say thank you to the UK operators who stood by whilst he was in QSO with 9L1TL, apparently the hush on 1804 kc/s was quite uncanny. Operation during the *CQ* 160 Meter Contest was difficult owing to a S9 noise level but despite this 106 different stations in 12 countries were worked, of this number 46 were UK stations. On the second day of the Contest the band was open to Europe from 19.30 until 06.45 GMT. The claimed score is in excess of 18,000 points and the best European signals came from DL1FF, G3GRL/A, EI9J and G3BA. QSL requests may be sent to Dr. J. C. Craig, c/o General Hospital, St. John's, Newfoundland.

9M4LP, Bob Snyder, was another participant in the *CQ* 160 Meter Contest, and spent a considerable time on the band but was able to contact only three stations, i.e. G3GRL/A (22.58), GM3IGW/A (23.22) and JA6AK (13.19). Bob mentions that conditions were poor compared to last year when literally dozens of G stations were heard. GM3IGW was called for a long time before the QSO was made, whilst G8NF was heard and called on many occasions without a QSO resulting. Also heard were G3L?Q at 22.20 and VK5KO at 11.02, with bursts of QRN of up to 40db over S9 in intensity, making copy extremely difficult. 9M4LP is looking for a contact with 9L1 to give him five continents on Top Band and believes that he may have been unlucky in not working 9L1HX on 1803 kc/s just after the Contest. Obviously Top Band has been a big disappointment in 9M4 during the past season, the expected bottom-of-the-cycle results have not materialized and conditions have been generally poor. Bob queries whether his QSO with **GM3IGW/A** is a " first " on this band; any advance on January 30, 1965?

5B4CL mentions that the annual Top Band contest in Cyprus is being held on March 20-21 to coincide with the RSGB First Top Band Contest on those dates. Intending UK participants are asked to keep an ear alert for any ZC4 signals. During the last Transatlantic Test Ray Pulling at Pergamos heard the following stations on a HRO5: G3RFS (05.10), G3ORP (05.10), G3PQA (05.10), GW3SVA (05.11), G3KKP (05.11), G3RAU (05.12) and VO1FB (05.25). All these stations were inaudible by 05.40. Also logged were W1, W2, W3, W4, OK2 and VP3. **6Y5FH** hopes to be operational in time for the next season but has been listening on the band and hearing stations from North and South America, but, as yet, nothing from the UK.

The **Fareham ARC** operating under the call **G3SHD/A** and comprising G2QK, G3EER, G3LGX, G3HYG, G3SZA and G8DK took part in the *CQ* 160 Meter Contest and have entered a claimed score in excess of 4250 points. The list of UK stations worked shows a tremendous amount of activity during the Contest period.

Apropos the query last month regarding the first **G/9L1** QSO Bill Mahoney, A3867, produces extracts from his log which show the first 9L1HX/G3RFS QSO as being on December 6 at 00.39, with a QSO with 9L1TL taking place some four minutes later. It is hoped that the record is now straight on this one.

DXpeditions

After the **VQ8AMR** and **KP6AZ/EA9** operations which terminated after only a few days, and the initial demand for **VU2NRA**, the DXpedition front seems to be set calm for a while, unless of course Gus can make an " ARRL recognised " trip to BY. **PY7BAL/O** is said to be making a two month stay on Fernando de Noronha whilst **VP1GFQ** will be available during the ARRL Contest phone sections. There have been rumours regarding a possible trip by a Russian amateur to BY, but this cannot be confirmed from any source.

Jack Lambert, **G3TA**, will be making another of his trips to the West Indies between March 22 and May 1, 1965. This time it is to VP7, from where he hopes to operate as VP7TA if this call is still available. At the present time the gear comprises the much journeyed B2 of G3YF, with an all up weight of 40 lb plus such items as a key, headphones, etc. If there is anybody who might be able to loan G3TA something more modern and somewhat lighter in weight he would be most pleased to hear from them. At the moment activity is scheduled for 7 and 14 Mc/s with a limited number of crystals available.

G3PWU will again be active from **Radnorshire** during the second weekend in April. An excellent site has been chosen at 1350 ft a.s.l. in open country and it is hoped that the weather will be favourable towards the intended Top Band operation.

Contests

The results of the 1964 **WAE Contest** show the following five entrants from England: G2DC (25,620 points), G3EYN (16,530), G3MWZ (1178), G2AJB (805) and G3OLU (252). The overall European winner was DJ3KR with 84,784 points whilst EP2RC scored 106,645 points.

The 1965 **PACC Contest** will take place between 12.00 April 24 and 18.00 April 25. Both phone and c.w. sections will run concurrently but cross mode QSOs are not permitted, and each station may be worked only once per band either on c.w. or phone. Leaflets are available which give full details of the Contest and these may be obtained from G2BVN by sending a s.a.e.

The following high *claimed* scores have been made in the Affiliated Societies Contest:

G3GRS	1675 points	G3PIA	1395 points
G3TRF	1675 points	G3KLH	1385 points
G3HS	1620 points	G3JEQ	1375 points
G3SRC	1450 points	G3TR	1325 points

Awards

The **Amateur Radio Friends of Ockenden Venture** issued 78 certificates to operators in 25 countries during the year ended December 31, 1964, and in so doing collected £32 for the funds of the Ockenden Venture. G3IFB is the award custodian and G2FUX the honorary treasurer. This group and the Austrian "Save the Children Trust" are believed to be the only organizations issuing certificates for a charity.

5N2AAF reports that the 350th **5N2 Award** has recently been issued and this went to 5A4TK. The first two-way S.S.B. Award to a s.w.l. was made within the last few weeks to E. Eriksson, SM5-2086. Only six operators have so far received the 5N2 Award for two-way s.s.b. QSOs. Details of the 5N2 Award were given in November 1964 *MOTA*.

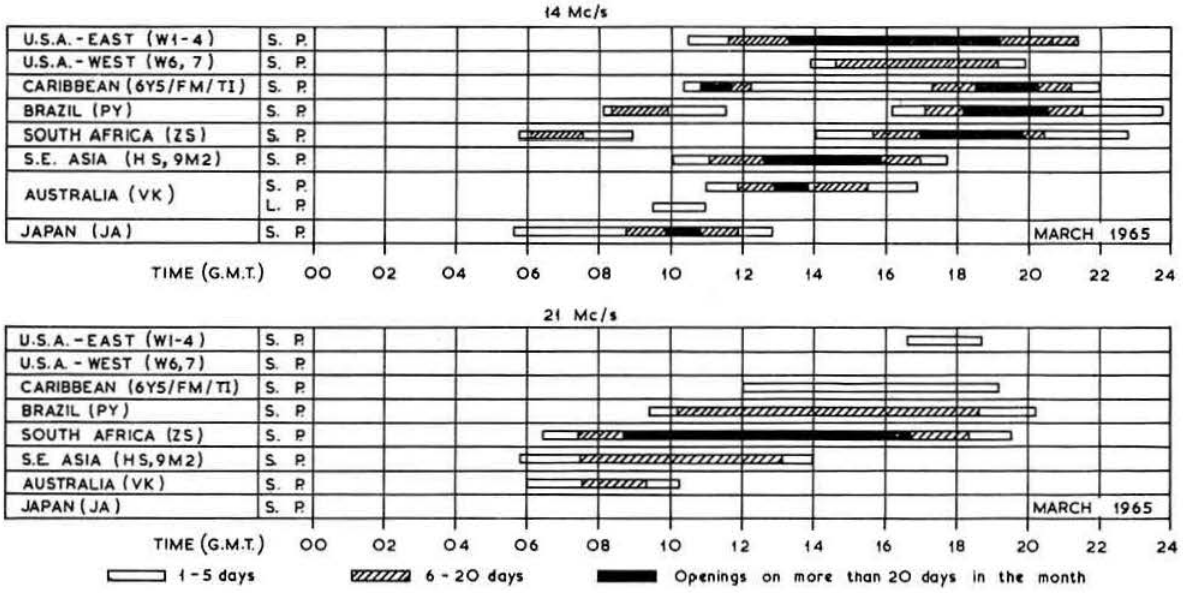
The **IOTA Directory of Islands** contains some 500 entries. Six Continental sections list all the main island groups, the majority of known minor groups, larger islands not covered by a group name, most of the remote islands of the world's oceans, and includes all present DXCC islands. An Appendix will list call-signs of stations active from those islands not already indicated by separate international prefix, e.g. Bornholm, Hebrides, Orkney Is., etc. Cost of the *Directory* (including postage) is: UK 2s.; overseas (by air mail), Europe six IRC; USA eight IRC; Pacific nine IRC. Orders now taken for delivery commencing in early March, write to: G. Watts, *DX News-Sheet*, 62 Belmore Road, Norwich, Norfolk, NOR.72.T., England.

Comment, criticisms or suggestions concerning either the *Directory* or the IOTA Award should be sent to the custodian before April 30, 1965. Rules for the IOTA Award will be announced shortly after that date. In so far as CE0AG is concerned the starting date for QSOs qualifying for this Award will be from December 1, 1964.

The **Doctorate of Amateur Radio Award** is given by Doctors' CHC Chapter 24 for working Doctors of Medicine, Dentistry, Osteopathy and Veterinary Medicine in the following classes:

(i) 25, 50, 75, etc., different doctors.
(ii) Doctors in different states, 10, 20, 30, etc.
(iii) Doctors in all continents.
(iv) Doctors in different zones, 10, 20, 30, etc.
(v) Doctors in different countries, 25, 50, 75, etc.

PROPAGATION PREDICTIONS



During the month of March, there is a symmetrical distribution of the m.u.f.s about the Equator, so that the propagation conditions will be nearly the same in both hemispheres. Traffic to the southern hemisphere (South Africa and South America) will therefore, in general show an improvement over the winter months. Solar activity still remains very low, so that 28 Mc/s is of no practical use for DX. At present, between 09.00 and 16.30 under exceptional conditions, contacts may be made on this band with Africa, and with even less probability with South America between 14.00 and 16.00. With the approach of the summer season (from about May), however, 28 Mc/s will liven up for sporadic E short skip contacts over distances of 450 to 1100 miles. Low solar activity and the approach of summer will lead to relatively poor conditions on 21 Mc/s. This will be particularly noticeable for traffic to North America, and East Coast stations (WI-4) will only be heard in the late afternoon on days with above average F2 m.u.f.s. The West Coast, Alaska and Hawaii will not be heard. The outlook for the second half of the ARRL DX Contest is unfortunately not encouraging. Only with African stations will contacts be possible on this band with any certainty. 14 Mc/s will show a certain improvement compared with the winter months, as the nights are becoming shorter and the band will remain open longer in the evening. Basically all continents should be workable with certainty on 14 Mc/s but chances for working DX on this band via the long path will become remote. On days with above average F2 m.u.f.s contacts should be possible via the short path with Hawaii between 16.40 and 18.30 GMT, and with Alaska between 08.30 and 12.00 and 15.30 to 18.30. On 7 Mc/s during March DX contacts are possible when the greater part of the transmission path lies in darkness. Traffic with South America, Australia and South Africa will show a seasonal improvement. QRM permitting, Eastern North America should come through from about 21.00. However, in the latter half of the night this traffic may be interrupted in some areas by a drop in the m.u.f. On 3·5 Mc/s DX traffic will experience slightly worse conditions compared with the winter months, as the atmospheric noise level slowly increases during this month. This increase will continue with the approach of summer. In the latter half of the night (and sometimes even earlier), the dead zone may frequently interrupt local traffic beyond the ground wave.

The provisional sunspot number for January 1965 was 18·5 with the periods of greatest activity lying between the 1st/9th and the 18th/31st of the month. The predicted figures for April, May and June are 15, 16 and 18 respectively, and a worthwhile increase in solar activity is to be expected.

The Doctorate degree held by the specific contacts claimed *must* be stated and is limited to the USA degrees MD, DDS, DO and DVM, or their foreign equivalents. Contacts with members of CHC Chapter 24 count double. There are no date limits, and a certified (GCR) list should be sent with one dollar or 10 IRC to WA6CRN, W. L. Sprague, MD, 8028 San Lucas Dr., Whittier, Calif., USA. A world-wide *Doctor-Ham Directory* is available from WA6CRN for 50 cents or five IRC. This contains the names of some 1150 doctors in the classes mentioned above and it is hoped to expand the scope of the *Directory* to include as many doctors as possible. Such a *Directory* could be of great value in emergency medical communications, although this application may be of limited value in the UK. The *Directory* list only three UK Ham-Doctors, G2FU, G2HFD and G3FKM; are there others?

The **Directory of Certificates**, published by K6BX, will henceforth not include details of awards sponsored by businesses, manufacturers or publications using such awards for business aims, nor awards sponsored by individuals. The thinking behind this action is logical but will not be reproduced here; additionally there have been some unfortunate experiences with awards controlled by individuals, though not in the UK, one is pleased to note. It is hoped that this refusal of listing in the *Directory* will assist in the maintenance of awards standards that are above reproach.

Commonwealth Call Areas Table

	1·8	3·5	7	14	21	28 Mc/s	Total
G3DYY	—	7	12	12	5	1	37
G3LHJ	1	3	1	17	14	1	37
G3AAE	—	—	1	21	7	—	29
G8JM	—	—	—	29	—	—	29
5N2AAF	—	—	5	19	4	—	28
G3KSH	—	2 *	3 *	1 *	3	—	9
A2498	2	7	3	51	12	1	76
A2340	4	7	6	40	2	—	59
A4201	3	6	2	34	5	1	51
A4048	3	3	2	40	1	1	50
A3699	4	6	1	15	1	0	27
A3902	—	3	—	13	7	—	23

Band Activities

There is no such thing as easy DX these days, and some of the more recent recruits can have little idea of what the higher frequency bands can be like at sunspot maximum. 14 Mc/s open for 24 hours a day with all six continents easily workable, 21 and 28 Mc/s both packed with S9 signals from all over the place: halcyon days indeed. Nowadays the DX has to be worked for, winkled out from under layers of QRM and found only as a reward for painstaking endeavour. All praise then to the many stalwarts who continue to press on, sunspots or no sunspots. Such application does, however, need stimulating, and during the past month the appearance of VQ8AMR from Rodriguez Island, VU2NRA from the Andaman Islands and KP6AZ/EA9 from Rio de Oro have provided just such encouragement. VQ8AMR certainly packed a lot of activity into a very few days of operation on 14 Mc/s sideband and, to the great joy of one of your contributors, responded to a call on c.w.

The following summary of the month's DX highlights results from details provided by G3AAE, G3APZ, G3HCT, G3HDA, G3KSK, G3SML, G8JM, BRS20317, A2498, A3699, A3867, A3926, A4038, A4062 and A4311, without whose helpful co-operation there would be no band activities report. Salute them all.

1·8 Mc/s C.W.: HK4EB (04.15-06.40), TF5TP (07.15), VE1, VE2, VE3, VO1 (20.45-08.40), VP3CZ (05.40-06.15), W1-5 (04.00-07.00), K5JVF (05.20), K5LIW/5 (06.30), W5KUA (04.20), W6JTB (07.00), W6RW (07.00-07.40), W8-9 (04.00-07.00), W0NWX (06.50), W0VXO (06.10) and 4U1ITU (16.30).

3·5 Mc/s C.W.: CN2AF (18.50), HI8XAL (00.40), JA6AK (22.50), MP4BEK (20.15), TA2FA (19.00), TF5TP (23.50), UA0AG (23.15), UA0KKB (19.00), UL7KBK (01.00), UH8DC (19.45), UJ8KAA (19.45), UM8FM (22.45) and VK4FJ (19.30).

7 Mc/s C.W.: CP5EZ (23.45), CR6AI (21.00), CR7FC (19.05), DU9FB (18.00), EA9EN (08.45), EL2AD (23.50), EL2AQ (08.15), EL3C (18.15), FB8WW (23.00), FB8XX (19.40), FG7XC (01.00), FY7YK (23.40), HI8NPI (23.45), HK3AVK (23.50), HK4DP (00.20), JA1PTI (17.40), JA4BTK (14.30), KZ5BO (23.00), OR4VN (21.00), TA2FA (16.15), VK2EO (19.35), VK3MJ (19.50), VK5KO (20.45), VP2GAW (00.50), VP2LH (00.10), VP2SM (00.20), VP4VU (23.35), VP6AK (23.15), VP9WB (22.55), VS9MB (15.45), VS9SJF Socotra (18.20), ZL1HV (08.20), ZL2GS (08.15), ZS1XR (20.00), ZS8E (17.30-19.00), 5H3JJ (19.15), 6W8BF (18.35), 6Y5XG (23.30), 7Q7EX (23.00), 7X2AB (18.55), 9J2BC (18.00), 9J2WR, 9K2AD (19.00) and 9M4MN (19.45).

7 Mc/s S.S.B.: CX2CO (11.45), HC2KT (02.05), JA1AEA (16.00), JA2BTK (15.45), MP4BEQ (23.15), OA4NTF (08.40), OX3JV (08.35), VK2AVA (06.10), ZC4GT (18.00), ZL1AYY (07.15), ZL2BCG (08.10), ZS2MI Marion Island (19.30), 5N2AAC (22.15), 5Z4AA (17.20), 6O6BW (21.40) and 9M4LP (21.15).

14 Mc/s C.W.: CR4BB (00.05), KP6AZ/EA9 Rio de Oro (10.30), FB8XX (17.25), FM7WP (12.30), FY7YF (12.20), HK3AVK (12.10), JA6AA (07.55), KZ5BC (21.45), TN8AF (18.10), OD5LX (08.20), OR4VN (19.40), OX3AY (14.35), SV0WT/0 (18.35), TG9AD (14.00), UA0KYA Zone 23 (08.30), VP2DAD (12.05), VQ9HB (16.25), VS6FF (11.55), ZA2BA (12.10), ZB2A (16.00), ZD5M Swaziland (18.55), ZL4BO (12.00), 5R8AN (18.00), 7Q7EX (18.35) and 7Q7LC (18.15).

14 Mc/s A.M.: CR4BA (09.10), HI4XA (21.30), PJ3AJ (14.20), ZB2AE (14.55), ZB2AK (13.25), 7X2VR (10.55) and 9K2AY (14.10).

14 Mc/s S.S.B.: AC5NW (12.40), CE3UF (11.20), CE0AG Easter Island (13.30), CP1CY (12.25), CR4AJ (09.35), CR4BB (09.30), CR9AK (11.35), DU1BSP (10.30), EL7B (09.40), EP2DS (09.40), ET3DR (16.15), ET3FW (11.00), FG7XT (13.35), FK8AC (08.20), FK8AU (08.25), FM7WQ (11.30), FY7YL (11.45), HC5NW (17.30), HC8FN Gala-

QTH Corner

CR4AJ	via R. W. Stankus, W2VCZ, 30 Pitcairn Avenue, Hohocus, N.J., U.S.A.
ET3AZ	A. Bar-Giora, Gymnicherstr. 4, Cologne, Lindental, W. Germany.
FO8AU	E. Poroi, PIRAE, Papeete, Tahiti.
TJ1AD	via DL3BK, Ackermannstr. 31, 7 Stuttgart-Vaihingen, W. Germany.
TN8AL	S. Besse, Postes & Telecoms., Service Radio, Fort Lamy, Rep. of Tchad.
VS9ADQ	Tpr Quigley, D. J., SHQ Troop C Sqdn., 10th Royal Hussars, BFPO 69, GPO, London.
VU2NRA	via W4ANE, Calvin Des Portes, PO Box 501, Apalachicola, Florida, USA.
XE1TQ	Dr M. J. Graham, Independencia 188, Veracruz, Mexico.
ZC4CI	D. Shaw, PO Box 216, Famagusta, Rep. of Cyprus.
ZD8JC	via W5EBJ, J. C. Makeever, 244 S. Live Oak St., Bellville, Texas, USA.
ZS8G	PO Box 379, Maseru, Basutoland.
5H3JI	G. T. Allen, G3JTK, c/o Mrs M. Allen, 157 Walton Breck Road, Anfield, Liverpool 4, Lancs, England.
5N2RFB	R. Brown, c/o CFAO, PO Box 5110 Port Harcourt, Nigeria.
5U7AG	B.P. 201, Niamey, Niger Rep.

* * *

RSGB QSL Bureau: G2MI, Bromley, Kent.

G2ATM (ex-VS1FZ), Mrs. Snyder, Bob Snyder, 9M4LP, and G6LX at a dinner party in Singapore.

pagos (18.10), HI8AMA (17.15), HI8XAS (15.55), HM2BD (08.45), HP1ME (11.55), HV1CN (10.40), KA2DF (08.50), KC6BM (10.50), KG6APJ (14.35), KH6DUG (14.15), KG6IG Iwo Jima (08.10), KR6BL (09.05), KR6FJ (09.55), KR6UL (09.20), KR8CA (09.55), KV4CF (11.15), KW6EJ (08.10), KX6DP (08.15), KX6DR (08.25), OD5AX (16.00), OD5LX (14.10), OH0NI (11.40), PZ1BW (11.30), SV0WF Rhodes (09.35), TG9AD (13.55), TG9EL (13.00), TG9RR (17.45), TG9SC (14.30), TJ1AC (08.15), TU2AE (09.10), VK7CK (13.05), VK8KK (11.25), VK9NT (10.00), VK9TG (10.00), VK9TL Norfolk Island (08.45), VK0DS (18.00), VP2DAD (11.55), VP2KR (17.50), VP2LS (17.35), VP4VP (16.35), VP7BG (17.40), VP7NS (13.00), VQ8AMR Rodriguez Island (14.00-17.30), VS9OC (11.00), VU2NRA Andaman Island (14.30), XE1CE (14.00), XE1NI (14.30), XE2BM (14.10), XE2DDV (17.35), XT2HV (09.05), XW8AL (10.50-14.00), XW8AX (11.00), YA4A (13.00), YN1PJ (13.30), YN3PN (14.10), YS1AGM (13.10), YS1O (13.30), ZB2AE (10.40), ZD3C (18.50), ZD5R (17.10), ZD8JC (18.50), ZP5BC (11.20), ZS8H (17.20), 4S7IW (16.30), 4U1ITU (14.20), 4U1SU (15.00), 4W1G (17.55), 5T5AB (11.00), 5U7AG (18.30), 5V8AB (18.05), 5X5IU 19.55), 6Y5MJ (17.15), 7G1H (15.50), W8BZB/7G1 (12.20), 7Q7PBD (17.15), 7X3CT (10.20), 9L1JR (10.30), 9M4LX (15.55), 9U5ID (18.40) and 9U5JE (18.40).

21 Mc/s C.W.: CR6FN (14.00), CR7IZ (09.00), EL8X (09.25), ET3USA (16.25), FB8WW (11.45), FB8XX (10.50), FR7ZD (09.20-12.45), MP4DAK (10.15), OD5LX (11.00-13.30), VS6EY (09.20), VS6FE (11.10), VS9AMD (14.10), ZD5M (12.24), 5R8AB (12.00), 5R8AN (11.00-14.00), 5R8CB (10.40), 6W8BL (11.45), 9K2AD (08.25) and 9M4GZ (09.10).

21 Mc/s A.M.: CE6EZ (15.10), CR4AD (11.00-14.00), CR4BB (13.30), CR6FA (11.50), CR7GW (12.40), CT2AL (12.10), ET3USA (11.10-14.00), FH8CD Comoro Island (15.15), HI4XAC (16.40), HC2MP (14.35), KV4CX (12.25), PJ3AJ (16.10), PZ1BW (10.15), TG9US (14.00), TN8AA (13.55), VK6QL (08.20), VP9FK (17.10), VQ8BZ (14.05), VS9ARC (15.05), VS9SJF (14.00), ZS9G (09.50), 7X2SQ (17.55), 9L1WN (11.50) and 9X5AV (11.25).

21 Mc/s S.S.B.: EA8CG (18.00), HK1MT (17.55), HK1SU (18.20), KV4CF (12.50), KV4CX (14.05), OD5LX (10.30), TI2EV (19.20), VQ1GDW (10.30), VS9AWR (12.10), VU2JM (11.50), XE1FSV (17.00), YA3TNC (09.25), YN1LC (15.00), YS1HUKE (15.45), ZD8JC (12.30), ZS7R (13.15), 5X5JG (12.20), 6W8AE (12.45), 9J2WR (16.10) and 9K2AU (11.35).

28 Mc/s C.W.: 5N2AAF (12.30).

28 Mc/s S.S.B.: LU6DAP (13.10), 5N2AAF (14.00), 7Q7PBD (15.05) and 7X2VX (13.30).

The review next month will cover the period of BERU and the first sections of the ARRL DX contest. It will be interesting to see whether 28 Mc/s is really as dead as it appears to be! Incidentally, do not be fooled by that ZA2BA reported on 14 Mc/s c.w.: while he is no doubt adjacent to Albania he is most unlikely to be operating from within that country. The last genuine operation from ZA was that of OK7HZ/ZA nearly a decade ago. Perhaps in 1975?

DX Briefs

ZD3C received his licence on February 4 and is active on s.s.b. usually at the high end of 14 Mc/s. His home call is W4WRK (Tks G3IEN).

XE1TQ is active daily from 13.30 to 15.00 on 14,031 kc/s c.w. and offers to provide any UK operator with a Zone 6 QSO. Few Mexican stations operate on c.w. and some operators find it difficult to complete WAZ for this reason. XE1TQ QSLs direct only and his address will be found in *QTH Corner*.

4X4DF, who is the former operator of **ET3AZ**, called recently at RSGB HQ and left his present address in Germany from where he will be pleased to replace any missing QSLs, and which will be found in *QTH Corner*.

VK4FJ is looking for European contacts on 3505 kc/s c.w. around 19.00, with operation on 7010 kc/s an hour later. An inverted-V is the radiator in use on these bands.

CR4AJ QSLs can now be obtained from W2VCZ whose address will be found in *QTH Corner*.

VE3CJ reports that the new prefix for the **Cayman Islands** w.e.f. April 1 will be **ZF1**.

TL8SW advises that QSLs from UK stations should be sent to his QTH in the Central African Republic (c/o US Embassy, PO Box 302, Bangui), and *not* via W1BPM.

* * *

Correspondents are thanked for their co-operation and acknowledgement is made to the West Gulf DX Club *Bulletin* (W5IGJ), *DX'press* (PA0FX), and *The DX'er* (N. Californian DX Club). Please send all items to RSGB Headquarters to arrive not later than March 17 for the April issue and April 8 for the May issue.

Correction

Mr G. W. Roberts' call-sign was incorrectly given as G3EWY on page 106 of the February, 1965, issue of the BULLETIN. It should have appeared as G3ENY.

Pocket-size CR Bridge (Continued from page 161)

or resistor of unknown value is connected across terminals X1, X2 and the switch set to the appropriate range. The 300 c/s signal from the audio oscillator is then carefully tuned out by slowly adjusting VR1. The null point is quite distinct, and when found enables the value of the externally connected component to be recognized by reading the scale; provided, of course, that the value is within the range offered.

As the same scale can be used for both capacitance and resistance readings, in the prototype scale markings are direct capacitance values, these being mentally multiplied by 10 when resistors are measured. If, as mentioned earlier, R1 is reduced to 1 K ohm, scale readings will be direct in both cases. The unit cannot indicate the voltage ratings of capacitors or course, neither can it be usefully employed with electrolytics; but it can, however, be otherwise usefully employed as a fixed frequency audio oscillator by short-circuiting the *X* terminals, whereupon VR1 will function as a crude attenuator the output being taken from the 'phones sockets.

RSGB Slow Morse Practice Transmissions

The following Slow Morse Practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the Honorary Organizer, M. McBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Time	Call-sign	kc/s	Town
Sundays			
08.00	G3KLT	1827	Birmingham
09.30	G3KZZ	1920	South Shields, Co. Durham
10.00	GW3TMH	1980	Rhyl, Flints.
10.15	G3CGD	1875	Cheltenham
10.30	GI3JEX	1860	Belfast
11.00	G2FXA	1900	Stockton-on-Tees
12.00	GM3HBY	1903	Glasgow
12.00	† G3HVI / G3OGD	1890	Stoke-on-Trent
12.00	G3SVD	1870	Reading, Berks.
12.00	G3PAI	1825	Ongar, Essex.
18.00	GW3TMP	1980	Mold, Flints.
18.30	G3NCZ	1920	Blackburn, Lancs.
19.00	G3NPB	1875	Hexham, Northumberland
21.00	† G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.30	G3NQR	1875	Harrow Weald, Middx.
Mondays			
18.00	G3SWR	1980	Middlesbro', Yorks.
18.30	G3NCZ	1920	Blackburn, Lancs.
18.45	GW3PMR	1920	Bangor, Caerns.
19.00	G3MXS	1875	Birkenhead
19.00	G3NPB	1875	Hexham, Northumberland
19.30	G3SRY	1920	Cheam, Surrey
20.00	G3HJG	1980	Manchester
20.00	G3IBJ	1910	Southampton, Hants.
20.00	G3PKZ	1930	London N.22
20.15	G3SAZ	1845	Ashford, Middx.
20.30	G3MJS	1980	Leigh-on-Sea, Essex.
21.00	† G3IRM / G3MWO / G3PHW	1981	Bury St. Edmunds
21.00	† G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.15	G3ADQ	1990	Bradford, Yorks.
21.30	† G2BSW / G3TBW	1865 / 1865	Studley, Warks. / Redditch, Worcs.
Tuesdays			
19.00	G3NPB	1875	Hexham, Northumberland
19.00	G3NUE	144-26 Mc/s	Worcester
19.30	G3RFL	1910	Great Harwood, Lancs.
20.00	G3RZO	1865	Redditch, Worcs.
20.00	G3PJI	1910	Southampton
20.00	G3AYJ	1925	Birmingham
20.30	G3NKX	1915	Loughton
21.00	† G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.30	† G3HZG / G3TNI	1865 / 1865	Redditch, Worcs. / Bromsgrove, Worcs.
22.00	G3AWL	1980	Wingate, Co. Durham
22.00	G3HZM	1925	Manchester
Wednesdays			
18.30	G2FXA	1900	Stockton-on-Tees
18.45	GW3PMR	1920	Bangor, Caerns.
19.00	G3GBS	1865	Moseley
19.00	G3GBJ	1870	Redditch, Worcs.
19.00	GW3CJR	1930	Newbridge, Mon.
Wednesdays			
19.00	G3RBP	1860	Oxford
20.00	G3RQX	1840	Wolverhampton, Staffs.
20.00	G3SAD/A	1980	Stevenage, Herts.
20.30	G3KGU	1920	Theydon Bois, Essex
20.30	G3AGN	1875	Felixstowe
21.00	† G3HVI / G3OGD	1890	Stoke-on-Trent
21.00	† G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.00	G3POU / G3SFO	1850	Doncaster, Yorks.
Thursdays			
18.00	G3SWR	1980	Middlesbro', Yorks.
18.30	G3NC	1968	Swindon
18.30	G3TMI	1840	Canterbury, Kent
19.00	G3NUT	1875	Wallasey
19.00	G3NPB	1875	Hexham, Northumberland
19.30	G3RFL	1910	Great Harwood, Lancs.
20.00	G3NHR	1900	Hounslow
20.00	G3LLM	1820	Bath, Somerset
20.00	G5XB	1878	Reading, Berks.
20.30	G3RSF	1925	Harlow, Essex
20.30	† G3KAD / G3LLZ	1850	Swindon, Wilts.
21.00	† G3IRM / G3MWO / G3PHW	1981	Bury St. Edmunds
21.00	† G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.00	G3ADQ	1990	Bradford, Yorks.
21.30	† G3EVT / G3TOI	1865	Redditch, Worcs.
22.00	G3AWL	1980	Wingate, Co. Durham
22.00	G3LLM	1820	Bath, Somerset
Fridays			
18.30	G3NCZ	1920	Blackburn, Lancs.
19.00	G3RBP	1860	Oxford
19.00	G3NPB	1875	Hexham, Northumberland
19.30	G3PWU	1850	Reading, Berks.
20.15	G3DXA	1845	Ashford, Middx.
21.00	† G3LKT / G3PLQ	1892	Salisbury, Wilts.
21.00	G3PKE	1920	Dorking, Surrey
21.30	† G3RZI / G3TQD	1865 / 1865	Redditch, Worcs. / Droitwich, Worcs.
21.30	† G3RPW / G3KSS	1900	Pudsey, Yorks. / Bradford
23.00	GM3HBY	1903	Glasgow
Saturdays			
13.00	G2FXA	1900	Stockton-on-Tees
14.00	GI3JEX	1860	Belfast
14.00	G3SVD	1870	Reading, Berks.
15.30	G3RFL	1910	Great Harwood, Lancs.
18.00	GW3TMP	1980	Mold, Flints.
19.00	G3NPB	1875	Hexham, Northumberland
20.00	G3KPO	1980	Peterborough
21.00	† G3LKT / G3PLQ	1892	Salisbury, Wilts.

†*Alternately*

Can You Help?

● A. E. Harvey, G3IUG, 39 Curlieu Road, Oakdale, Poole, Dorset, who would like to purchase or borrow the manual or circuit of the Hallicrafters v.h.f. receiver R.1949, tuning 27-144 Mc/s? It is believed that this is similar to the S27D by the same manufacturer.

● I. A. Cobbold, G3RPJ, 62 Rydal Drive, Barnehurst, Kent, who desires information on the v.h.f. receiver unit 62H (AP61357) manufactured by Ekco, and thought to be the same as the receiver type 1392?

● D. Byrne, G3KPO, Jersey House, Eye, Peterborough, who wishes to borrow the manual or obtain any other information on the DST.100 receiver?

● E. A. Bovey, BRS19530, 1 Chapel Lane, Dartmouth, Devon, who wishes to buy or borrow the circuit diagram of the Indicating Unit CRT Type 1, Ref. 10Q/253, and would also like information on the cathode ray tube type VCRX 263 which is used in the unit?

● C. R. S. Smith, BRS18612, 19 Hyde Road, Kenilworth, Warks., who requires the manuals or circuits for the BC348 and DST100 receivers?

News from Headquarters

Committees of the Council for 1965

The following members have been appointed to serve on the Committees of the Council for 1965:

Contests, H.F. *Council Member:* J. C. Graham, G3TR; *Non-Council Members:* D. A. Findlay, G3BZG, R. L. Glaisher, G6LX, M. Harrington, BRS20249, M. C. W. Sandford, G3PIT, R. A. Wybrow, G3JVJ, and C. Penna, G3POI. **V.H.F.** *Council Member:* J. C. Foster, G2JF. *Non-Council Members:* M. D. Bass, G3OJE, D. A. Findlay, G3BZG, C. Penna, G3POI, and H. W. Rees, G3HWR.

Education. *Council Members:* L. E. Newnham, G6NZ, G. M. C. Stone, G3FZL, J. W. Swinnerton, G2YS. *Non-Council Members:* K. L. Smith, G3JIX, P. W. Winsford, G4DC, D. N. Biltcliffe, G6NB, and R. J. Hughes, G3GVV.

Exhibition. *Council Members:* J. C. Graham, G3TR, L. E. Newnham, G6NZ, E. W. Yeomanson, G3IIR. *Non-Council Members:* A. J. Gibbs, G3PHG, G. W. Norris, G3ICI, F. F. Ruth, G2BRH, P. A. Thorogood, G4KD, R. G. B. Vaughan, G3FRV, and A. J. Worrall, G3IWA.

Finance and Staff. *Council Members:* N. Caws, G3BVG, J. C. Graham, G3TR, L. E. Newnham, G6NZ, R. F. Stevens, G2BVN, and G. M. C. Stone, G3FZL.

GPO Liaison and TVI. *Council Members:* A. O. Milne, G2MI, L. E. Newnham, G6NZ, F. K. Parker, G3FUR, R. F. Stevens, G2BVN, J. W. Swinnerton, G2YS, and E. W. Yeomanson, G3IIR.

Membership and Representation. *Council Members:* L. N. Goldsbrough, G3ERB, J. C. Graham, G3TR, R. H. James, GW3BFH, F. K. Parker, G3FUR, A. D. Patterson, GI3KYP, and J. Fraser Shepherd, GM3EGW.

Mobile. *Council Member:* F. K. Parker, G3FUR. *Non-Council Members:* R. Boby, G3JLE, H. T. Brock, G3FD, G. C. Clark, G3NJL, M. A. C. McBrayne, G3KGU, N. O. Miller, G3MVV, A. J. Reynolds, G3NNK, and P. W. Winsford, G4DC.

RAEN. *Council Members:* L. E. Newnham, G6NZ, and E. W. Yeomanson, G3IIR. *Non-Council Members:* G. A. Allcock, G3ION, E. R. L. Bassett, BRS16075, R. A. Ferguson, G4VF, A. C. Gee, G2UK, J. D. Kingston, G3VK, E. A. Matthews, G3FZW, and P. Balestrini, G3BPT.

Scientific Studies. *Council Members:* R. F. Stevens, G2BVN, J. Fraser Shepherd, GM3EGW and G. M. C. Stone, G3FZL. *Non-Council Members:* W. H. Allen, G2UJ, R. G. Flavell, GM3LTP, H. L. Gibson, BRS1224, C. E. Newton, G2FKZ, D. G. Thorpe, G3OBT. *Corresponding Members:* J. M. Lyons, GM3GUJ, W. D. Oliphant, BRS26076, and W. E. D. Parker, G6BY.

Technical. *Council Members:* R. F. Stevens, G2BVN, and G. M. C. Stone, G3FZL. *Non-Council Members:* W. H. Allen, G2UJ, D. N. Corfield, G5CD, G. C. Fox, G3AEX, G. R. Jessop, G6JP, J. W. Mathews, G6LL, B. Priestley, G3JGO.

V.H.F. *Council Members:* N. Caws, G3BVG, R. C. Hills, G3HRH, and G. M. C. Stone, G3FZL. *Non-Council Members:* W. H. Allen, G2UJ, P. Balestrini, G3BPT, D. N. Biltcliffe, G6NB, F. E. A. Green, G3GMY, F. A. Griffiths, G3MED, J. H. Hum, G5UM, and A. L. Mynett, G3HBW.

The President is an ex-officio member of all Committees.

Death of Sir Winston Churchill

A letter of condolence on the death of Sir Winston Churchill was sent to Lady Churchill by the President, Mr E. W. Yeomanson, G3IIR, on behalf of the Society.

A number of letters of condolence have been received by the Society from amateurs overseas.

Mr R. F. Stevens
Executive Vice-President

In accordance with Article 11 of the Articles of Association, the Council has appointed Mr R. F. Stevens, G2BVN, to the office of Executive Vice-President for 1965.

Mr Stevens has been a member of the Council since 1962 and serves on the GPO Liaison and TVI, Finance and Staff, Scientific Studies and Technical Committees. He is also the Society's Region I IARU Liaison Officer.

RSGB QSL Bureau Manager, 1965

Mr A. O. Milne, G2MI, has been reappointed Manager of the Society's QSL Bureau for 1965.

V.H.F. Manager, 1965

Mr R. C. Hills, G3HRH, has been reappointed the Society's V.H.F. Manager for 1965.

Certificates Manager

Mr K. A. V. Hurrell, G3NBC, has been reappointed the Society's Certificates Manager for 1965.

Claims for certificates should be sent direct to Headquarters and will be acknowledged on arrival.

Slow Morse Practice Transmissions Organizer, 1965

Mr M. A. C. McBrayne, G3KGU, has been reappointed Organizer of the Society's Slow Morse Practice Transmissions for 1965.

International Amateur Radio Club

Mr G. M. C. Stone, G3FZL, the Society's Immediate Past President, has been elected Vice-President of the International Amateur Radio Club, Geneva.

RSGB Intruder Watch

Correspondence for the Intruder Watch should be addressed to the Honorary Organizer, RSGB Intruder Watch, Radio Society of Great Britain, 28 Little Russell Street, London, W.C.1.

Mr G. M. C. Stone, G3FZL, Immediate Past President, installing Mr E. W. Yeomanson, G3IIR, as the Society's thirty-first President at the General Meeting and Social Evening held at the Kingsley Hotel, London, on January 15, 1965. There was an attendance of nearly 100.

(Photo by H. R. Preece)

G6HL Wins Planning Appeal for Aerial Mast

The Minister of Housing and Local Government has allowed an appeal by Wing Commander I. E. Hill, G6HL, against refusal of planning permission by Andover Borough Council for an additional 55ft. mast in the garden of his home. In presenting his case at the public hearing in Andover on November 12, 1964, G6HL stressed, *inter alia*, that the position of the mast had been carefully selected and was backed by a screen of mixed trees of similar height to the mast. It was proposed to paint the mast green to harmonise with the surroundings.

Like many other members faced with planning problems, G6HL consulted the Society and was in fact advised to stress that the mast was near to tall trees and to offer to paint it a suitable colour.

A leaflet on the subject prepared for the information of members is available on request from Headquarters.

Parliamentary Question on Reciprocal Licensing

Mr George Wallace, M.P., is to ask the Postmaster General on March 16 whether he will negotiate reciprocal arrangements with other countries to allow amateurs to operate their Amateur Radio stations during visits to other countries.

Affiliated Societies

The following societies are now affiliated to RSGB:

BEDFORD & DISTRICT AMATEUR RADIO CLUB
c/o J. R. Clarke, 12 Robin Hill, Brickhill, Beds.

GOSPORT & DISTRICT AMATEUR RADIO CLUB
c/o J. T. Nightingale, 21 Pier Street, Lee-on-Solent, Hants.

THE JAMAICA AMATEUR RADIO ASSOCIATION
c/o C. E. Soares, 76 Arnold Road, Kingston 5, Jamaica, W. Indies.

SALTASH & DISTRICT RADIO CLUB
c/o D. Bowers, Esq., 95 Grenfell Avenue, Saltash, Cornwall.

Affiliated Society Representatives

BURNHAM ON SEA RADIO CLUB
D. W. Birt, 99 Stoddens Road, Burnham on Sea, Somerset.

BASILDON & DISTRICT AMATEUR RADIO SOCIETY
H. Buckenham, G3PGN, Steeple View Farm, Arterial Road, Laindon, Basildon, Essex.

NEWARK & DISTRICT AMATEUR RADIO SOCIETY
W. A. G. Davidson, G3EVG, 4 Orston Avenue, Newark, Notts.

STOKE-ON-TRENT AMATEUR RADIO SOCIETY
V. J. Reynolds, G3COY, 90 Princes Road, Hartshill, Stoke-on-Trent, Staffs.

Area Representatives

AYRSHIRE RSGB GROUP
J. Wilson, 3 Whitehill Avenue, Annbank, Ayr, Scotland.

ILFORD RSGB GROUP
G. W. A. Rick, 19 Essex Road, Dagenham, Essex.

STOKE-ON-TRENT
V. J. Reynolds, G3COY, 90 Princes Road, Hartshill, Stoke-on-Trent, Staffs.

Area Representatives Badges

Badges for Area Representatives are now available from RSGB Headquarters, price 10s. each including postage.

Illustrated Recorded Lecture on Amateur Radio

Council Member John Swinnerton, G2YS (28 Nightingale Road, Rickmansworth, Herts.), is compiling a tape/colour transparency talk to interest young people aged 13 to 16 in Amateur Radio. Members who have suitable transparencies and would like to make them available to the RSGB are invited to contact G2YS at the above address.

Band Occupancy Checks

In 1968 or thereabouts, another Ordinary Administrative Conference of the International Telecommunications Union will be held and, if it goes to pattern, radio frequency allocations will be re-examined and changes made.

At past conferences, information regarding the actual number of amateurs active on the various amateur bands has been of inestimable value and has been gathered together by a small but enthusiastic group of people who have been willing to give time to this extremely important job.

There is no doubt that efforts will be made once again to filch some of our frequencies for other services, in particular, short wave broadcasting, and detailed records of the number of amateurs actually using each band can help to refute any suggestion that any of our frequencies are not being fully used.

Volunteers are sought who will be willing to listen and log all British Isles stations heard during specific times of day, over a period of time. Daily checks will not be necessary, but about a dozen checks over several weeks will be required. Other details have yet to be worked out.

Will *you* undertake this vital and important task in defence of the frequency bands which make our existence as radio amateurs possible and worthwhile?

If you are willing to help, will you please write to the undersigned at the following address: A. O. Milne, G2MI, Bromley, Kent, marking your envelope "Band Occupancy Check."

Silent Keys

We record with sorrow the passing of the following amateurs:

W. A. L. Brundle, G3EKB, of Barking, Essex
E. Greenwood, G3GXB, of Shafton, nr. Barnsley, Yorks.
A. Parker, G3IAA, of Mansfield, Notts.
L. H. Platt, G5PB, of Barton-on-Sea, Hunts.
C. A. Webb, G5WB, of Canterbury, Kent
J. Nelson, GD2FRV, of Douglas, Isle of Man
J. D. Sheard, GD3IYS, of Douglas, Isle of Man
Harry L. Overton, G4CW, of Crayford, Kent

Obituary

Harold Yeoman, G2FOL

Radio enthusiasts in Clitheroe and the surrounding towns will learn with deep regret of the death, at his home on January 13, 1965, of Harold Yeoman, G2FOL. He passed away at the age of 55 years.

Harold Yeoman developed an interest in Amateur Radio about 1935, and before the commencement of the 1939 hostilities he obtained an AA licence. He rejoined his territorial unit at the outbreak of war, and served with HM Forces until peace was finally restored.

Harold then obtained his present call and was a founder member of the Clitheroe Amateur Radio Club, which flourished for a number of years until the premises were taken over. G2FOL was active on Top Band phone from his home QTH, and became known locally as "The Golden Voice of Clitheroe."

More recently his enthusiasm was for Top Band mobile operation, but his main interest was always the constructional side of Amateur Radio.

He will be sadly missed by his many friends, and we offer our sincere sympathy to his wife Irene.

Society Affairs

Brief Report on the December, 1964 meeting of the Council

THE December meeting of the Council was held on December 17, 1964, and was attended by Messrs. G. M. C. Stone (President), N. Caws, J. C. Foster, J. C. Graham, R. C. Hills, E. G. Ingram, R. H. James, A. O. Milne, L. E. Newnham, R. F. Stevens, J. W. Swinnerton, E. W. Yeomanson (Members of the Council), John A. Rouse (General Manager and Secretary) and P. C. M. Smee (Minuting Secretary).

Apologies for absence were tabled on behalf of Messrs. H. A. Bartlett, L. N. Goldsbrough, F. K. Parker, A. D. Patterson and L. Varney.

Beacon Stations

The latest progress in negotiations for the setting up of a 2m beacon station in Scotland was discussed but it was reported that plans for a similar station in Northern Ireland had received a severe set-back as the site that it had been hoped to use was no longer available. An alternative site was therefore being sought.

History of the Society

It was reported that Mr Clarricoats had submitted the first instalment of the History of the Society up to the early 1920's.

Recommendations of Committees

The Council accepted recommendations relating to the co-option of an additional member (Scientific Studies Committee), a visit to a Junior Leaders Regiment (Education and Training Committee), the results of V.H.F. National Field Day and a 1296 Mc/s Contest (V.H.F. Contests Committee), the Low Power Field Day (H.F. Contests Committee), s.s.b. and RTTY operation on 2m (V.H.F. Committee) and the RSGB Intruder Watch (GPO Liaison Committee).

Membership and Affiliation

The Council approved 176 applications for membership (125 Corporate and 51 Associate). In addition, five applications for transfer from Associate to Corporate grade were approved.

The subscriptions of four members were waived, two on the grounds of blindness and two on the grounds of physical disability.

Affiliation was granted to

RAF Leeming Amateur Radio Club.
University of Sheffield Amateur Radio Society.

Annual General Meeting

A short Supplementary Report of the Council was approved for presentation to members present at the AGM on December 18, 1964. (The Report was published in the February issue of the BULLETIN—EDITOR).

The Hanson Trophy

The draft rules for this new trophy were approved. (Details are given on page 190).

Council Meetings during 1965

It was agreed to hold meetings of the Council on January 14, February 6, March 6, April 5, May 3, June 14, July 5, August 2, September 6, October 2, November 6 and December 9. Four meetings were arranged for Saturdays as a help to those members of the Council who have to travel long distances.

Regional Representatives' Newsletter

The issue of a quarterly Newsletter prepared by the Membership and Representation Committee was approved.

New Membership Badges

Samples of a smaller membership lapel badge and tie-clip were approved. (The new badges are now available from Headquarters—EDITOR).

RAEN Rally, 1964

The Council approved the results of the RAEN Rally.

Reports of Committees

The Council received reports on the meetings of the following Committees: Technical (22.10.64), Exhibition (23.10.64), Scientific Studies (9.11.64), V.H.F. Contests (12.11.64), H.F. Contests (12.11.64), Finance and Staff (14.11.64), Membership and Representation (16.11.64), Mobile (19.11.64), V.H.F. (23.11.64) and GPO Liaison (2.12.64).

Progress Report on the Society's IQSY Programme

The Council received for information the first progress report on the Society's IQSY Programme prepared for the Royal Society. (The Report is published on page 165 of this issue—EDITOR).

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The Council was in session for nearly five hours

Brief Report on the January, 1965 meeting of the Council

THE January meeting of the Council was held on January 14, 1965, and was attended by Messrs. E. W. Yeomanson (President), N. Caws, J. C. Foster, J. C. Graham, R. C. Hills, E. G. Ingram, R. H. James, A. O. Milne, L. E. Newnham, A. D. Patterson, J. F. Shepherd, R. F. Stevens, G. M. C. Stone and J. W. Swinnerton (Members of the Council), John A. Rouse (General Manager and Secretary), and P. C. M. Smee (Minuting Secretary).

Apologies for absence were tabled on behalf of Messrs. H. A. Bartlett, L. N. Goldsbrough and Louis Varney.

Welcome to New Member

The President opened the proceedings by welcoming Mr J. Fraser Shepherd, GM3EGW, the Council member for the new Zone G (Scotland). Mr Yeomanson also welcomed Messrs. E. G. Ingram, GM6IZ, J. C. Foster, G2JF, R. F. Stevens, G2BVN, and J. W. Swinnerton, G2YS, on their re-election unopposed to the Council.

Executive Vice-President

In accordance with Article 11 of the Articles of Association, Mr R. F. Stevens, G2BVN, was elected Executive Vice-President for 1965. (Mr Stevens' election is reported on page 187 of this issue of the BULLETIN—EDITOR).

ITU Centenary

It was reported that the International Amateur Radio Club is to hold a Hamvention in Geneva on September 17-19, 1965, to which representatives attending the ITU Plenipotentiary Conference in Montreux will be invited.

Committee Recommendations

The Council adopted Committee recommendations relating to expenses for one of the exhibits at the 1964 RSGB Communications Exhibition (Exhibition), a 1296 Mc/s contest in May (V.H.F. Contests), a weekend conference and a change of Committee name (Education and Training, now simply Education), and mobile rallies to be arranged by or in association with the Society (Mobile). (A list of RSGB mobile rallies is published in this issue—EDITOR).

Annual Reports of Committees

The Council received reports summarizing the work of the following Committees during 1964: Education and Training, Exhibition, Membership and Representation, Mobile, Scientific Studies and Technical. Reports were also received from the V.H.F. Manager, Certificates Manager and Slow Morse Transmissions Organizer.

Membership

The Council approved 129 applications for membership (98 Corporate and 31 Associate) and 13 applications for transfer from Associate to Corporate grade.

The subscriptions of two members were waived on the grounds of blindness.

Committees of Council for 1965

The Council agreed to invite members to serve on the Committees during 1965. (A list of Committee members is published on page 187 of this issue—EDITOR).

Action was also taken to invite the QSL Manager, V.H.F. Manager, Certificates Manager and Slow Morse Practice Transmissions Organizer to serve again.

National Field Day 1965

The rules for this year's N.F.D. were approved for publication in the February issue of the RSGB BULLETIN.

Annual General Meeting

The Minutes of the Annual General Meeting held on December 18, 1964, were approved for publication in the February issue of the RSGB BULLETIN.

Complaints against an Advertiser

The Council gave further consideration to complaints from members regarding deliveries of equipment by an advertiser in the RSGB BULLETIN. It was agreed to ask the Technical Committee to investigate and report to the Council at a later date.

Publications

The production of new editions of the *Radio Amateurs' Examination Manual* and *A Guide to Amateur Radio* was authorized.

* * *

The Council was in session for nearly five hours

The Hanson Trophy

The Council has accepted with gratitude a generous offer by Mr D. A. S. Drybrough, BRS22550, of Coventry, to donate a trophy for award in connection with the V.H.F. Listeners' Championship. The trophy will be known as The Hanson Trophy in memory of the late John Hanson, G6YU. The rules governing its award are as follows:

(i) The Trophy will be known as "The Hanson Trophy."
(ii) The Trophy shall be awarded annually to the contestant adjudged by the RSGB V.H.F. Contests Committee to be the winner of the annual V.H.F./U.H.F. Listeners' Championship.
(iii) In the event of the Championship ceasing to be held, the Trophy shall (a) be used as an award in a major RSGB v.h.f. contest or (b) be used for some other purpose in connection with v.h.f. activity.
(iv) The Council reserves the right to award the Trophy for some other purpose than that laid down in Rules (ii) and (iii).

ELEVENTH INTERNATIONAL V.H.F.-U.H.F. CONVENTION

Saturday, April 10, 1965

Kingsley Hotel, Bloomsbury Way, London, W.C.1.

Programme:

Morning—Exhibition of commercial and amateur equipment
Afternoon—A programme of lectures
Evening—Dinner, and presentation of prizes

Tickets may be obtained from F. E. A. Green, G3GMY, 48 Borough Way, Potters Bar, Middlesex, at the following prices:

Convention only 4/6
Convention and dinner 30/-

Underground Stations: Holborn (Kingsway) and Tottenham Court Road
Buses: 7, 8, 19, 22, 24, 25, 29, 32, 38, 73, 127, 134, 156, 176

Organized jointly by the RSGB V.H.F. Committee and the London U.H.F. Group

CONTEST NEWS

RESULTS — REPORTS — RULES

Low Power/80 Metre Field Day

The Contests Committee has for some time felt that the support for the Low Power Field Day contest has been hardly sufficient to justify its continuation. Also, with the advent of one or two stations able to use high power transistors, the number of entries could drop even lower. With this in mind the Contests Committee have decided to alter the rules for this year's event as follows.

Since low power has become an obsolete title it will now be called the " 80m Field Day " and a power limit of 10 watts will be imposed. The weight restriction will be removed so that specialized equipment need not necessarily have to be constructed in order to enter. To retain the simple nature of the contest the number of operators and helpers will be limited to two and power may only be taken from h.t. and/or l.t. batteries.

With these changes it is hoped that many more stations will be induced to spend a day out in the field and that the regular competitors of the last few years will continue to give their support to this contest in September.

Low Power Contest

The rules for the Low Power Contest to be held on April 4, 1965 are given below. It should be noted that the event is for one day only.

1. **When:** 08.00 GMT to 20.00 GMT on April 4, 1965.
2. **Eligible Entrants:** All fully paid-up members of the RSGB resident in Europe.
3. The General Rules relating to RSGB Contests, as published in the January, 1965 issue of the RSGB BULLETIN, will apply except as superseded by the rules of this Contest.
4. **Contacts:** Must be made on c.w. (A1) only between 3500 and 3600 kc/s.
5. **Scoring:** Points will be scored on the following basis:

Watts input to p.a. stage	Up to 0·5	To 1	To 2	To 3	To 4	To 5
Points per contact	20	10	5	3	2	1

A bonus of 20 points may be claimed for the first contact with each different county code area listed on page 50 of the January, 1965 issue of the RSGB BULLETIN.

6. **Contest Exchanges:** RST reports followed by the contact number, starting at 001, and the county code letters, e.g. 559061SX or Sussex.
7. **Logs:** (a) Must be tabulated in columns headed (in this order) " Date/Time (GMT)," " Call-sign of station contacted," " My report on his signals and serial number sent," " His report on my signals and serial number received," " His County," " My input power," " Points claimed."

(b) The cover sheet must be made out in accordance with RSGB Contests Rule 4, and the declaration signed.

(c) Entries must be postmarked not later than **Monday, April 19, 1965.**

8. **Awards:** At the discretion of the Council, the 1930 Committee Cup will be awarded to the winner, and certificates of merit to the runner-up and to the non-transmitting member submitting the best check log in the opinion of the Contests Committee.

Second 70 Mc/s Contest (Open) 1965

It is intended that this contest will be the principal event in the 70 Mc/s calendar. The date has been brought forward to allow for a portable event later in the summer and the gap in operating times has been closed.

1. **When:** 18.00 GMT on Saturday, May 15, to 18.00 GMT on Sunday, May 16, 1965.
2. The General Rules of RSGB Contests as published in the January 1965 issue of the RSGB BULLETIN will apply except as superseded by the rules of this contest.
3. **Eligible entrants:** All fully paid up members of the RSGB resident in Europe. Multiple operator entries will be accepted in Section *B* provided only one call-sign is used.
4. **Sections:** *A*, Single operator, fixed stations; *B*, other stations.
5. **Contacts** may be made on any mode permitted in the Amateur (Sound) Licence A except A2 (m.c.w.).
6. **Scoring** will be on the basis of 1 point per mile.
7. **Contest exchanges:** RST or RS reports followed by the contact number and location (e.g. RST 559007 Luton). This location must be identifiable on the 10 mile to 1 inch Ordnance Survey map. It is the responsibility of the receiving operator to obtain the information he requires to calculate distances correctly.
8. **Logs** must be tabulated in columns headed (in this order), " Date/time (GMT)"; " Call-sign of station contacted"; " My report on his signal and serial number sent"; " His report on my signal and serial number received"; " Location of station as received "; " Call-sign of operator (multi-operator stations)"; " Points claimed."

The cover sheet must be made out in accordance with RSGB Contests Rule 4 and the declaration signed. Operators of multi-operator stations must be listed and the NGR full six figure reference recorded. Stations outside the area covered by the National Grid should show latitude and longitude.

Entries must be postmarked not later than **Monday, May 31, 1965.**

9. **Awards.** At the discretion of Council, the V.H.F. Manager's Trophy will be awarded to the overall winner and a miniature cup to the leader in the other section. Certificates of merit will be awarded to the runner-up in each section.

70 Mc/s Listeners' Contest 1965

The following are details of a new contest for listeners on the 70 Mc/s band. Entries to this event, which coincides with the Second 70 Mc/s Contest (Open) will be automatically credited to the Listeners' Championship.

1. **When:** 18.00 GMT on Saturday, May 15, to 18.00 GMT on Sunday, May 16, 1965.
2. **Eligible Entrants:** The contest is open to all fully paid up members of RSGB resident in Europe. Only the entrant may operate his receiving station for the duration of the contest. Holders of amateur transmitting licences are eligible to take part if they do not own transmitting equipment for the 70 Mc/s band.
3. **Scoring:** Entrants will be required to log amateur stations operating in the 70·1 to 70·7 Mc/s band, but each station may be logged once only in column (ii). Points are to be scored for each complete log entry, with bonus points for each new county received and for c.w. reception as follows. For each station logged in the entrant's own *county* or an adjacent *county*, 10 points; for each station logged in other *counties* in the entrant's *country*, 20 points; for each station logged in any other *country*, 30 points; for a log entry of a station not taking part in the contest, 5 points.

Bonus points: for an entry of a telegraphy transmission double points are to be claimed; for each British Isles county received an additional 20 points may be claimed (the whole of the London Postal Districts will count as one county only).

4. **Entries:** (*a*) To count for points logs must show in columns (i) Date and time (GMT); (ii) Call-sign of station heard; (iii) Report and serial number sent by station heard; (iv) My report on station heard; (v) County of station heard; (vi) Call-sign of station being worked; (vii) Points claimed.

(*b*) Entries must be set out on RSGB Contest Log Sheets available from RSGB Headquarters or on one side only of foolscap paper.

(*c*) The cover sheet must be made out in accordance with RSGB Contests Rule 4 and must certify that the entrant does not possess transmitting equipment for the 70 Mc/s band.

(*d*) Entries must be postmarked not later than **Monday, May 31, 1965.**

5. **Awards.** At the discretion of Council, certificates of merit will be awarded to the leader and runner-up.

D/F Qualifying Events

Details of the AEI Rugby Recreation Club Qualifying Event are as follows:

Sunday, April 25, 1965

Organizer: D. T. Price, G3LYU, 29 Pytchley Road, Rugby, Warks.

Map: Ordnance Survey, Seventh Series, Sheet 145, Banbury.

Assembly: 13.00 BST for first transmission at 13.20 BST.

Location: NGR 356438, 3 miles south of Edge Hill.

Entries and Tea: Intending competitors should notify the organizer as soon as possible stating the number in their party requiring tea.

Rugby Cup: The winner of this qualifying event will be awarded the Rugby Cup for the year 1965/66.

Rules revision: Competitors should note that under the revised rules, the 1965 events will commence at 13.20 BST, i.e., 10 minutes earlier than in previous years, and that the frequencies and call-signs will be announced at the start.

RSGB 1296 Mc/s Tests 1965

The Council and the Contests Committee hope that the tenth series of RSGB 1296 Mc/s Tests will again attract the support of u.h.f. workers. The Contests Committee would very much like to receive information on routine local contacts during 1964 and 1965 as well as reports on special contacts during the Tests.

The event will have few fixed rules, other than the duration which will be from 17.00 GMT on Saturday, July 17, to 22.00 GMT on Sunday, July 18, 1965, and the provision that all entries must be from fully paid-up Corporate Members of the RSGB and accompanied by the declaration set out below. Entries will be accepted on behalf of individual stations or groups of stations and no limitation is placed on the number of operators or assistants. Entries from receiving stations, which will be very welcome, will be eligible for the award and also for inclusion in the 1965 V.H.F. Listeners' Championship as set out on page 537 of the August 1964 issue of the BULLETIN.

The entries will be required to include details of stations heard or worked (with distances) and general observations on the band. A full description of all equipment used should be included and this information and any other evidence submitted of work carried out on the band will be taken into consideration when judging the event. The Contests Committee reserves the right to abstract information for the purpose of preparing a report on the Tests—it is hoped to publish information on frequencies used by stations on this band. The entrant submitting the best entry in the opinion of the judges may be recommended to the Council for the award of the *Arthur Watts Trophy*.

Entries must be addressed to the Contests Committee, Radio Society of Great Britain, 28 Little Russell Street, London, W.C.1., and be postmarked not later than August 16, 1965; photographs may be sent in up to August 31. Entries must contain the following declaration.

I declare that my station was operated strictly in accordance with the rules and spirit of the Tests and I agree that the decision of the Council of the Radio Society of Great Britain shall be final in all cases of dispute.

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

British Amateur Radio Teleprinter Group Spring RTTY Contest 1965

1. **When.** 02.00 GMT March 20, 1965, to 02.00 GMT March 22, 1965.
2. **Bands.** 3·5, 7·0, 14·0, 21·0 and 28·0 Mc/s amateur bands.
3. **Stations.** Stations may not be contacted more than once on any one band. Additional contacts may be made with the same station if a different band is used.
4. **Country Status.** As ARRL Countries list, except for KL7, KH6 and VO which are to be considered as separate countries.
5. **Messages.** Messages exchanged will consist of: (*a*) message number; (*b*) report (RST); (*c*) time in GMT; (*d*) country.
6. **Points.** (*a*) All two-way RTTY contacts with stations in one's own country will earn two points. (*b*) All two-way RTTY contacts with stations outside one's own country will earn ten points. (*c*) All stations will receive a bonus of 200 points per country, including their own.
7. **Scoring.** (*a*) Two-way exchange points multiplied by the total number of countries worked. (*b*) total country points, multiplied by the number of continents worked. (*c*) (*a*) and (*b*) are added together to give the total test score.

Sample score

(*a*)	Exchange points (302) times countries (10)	=	3,020
(*b*)	Country points (2,000) times continents (3)	=	6,000
(*c*)	Items (*a*) and (*b*) added	=	9,020

8. **Logs and Score Sheets.** Logs and Score Sheets should be received by the BARTG Contest Manager, Alan Walmsley, G2HIO, The Woodlands, Bath Lane, Moira, Nr. Burton-on-Trent, Staffordshire, England, not later than **May 1, 1965**, to qualify.

Grafton Annual Top Band Contest

The Grafton Radio Society will again be incorporating an Open Section for all UK stations in the annual G2AAN Top Band Contest to be held on April 3 (C.W. Section) and April 10 (Phone Section). Both sections will take place during the period 22.30 to 01.00 BST. Competitors should exchange RST (RS on phone) reports, followed by a serial number, commencing with any number between 001 and 100. Scoring will be one point per contact. For first and second place certificates, the total score is the sum of points in the c.w. and phone sections. Further certificates are awarded to individual winners in the c.w. and phone sections.

Logs, bearing the usual signed declaration, must be posted to A. W. Wennell, G2CJN, 145 Uxendon Hill, Wembley Park, Middlesex, to arrive not later than April 20.

CONTESTS DIARY

March 6-7	- Second 144 Mc/s Contest (Open) and Listeners' V.H.F. Contest (see page 741, November, 1964).
March 6-7	- YL/OM (C.W.) Contest.
March 13-14	- ARRL International DX Competition (Phone) (see page 29, January, 1965).
March 20-21	- First 1·8 Mc/s Contest (see page 741, November, 1964).
March 20-21	- International S.S.B.'ers Contest.
March 20-21	- BARTG RTTY DX Contest (see rules opposite).
March 27-28	- ARRL International DX Competition (C.W.) (see page 29, January, 1965).
April 1-15	- Goose Bay ARC QSO Party.
April 3-4	- International SRKB V.H.F. Contest.
April 4	- Low Power Contest (see page 191).
April 10-11	- CQ WW S.S.B. Contest.
April 24-25	- PACC Contest (C.W. and Phone).
April 25	- Rugby D/F Qualifying Event (see page 191).

May 2	— Third 144 Mc/s Contest (Portable).
May 8-9	— USSR DX (C.W.) Contest.
May 9	— High Wycombe D/F Qualifying Event.
May 15-16	— Second 70 Mc/s Contest (Open).
May 23	— South Manchester D/F Qualifying Event.
May 29-30	— First 432 Mc/s Contest.
June 4-7	— CHC/FHC/HTH QSO Party.
June 12-13	— National Field Day (see page 119, February, 1965).
June 27	— D/F Qualifying Event.
July 4	— Fourth 144 Mc/s Contest (Portable).
July 17-18	— 1296 Mc/s Tests.
July 18	— Oxford D/F Qualifying Event.
July 25	— Third 70 Mc/s Contest (Portable).
September 4-5	— Region 1 IARU Contest.
September 4-5	— V.H.F. National Field Day.
September 12	— 80m Field Day.
September 19	— D/F National Final.
September 25-26	— 21/28 Mc/s Telephony/Receiving Contest.
October 9-10	— Raynet Rally.
October 16-17	— 7 Mc/s DX Contest (Phone).
October 24-25	— CQ World Wide Contest (Phone).
October 30-31	— Second 432 Mc/s Contest.
November 6-7	— 7 Mc/s DX Contest (C.W.).
November 20-21	— Second 1·8 Mc/s Contest.
November 28-29	— CQ World Wide Contest (C.W.).
December 5	— Fourth 70 Mc/s Contest (C.W.).

RSGB 21/28 Mc/s Telephony Contest 1964

The 1964 contest on December 5 and 6, the ninth in the series, was well supported with 96 entrants in the three sections and several hundred non-competing stations also participating. While several of the leading stations used a.m. exclusively, over half of the entrants operated on s.s.b. or a combination of the two modes. Scores were lower than in previous years due mainly to the unfavourable m.u.f. associated with the trough of the present sunspot cycle. This adversely affected conditions on both bands and virtually restricted the event to a 21 Mc/s contest.

The north-south path on 21 Mc/s was open for most of the two contest periods as was evidenced by the contacts made by 5A1TK and other Central/East African stations. A few " G " entrants complained that there were no openings to the west, but this was not born out by the s.s.b. contingent whose logs showed upwards of 200 different W/VE exchanges. GW3NWV on s.s.b. contacted all W districts and a number of West Indian and Central/South American stations.

Logs

The standard of logs was generally quite good. Several of the " G " entrants were optimistic in claiming bonus points for different prefixes in the same country which was not on the exception list—e.g. W/K, VK etc. A number of overseas logs also had to be rescored—some up and some down, because of incorrect bonus and points claims. Similarly, the Contests Committee had to pay a disproportionate amount of time in checking the Receiving Section owing to logging errors, incorrect addition, duplicates and/or wrong bonus claims. The Contests Committee again asks intending entrants in future Receiving Contests to please read the rules carefully and to add up their scores correctly.

Awards

In the British Section of the Transmitting event, J. Readings, G3KFT, won the Whitworth Trophy with a score of 1445 points. 5A1TK submitted the best overseas entry.

Once again, the multi-operator section was very poorly supported. R. C. Holt, GW3NWV, assisted by GW3DIX scored 1455 points to give them first place over last year's winners, Royal Signals, Catterick, G3CIO. Kagnew Amateur Radio Club, ET3USA, was the highest overseas entry in this section.

This year it was the turn of M. Vincent, A3470, to win top honours in the Receiving Section and the Metcalfe Trophy with a good score of 1599 points. L. Margolis, A2111, was second with 1460 points.

Check Logs

Check logs from GB2SM, G3MWZ, G6LX, BRS24550, DL1RO, UA6KVB and ZC4MO are gratefully acknowledged, as are the many and varied comments and other details from competitors.

RESULTS

Call-sign	Points	Placings Home	Placings Overseas
5A1TK*	1663		1
G3KFT*	1445	1	
G3KGY*	1415	2	
G3HCU	1400	3	
G2QT	1395	4	
G3CAZ	1385	5	
G5HZ	1310	6	
UB5FG*	1256		2
9J2DT*	1255		3
5N2JKO*	1228		4
G2JB	1205	7	
G2DC	1148	8	
ZC4HK*	1013		5
G3LHJ	955	9	
GM3NPR*	920	10	
G3FUU	915	11	
WA4TLI*	890		6
VK6QL*	850		7
G3BXS	821	12	
G3NLY	785	13	
W4RLS	765		8
G5JU	761	14	
G8KL	755	15	
G3PZO	710	16	
W3HQO*	630		9
9J2W	626		10
I1LCF*	620		11
W9GIL*	570		12
GW2HFR*	540	17	
UB5BX	515		13
9L1WN*	483		14
LZ1UF*	470		15
G3JIZ	548	18	
W8IJZ*	445		16
WB2IQB*	410		17
G2AJB	398	19	
K2UTC	395		18
WA8HXR	380		19
K4ZJF	350		20
W9LKI	330		21
VE3AXF*	325		22
CT1LQ*	300		23
G8KU	299	20	
G3DYY	280	21	
W2MNW	275		24
UA1TT*	265		25
K1RQE*	250		26
G3RJH	230	22	
VK5BQ*	220		27
UA3VB*	195		28
GM3RFR	185	23	
UA6FD*	180		29
WA5ALB*	165		30
VK3QV*	120		31
KV4BX*	120		
SP8AJK*	120		
VE2AFC*	55		34
Multi-Operator Section			
GW3NWV*	1475		1
G3CIO*	1413		2
G3LHZ	1360		3
ET3USA*	665		4
UB5KCA	265		5

Receiving Section

Call-sign	Points	Placings
A3470*	1685	1
A2111*	1460	2
BRS26444	1390	3
A2498	1388	4
BRS24733	1293	5
A3675	1278	6
A3766	1185	7
A4048	1173	8
BRS22445	1169	9
A4038	1069	10
A3756	961	11
BRS24957	253	12
A4089	926	13
A2886	910	14
A2966	901	15
A3297	888	16
BRS24962	860	17
BRS26094	834	18
A3699	791	19
BRS25985	784	20
A3670	733	21
B. Collins	770	22
A3724	748	23
BRS18461	695	24
A4067	610	25
BRS26003	530	26
BRS26298	510	27
OK1-7453*	390	28
A4266	376	29
A3994	345	30
D. Woodbury	250	31
BRS25204	200	32
NL-455*	140	33
DE15143-105*	210	34

* Certificate winners

CLUBROOM

A Monthly Survey of Group and Club Activities

The **Ariel Radio Group** (London Sections) of the BBC Club held their AGM on January 26, when the following officers were elected: President, R. C. Patrick, G2BBX; Chairman, H. M Tainton, G2BCI; Vice-Chairmen, L. P. Best, G3THM (TV), W. F. Williams, G3RFJ (Bush), D. Booty, G3KKQ (B.H.); Honorary Treasurer, A. H. B. Bower, G3COJ; Honorary Secretary, R. D. Lyder, G3NBB, c/o 14a Cavendish Place, London, W.1; R. C. Hills, G3HRH, continues as Liaison Officer with the regional members and clubs; S. A. G. Cook, G5XB (Caversham) was co-opted to the committee and will help with regional affairs.

Acton, Brentford and Chiswick RC. The AGM came round in January, which meant the election of officers for this year. The Chairman, G3IGM; Vice-Chairman, G6RC; Honorary Secretary, Treasurer and Press-Agent, W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London, W.3; Committee, G5ZA, G3PZK and G3OJX; Auditors, G3KSO and G3LDD.

The **Baden Powell House Scout ARS** recently provided part of the stand erected by the Boy Scout and Girl Guide Associations at the Camping and Outdoor Life Exhibition at Olympia. The club station G3TGS/A was on the air on 80m, and many Scouts and Guides were given instruction in building pieces of electronic apparatus, which was made possible by Philips Ltd., who provided the club with some of their electronic kits. The next event for G3TGS/A will be the Middlesex Rover Scout Conference on March 7 at the Isleworth Sea Scout Base. Operation will be on Top Band. Plans for the Scout Station back at Baden Powell House are now well in hand, and it is hoped to announce operating times in the near future. Honorary Secretary: A. H. Watts, G3FXC, 8 Thorneycroft Court, Kew Road, Richmond, Surrey.

The **Barnsley and District ARC** held its Annual Dinner on January 16, and once again it was an outstanding success. A large proportion of the local amateurs and their friends were there to appreciate a splendid meal, and later to enjoy the games organized by G3FLQ, G3SNB, G4JJ and Mr Williams. The following meeting was occupied with the RSGB tape recorded lecture on TVI and Transmitter Design which, we are glad to learn, supplied answers to previously unexplained problems. On March 12, G3GNK will give a talk on his hybrid mobile receiver, and on the 26th, an Open Night, there will be a junk sale. Honorary Secretary: J. A. Ward, G4JJ, 44 Northgate, Barnsley, Yorks.

Bedford and District ARC. The club has started issuing a comprehensive news sheet called *In Circuit*. During January there was a film show by courtesy of Mullard Ltd., and the AGM. Discussions on receivers, s.s.b., and members' hints and kinks are planned for the coming meetings.

City and County of Bristol Group. On January 22, at the meeting at the Royal Fort, University of Bristol, Reg Griffin, G5UH, gave an interesting talk on aerials and propagation, and illustrated this with film strips. Honorary Secretary: A. J. Rawlings, G3PFC, 43 Mackie Avenue, Filton, Bristol.

Bromsgrove and District ARC. The February meeting, held on the 5th, was taken up with discussions about the rules and a future programme. Officers were also elected, as follows: Chairman, J. Gwynne, G2CLN; Honorary Secretary, J. Harvey; Honorary Treasurer, J. Dufrave. Meetings will be held monthly in future on the second Friday in each month at 8 p.m. in the Co-operative Rooms, High Street, Bromsgrove. The March meeting will include a talk on 14 Mc/s conditions and operation, to be given by R. J. Crutchley, G6WI. J. F. Gwynne, G2CLN, will talk on mobile operation on May 9. Honorary Secretary: J. K. Harvey, 22 Elm Grove, Bromsgrove, Worcestershire.

Bury and Rossendale RS. Owing to the absence of the scheduled speaker, the January meeting was spent discussing club affairs and policy. As a result, the meeting on March 9 will now take the form of an "Annual Nosh," to be held at the new venue, the "Old Boar's Head," at the corner of Crompton Street, and The Rock, Bury. A junk sale will be held on April 13. Copies of the complete 1965 programme are available from the Honorary Secretary, K. Drinkwater, 16 Lindadale Avenue, Accrington, Lancs.

Cambridge and District ARC. The Annual Dinner was held at the University Arms Hotel, Cambridge, on January 22, when over 50 members and their wives were present. The Guests of Honour were Eric Yeomanson, G3IIR, President of RSGB, and his wife. The chair was taken by S. J. Granfield, G5BQ, Club President, while P. J. Brook, G5DQ, J. Hum, G5UM, J. R. T. Royle, G3NOX/T, L. W. Jones, G5JO, R. C. Hills, G3HRH, and Mrs Peggy Porter were the other speakers. Another interesting evening was provided by the Cambridge Tape Recording Club. Two of its members demonstrated some hi-fi recordings they had made of choral groups in Cambridgeshire village colleges, and explained their methods and equipment in detail. The Granfield Trophy has this year been awarded to Jeremey Royle, G3NOX/T, in recognition of his work for Amateur TV. Recently he and Ian Waters, G6KKD/T, arranged a TV lecture/demonstration for the club.

The **Cannock Chase ARS** produced its first newsletter in January; a commendable effort—keep it up. Meetings are held on the first and third Thursdays in each month at the George Inn, Walsall Road, Cannock, Staffs. Don Perks, G3SVH, will be showing a colour film of CCARS about NFD 1964 on March 4, while the meeting on March 18 will be devoted to Morse instruction, constructional work and committee business. Bob Palmer, G5PP, will be giving a lecture, with demonstrations, on mobile working on April 1.

Chester and District RS. The forthcoming programme of the Chester Society is as follows: March 9, radio panel game; March 16, film on world-wide communication; March 23, second talk especially for beginners by H. Morris, G3ATZ; March 30, pre-NFD discussions. It is hoped to organize more visits to places of interest this year. The Society meets every Tuesday, except the first in each month, at 8 p.m. in the YMCA, Chester. Visitors and new members are always welcome.

Clifton ARS. A junk sale which lasted for two meetings and a quiz arranged by D. Reid were among two recent events. Committees have been formed to organize the club's participation in NFD and V.H.F. NFD. Honorary Secretary: J. Rose, G3OGE, 63 Broomfield Road, Beckenham, Kent.

The **Crawley ARC** had an excellent lecture on Amateur TV during January from members of the British Amateur Television Club. The club's annual Dinner, to be held on Friday, March 19, at the "Grasshopper," Crawley, will have Bert Allen, G2UJ, and his wife as Guests of Honour. A large number of other guests are expected, but tickets are still available, price 27s. 6d. each, from J. W. Swift, G3CTP. On March 24, the visiting lecturers will be Messrs Green and Davis, from the firm of that name, who will be taking along some of their range of equipment.

Cray Valley RS. At the February meeting, G. F. Gearing, G3JJG, provided some inside comments about his Princess Transmitter, but did not prove it on the air as was expected. January 16 and 17 saw G3RXV, the club station, active on 160m for transatlantic tests. The second meeting in each month is now held at Ruxley Corner (on the A20), Sea Cadets' Hall, 13 days after the first Thursday in each month. The first meeting in March will be on March 4, and not as shown in the last issue, at 1 Court Road, Eltham, London, S.E.9., at 7.30 p.m. G3GJW will be giving the second part of his illustrated do-it-yourself slide show entitled "My Shack." March 17 (St Patrick's Day) will probably be spent trying to raise EI and GI on 160m!

Durham City ARS. The society is now well into its second year, and can look back on a prosperous year with attendances averaging 30 members. Recent lectures have included "DX-peditions" by G3MEA, "A Visit to Iceland" by G3PUF, and two talks on "S.S.B." by G3DIJ. Meetings are held every other Thursday at 8 p.m. at the Bridge Hotel, North Road, Durham City. Two meetings worthy of special note are June 3, when there will be a constructional competition, and June 17, the AGM. Honorary Secretary: M. Allenson, G3TGD, Physics Dept., University of Durham, South Road, Durham City.

East London Group. A visit from a representative of the GPO to a recent meeting of this group meant a very enjoyable afternoon. After describing the internal organization for dealing with matters affecting the amateur, Mr Smith turned his attention to the new licence. Very many searching questions were put to him, which he answered in a very able and concise manner. His

A group of scouts and guides assembling some electronic kits provided by Philips Ltd. at the Camping and Outdoor Life Exhibition at Olympia. The Baden Powell House Scout Amateur Radio Society's station G3TGS/A can be seen in the background.

interpretation of the terms of the licence did not always meet with wholehearted approval, but did show understanding and a willingness to be reasonable in all matters.

Enfield and District Group. The AGM was held on December 17, and the following officers were elected: Chairman, H. T. Brock, G3FD; Honorary Secretary, John Jackson; Honorary Treasurer, Peter McGuire, A2965; Publicity Officer, Ian Fletcher; Librarian, F. E. Fleet, G3LRR; and Committee Member, A. F. Webb, BRS21770. The group plans to take part in NFD, in the Enfield Show, that is, if it is held this year, and G3FD/P will be ready for 1965 V.H.F./U.H.F. Contests. A programme of lectures was being arranged for the monthly meetings, held at George Spicer School, Southbury Road, Enfield, at 7.30 p.m. on the third Monday of each month.

The **Ex-G Club,** in common with the rest of the world, paid its tribute to Sir Winston Churchill. Many of the members have their own vivid memories of those "Valiant Years." With the improved conditions expected during the summer months, the world-wide net on 14·345 Mc/s at 19.00 GMT every Sunday will call in more and more members each week. All ex-Britishers are welcomed from whatever part of the world they are operating. Full details may be obtained by sending an s.a.e. to G4MJ, W3HQO or W8YHO.

The **Harlow RS** is planning two events towards the end of this year. The first is an exhibition on Harlow Day, or rather week-end (August 28 and 29), sponsored by the local Council, who have allocated over £5,000 in promotion attracting major beat group, firework display, carnival and sporting events on both days. The society will be situated in a large marquee, with its own parking space. The display should be very impressive, as various aspects of Amateur Radio will be exhibited, including members' equipment and /A stations active on most bands. Sunday will also see a mobile rally. The second important event will be the society's annual mobile rally on September 26. The venue will be the same as last year: Magdalen Laver Village Hall near Harlow. Honorary Secretary: G. O'Donald, G3TLJ, "Great East," Roydon Road, Roydon, Harlow, Essex.

The **Radio Society of Harrow** held its AGM recently, when the following officers were elected: President, G2UV; Chairman, G2TA; Honorary Treasurer, G3SWT; Honorary Secretary, G3TUX; Committee Members, G3MLS, G3GNM, G3SM, G3HBW and G3PFR. At the same meeting, the past year was reviewed by the retiring president, G3SM, and showed that it had been most satisfactory in all respects, particularly in the membership which again topped the 100 mark. Future plans are the completion of the club project, a transistorized g.d.o., the expansion of premises, provision of test gear facilities for members, and an added emphasis on activities for the younger club members. The club net has been revived, and is off to a good start operating on 160m every Sunday at 11 a.m.

Hull and District RS. The Annual Dinner held in January was enjoyed by the 45 members and guests present, thanks to the hard work put in by G3AGX, G2SSA and their XYLs. There was a good attendance at the AGM held on January 26. The following were elected as officers: Chairman, L. Colley, G3AGX. Honorary Secretary, A. Sherer, G3TEU, 18 Malham Avenue, Anlaby Road, Hull; Honorary Treasurer, V. Medici, G3TTW; Committee Members, G3FCY, G3LIQ, G3RDM and G. Wheeler.

Liverpool and District RS. The society's programme for March is as follows: March 5 will be a Hamfest at the Gateacre Hall Hotel, Halewood Road, Gateacre. It will take the form of a dinner/dance, with the dinner at 8 p.m., costing 22s. 6d. Tickets may be obtained from G3MCN. The 9th will be an Open Night, the 16th will see a talk on 3cm by G3PLX, there will be a film show on the 23rd, and a junk sale will follow on the 30th. Honorary Secretary: H. James, G3MCN, 448 East Prescot Road, Liverpool.

Loughton and District RS. At the society's meeting on January 15, a large attendance of members gave an enthusiastic reception to Charles Warrener, of Associated Rediffusion, who gave a talk, with demonstrations, on "Sound in Television" in which taped extracts of future programmes were used as examples of techniques and associated problems in studio productions. G8AB talked on "A Re-statement of Operating Procedures" at the meeting on January 29, with particular reference to the new licence conditions. Messrs A. W. Nash and C. Horner of Cosmocord (Acos) Ltd. were due to give a lecture on "Piezo-electrical Devices" on February 26, and during March it is hoped that a party of members will be able to visit the Post Office Radio Station at Brentwood. Meetings are held on alternate Fridays; at least one in each month is devoted to a visiting lecturer, the other being informal, and all are held at Loughton Hall, Rectory Lane, Loughton, Essex, near Debden Station, on the Central Line. Honorary Secretary: A. W. Sheppard, G3JBS, 11 Barfields, Loughton, Essex.

Luton and District ARS. This club has had a change of secretary, and P. W. Thompson, G3TUI, 1 St. Michael's Crescent, now holds that office. A most interesting programme has been arranged, covering the period up to April 11. This seems to cater for all tastes, from a "Ham" burger supper to "Applications of Radar and Microwaves."

Lothians RS. Alf Coutts, GM3KPD, entertained the society recently with a very informative and amusing talk about the development of radio at sea, from Marconi's first attempts to the present day. His lecture was made all the more interesting by the inclusion of anecdotes of his own experiences as a Merchant Navy Radio Operator. There must be many such people who could perform a similar service to their own clubs—such a talk is warmly recommended.

Loughborough ARC. In addition to Morse classes every Monday, the following lectures and events will be held during March at Bleach Yard, Wards End, Loughborough. March 5, a lecture by A. Hitchcock, G3ESB; March 12, a components sale; March 19, NFD preparations, and on the 26th there will be a tape lecture on a DXpedition to St Pierre and Miquelon, illustrated with slides. Honorary Secretary: G. P. Bateman, G3LCG, 24 Farndale Drive, Loughborough.

Mid-Warwickshire ARS. On Monday, January 11, the society held its first open meeting of 1965, and at the subsequent meeting the members were shown two films by Mullard Ltd. The first described the advance of communications from the telegraphic semaphore to the multi-channel trans-oceanic cables and microwave links. The second film dealt with the production of miniature printed circuits.

Northern Heights ARS. At a recent committee meeting it was decided to organize some special fund-raising activities to enable the society to procure a transmitter for use at demonstration stations. Considerable interest was aroused recently when A. W. Walmsley, G3ADQ, lectured about trends of s.s.b. Future meetings will include a lecture about wide diffusion hi-fi by Mr Dudley Johnson on March 31, a junk sale on April 14, and the AGM on April 14. Honorary Secretary: A. Robinson, G3MDW, Candy Cabin, Ogden, Halifax.

Peterborough and District ARS. A lecture is held once a month at Peterborough Technical College, and on the other Fridays visitors are welcome to visit the new clubroom and station in the Windmill behind the Peacock Inn, London Road, Peterborough. On April 9 there will be a talk on s.s.b., and on May 7 a talk on radio astronomy will be given. Honorary Secretary: D. Byrne, G3KPO, Jersey House, Eye, Peterborough.

(Continued on page 197)

Forthcoming Events

Details for inclusion in this feature should be sent to the appropriate Regional Representatives by the first of the month preceding publication. A.R.s and club secretaries are reminded that the information submitted must include the date, time and venue of the meeting and, whenever possible, details of the lecture or other event being arranged. Regional Representatives are requested to set out the copy, preferably typed double spaced, in the style used below. Standing instructions cannot be accepted.

REGION 1

Ainsdale (ARS).—March 3, 17, 31 ("RAEN Discussion," by L. Goldsbrough, G3ERB), 8 p.m., 77 Clifton Road, Southport.

Blackburn.—Fridays, 8 p.m., West View Hotel, Revidge Road.

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

Bury (BRS).—March 9 (Sale of surplus gear), 8 p.m., Old Boars Head, Crompton Street.

Chester.—Tuesdays, except first in month, 8 p.m., YMCA, Chester.

Crewe & District.—April 5, 8 p.m., Earl of Crewe Hotel, Nantwich Road.

Eccles (E & DAC).—Tuesdays, 8 p.m., Patricroft Congregational Schools, Shakespeare Crescent, Patricroft, Eccles. Thursdays, club Top Band net at 20.30 GMT.

Liverpool (L & DARS).—Tuesdays, 8 p.m., Conservative Association Rooms, Church Road, Wavertree.

Macclesfield.—March 16, 30, The George Hotel Jordongate.

Manchester (M & DARS).—Wednesdays, 7.30 p.m., 203 Droylsden Road, Newton Heath, Manchester 10.

(SMRC).—Fridays, 7.45 p.m., Rackhouse Community Centre, Daine Avenue, Northenden.

Morecambe.—March 3, April 7, 125 Regent Road.

Preston.—March 9, 23 (All meetings start with a Morse practice at 7.30 p.m.), St. Paul's School, Pole Street.

Southport (SRS).—Wednesdays, 8.30 p.m., Sea Cadets Camp, The Esplanade.

Stockport.—March 10, 24, April 7, The Blossoms Hotel, Buxton Road, Stockport.

Wirral.—March 3 ("Nuclear Electronics," by Mr. D. Hyde), March 17 ("Amateur Television," by Mr. Lawrence, GW3JGA), April 7 ("Receivers," by W. Evans), 7.45 p.m., Harding House, Park Road West, Claughton, Birkenhead.

REGION 2

Barnsley.—March 12 ("Hybrid Mobile Receiver," by J. Walker, G3GNK), March 26 (Junk Sale and Visitors' Evening), King George Hotel, Peel Street.

Bradford.—March 4 ("RSGB Training Young People," Visit to Spen Valley ARS), March 16 (Junk Sale), March 30 (AGM), 7.30 p.m., 66 Little Horton Lane.

Northern Heights.—March 16 ("Wide Diffusion Hi-Fi," by Mr Dudley Johnson), March 30 (Ragchew and Committee Meeting), 7.30 p.m., Sportsman Inn, Ogden.

Scarborough.—Thursdays, 7.30 p.m., Rear of 3 Trinity Road.

Spen Valley.—March 4 ("Training of Young People in Amateur Radio, RSGB"), March 18 ("Electronic Equipment in Marshalling Yards," by British Railways), Grammar School, Heckmondwike.

Durham (CARS).—Alternate Thursdays, June 3 (Constructional Competition), June 17 (AGM), 8 p.m., The Bridge Hotel, North Road, Durham City.

REGION 3

Birmingham (MARS).—March 16, 7.30 p.m., Midland Institute, Paradise Street, Birmingham.

(Slade).—March 12, 26, 7.45 p.m., The Church House, High Street, Erdington.

Cannock Chase (ARS).—March 4, April 7, 7.30 p.m., The George Inn, Walsall Road, Cannock.

Coventry (CARS).—Mondays, 8 p.m., Westfield House, Radford Road, Coventry.

Dudley (ARS).—March 12, 26, 8 p.m., Art Gallery, Dudley.

Leamington Spa (MWARS).—March 8 (On the Air, with club transmitter), March 22 ("Frequency Meters and Calibrators"), April 5 (Radio Theory, Part 4, "Valve Performance"), 7.45 p.m., Civil Defence Training School, Harrington House, Newbold Terrace, Leamington Spa.

Stourbridge & District (ARS).—March 9, April 6, 7.45 p.m., Foley College, Stourbridge.

Wolverhampton (ARS).—Mondays, 8 p.m., Neachells Cottage, Stockwell End, Tettenhall.

REGION 4

Burton-on-Trent (B-o-TARS).—March 10 ("Fifty Years of Radio," by F. C. Ward, G2CVV), 7.30 p.m., Club Rooms, Stapenhill Institute, Burton-on-Trent.

Derby (D & DARS).—March 3 (Surplus Sale), March 10 (Open Evening), March 17 ("Servicing," by T. Darn, G3FGY), March 24 ("How to Make a Voltmeter," by F. C. Ward, G2CVV), March 31 ("The Morse Code," by B. J. C. Brown, G3JFD), 7.30 p.m., Room 4, 119 Green Lane, Derby.

Heanor (H & DARS).—March 9 (Constructors' Exhibition), March 16 ("Practical Receiver Alignment," by B. Sandall, G3LGK and E. West, G3KTP), March 20 (Annual Dinner), March 23 (Receiver Comparisons), March 30 (Surplus Sale), 7.30 p.m., Room 14, Heanor Technical College, Ilkeston Road, Heanor, Derbyshire.

Leicester (LRS).—Mondays, 7.30 p.m., Sundays, 10.30 a.m., Club Room, Old Hall Farm, Braunstone Lane, Leicester.

Lincoln (ARC).—First Wednesday in each month, 7.30 p.m., Lincoln Technical College, Cathedral Street, Lincoln.

Loughborough (LARC).—March 5 ("Finishing Touches to Amateur Equipment," by A. D. Hitchcock, G3ESB), March 12 (Components Sale), March 19 (NFD Discussion), March 26 (DXpedition to St. Pierre and Miquelon—slide illustrated), 7.30 p.m., Club Room, Bleach Yard, Wards End, Loughborough.

Mansfield (ARS).—Fridays, 7.30 p.m., ATC Headquarters, Sutton Road, Mansfield.

Melton Mowbray (ARS).—March 25 ("Basic Valve Circuits" Mullard Flim Strips), 7.30 p.m., St. John Ambulance Hall, Asfordby Hill, Melton Mowbray, Leics.

Nottingham (ARCN).—Tuesdays, Thursdays, Room 3, Sherwood Community Centre, Woodthorpe House, Mansfield Road, Sherwood.

Northampton (NSWC).—Thursdays, 7 p.m., Allen's Pram Works, 8 Duke Street, Northampton.

Peterborough (ARS).—March 5 (Radio Films), April 9 ("S.S.B."), May 7 ("Radio Astronomy"), June 4 ("Portable and mobile gear"), all lectures in the Electronics Section at Peterborough Technical College at 7.15 p.m. Other Fridays at 8 p.m., in the Old Windmill, behind the Peacock Inn, London Road, Peterborough.

Worksop (NNARS).—Tuesdays (RAE Classes), Thursdays (Lecture), 7.30 p.m., Club Rooms, 13 Gateford Road, Worksop, Notts.

REGION 5

Bedford (B & DARC).—March 9 ("Receivers"), March 25 (Members' Hints and Kinks), Harpur Secondary Modern School, Horne Lane, Bedford.

Cambridge (C & DARC).—March 5 ("The QSL Bureau," by Arthur Milne, G2MI), March 12 (Converter Discussion), March 19 (AGM), March 26 (Activity Evening), 7.30 p.m., Club Headquarters, Corporation Yard, Victoria Road, Cambridge.

Cambridge University (CUWS).—Tuesdays during Term, 8.15 p.m., Psychology Department, Downing Site, Downing Street.

Haverhill (H & DARC).—Mondays, 7.30 p.m., 41a High Street, Haverhill, Suffolk.

Luton (L & DARS).—March 9 ("V.H.F. Propagation," by W1HDQ on Tape), March 16 (Bring and Buy Sale), March 23 ("Circuits" Evening), March 30 (Debate "a.m. vs s.s.b.", with Verulam Radio Club, St. Albans, visiting), 8 p.m., ATC Headquarters, Crescent Road, Luton, Beds.

March (M & DRAS).—Tuesdays, 7.30 p.m., rear of Police Headquarters, High Street, March, Cambs.

Royston (R & DARC).—Wednesdays, 8 p.m., Manor House Social Club, Melbourn Street, Royston, Herts.

Shefford (S & DARS).—March 4 ("Tape Recording Techniques," by C. Brown), March 11 (Mullard Film Strip Lecture), March 18 (Programme Planning), March 25 (First NFD Meeting and Junk Sale), 7.45 p.m., Town Recreation Centre, Hitchin Road, Shefford, Beds.

REGION 6

Cheltenham.—First Thursday in each month, 8 p.m., Great Western Hotel, Clarence Street, Cheltenham.

Oxford (O & DARS).—Second and Fourth Wednesdays in each month, 7.30 p.m., Cherwell Hotel, Water Eaton Road, N. Oxford.

REGION 7

Acton, Brentford & Chiswick (ABCRC).—March 16 ("160m DX Working," by W1BB), AEU Club, 66 High Road, Chiswick.

Ashford (Middx.) Echelford (ARS).—March 17 (RAE Course), March 31 (Discussion on Receivers), April 28 (AGM), 7.30 p.m., Links Hotel, Ashford.

Bexley Heath (NKRS).—March 11, 25, 7.30 p.m., Congregational Hall, Chapel Road, Bexley Heath.

Barnet (BRC).—March 23, 8 p.m., Red Lion Hotel, Barnet.

Chingford (Group).—March 19, 35 Middleton Close, Epping. Hon. Secretary, Loughton 2397.

(SRC).—Fridays (except first), 8 p.m., Friday Hill House, Simmons Lane.

Croydon (SRCC).—March 9, 7.30 p.m., Blacksmith's Arms, South End, Croydon.

Dorking (D & DRS).—March 9, 8 p.m., Wheatsheaf, Dorking.

East Ham.—Tuesdays fortnightly, 7.30 p.m., 12 Leigh High Road, East Ham.

East London District.—March 21 ("RTTY," Talk and demonstration by E. W. Yeomanson, G3IIR), 2.30 p.m., Lambourne Room, Ilford Town Hall.

East Molesey (TVARTS).—First Wednesday in each month, Prince of Wales, Bridge Road, East Molesey.

LOOKING AHEAD

April 10.—International V.H.F. U.H.F. Convention.

April 4.—RSGB National Mobile Rally, Texas Instruments Ltd., Bedford.

April 11.—North Midlands Mobile Rally, Trentham Gardens.

May 16.—UBA AGM.

May 18-21.—RECMF Exhibition, Olympia, London.

May 30.—RNARS Mobile Rally at RN Signal School, HMS Mercury.

May 30.—Belfast and District RSGB Group Mobile Rally.

June 6.—RSGB National Mobile Rally, USAF Base, Wethersfield.

June 20.—Hunstanton Bucket and Spade Party.

June 27.—Longleat Mobile Rally.

July 11.—Oxford and District ARS 10th Anniversary Mobile Rally (sponsored by RSGB).

July 11.—Sixth South Shields Mobile Rally.

July 11.—Torbay ARS Mobile Rally, Newton Abbot.

August 25-September 4.—Radio Show, Earls Court, London.

August 30.—Peterborough Mobile Rally.

September 12.—RSGB National Mobile Rally, Woburn Abbey.

September 26.—Harlow and District RS Mobile Rally, Magdalen Laver.

October 2.—N.W. V.H.F. Convention.

October 16-17.—Eighth Jamboree-on-the-Air.

LONDON MEMBERS' LUNCHEON CLUB

will meet at the White Hall Hotel, Bloomsbury Square, London, W.C.1

at 12.30 p.m. on Fridays, March 19, and April 16, 1965.

Telephone table reservations to HOL 7373 prior to day of luncheon. Visiting amateurs especially welcome.

Edgware and Hendon (EARDS).—March 8, 22, 8 p.m., John Keble Hall, Church Close, Deans Lane, Edgware.

Enfield.—March 18, 8 p.m., George Spicer School, Southbury Road, Enfield.

Gravesend (GRS).—March 17, 7.30 p.m., RAFTA Club, 17 Overcliffe, Gravesend.

Guildford (G & DRS).—March 15, 29, 8 p.m., Guildford Model Engineering Society, in Stoke Park.

Harlow (DRS).—Tuesdays, 7.30 p.m., rear of 11 High Street, (QTH of G3ERN).

Harrow (RSH).—Fridays, 8 p.m., Roxeth Manor County School, Eastcote Lane, Harrow.

Holloway (GRS).—Mondays and Wednesdays, (7 p.m., RAE and Morse), Fridays, (Club) 7.30 p.m., Montem School, N.7.

Hounslow (HADRS).—March 8, 22, Canteen, Mogden Main Drainage Department, Mogden Works, Isleworth.

Ilford.—Thursdays, 8 p.m., 579 High Road, Ilford (nr. Seven Kings Station).

Kingston.—March 18 (Special General Meeting), April 1 (Junk Sale), 8 p.m., YMCA, Eden Street, Kingston. Fridays (Weekly Morse classes), 2 Sunray Avenue, Tolworth.

Leyton & Walthamstow.—March 23, 7.30 p.m., Leyton Senior Institute, Essex Road, London, E.10.

London U.H.F. Group.—March 4, 7.30 p.m., ("Eddystone Receivers," by J. Walker), Bull & Mouth, Bloomsbury Way, Holborn.

London Members' Luncheon Club.—12.30 p.m., Third Friday in each month. See separate box.

Loughton.—March 12, 7.30 p.m., Loughton Hall (Nr. Debden Station).

Mitcham (M & DRS).—March 12, 7 p.m., "The Cannons," Madeira Road, Mitcham.

New Cross (CARS).—Wednesdays and Fridays, 8 p.m., 225 New Cross Road, London, S.E.14.

Norwood & South London. (CP & DRS).—March 20, CD Training Centre, Catford, London, S.E.6.

Paddington (P & DARS).—Wednesdays, 7.30 p.m., Beauchamp Lodge, 2a Warwick Crescent, London, W.2.

Purley (P & DRC).—March 19, 8 p.m., Railwaymen's Hall (Side Entrance), Whytecliffe Road, Purley.

Reigate (RATS).—March 19, 7.30 p.m., George & Dragon, Cromwell Road, Redhill.

Romford (D & DRS).—Tuesdays, 8.15 p.m., RAFTA House, 18 Carlton Road, Romford.

Scout ARS.—March 18, 7.15 p.m., Baden Powell House, Queens Gate, South Kensington.

Science Museum (CSRS).—March 16, (Informal Meeting), April 6 (AGM), 6.30 p.m., Science Museum, South Kensington.

Sidcup (CVRS).—March 4, 7.30 p.m., Congregational Church Hall, Court Road, Eltham.

Slough (SARS).—First Wednesday in each month, 8 p.m., United Services Club, Wellington Street, Slough.

Southgate & District.—March 11, 7.30 p.m., Atlasta Lodge, Tottenhall Road, Palmers Green, London, N.13.

St. Albans (Verulam ARC).—March 17, (Film Show, and "Home Brew G.D.O.", by G3RPA), 8 p.m., Hedley Road.

Sutton & Cheam (SCRS).—March 17, 8 p.m., The Harrow Inn, High Street, Cheam.

Uxbridge.—March 15, April 5, 8 p.m., Railway Arms, Vine Street.

Welwyn Garden City.—March 11 (Annual Constructors' Competition), 8 p.m., Vineyard Community Centre, Digswell Road.

Wimbledon (W & DRS).—March 12, 8 p.m., Community Centre, St. Georges Road, Wimbledon, London, S.W.19.

REGION 8

Crawley (CARC).—March 10 (Informal, for details contact G3FRV), March 19 (Annual Dinner, for bookings contact G3CTP), March 24 (Lecture and demonstration of Green and Davis equipment), 8 p.m., Trinity Congregational Church, Ifield.

REGION 9

Bath.—March 19, 7.30 p.m., Room 247, Fourth Floor, Main Building, Bath Technical College.

Bristol.—Fourth Friday in each month, 7.15 p.m., Small Physics Theatre, Royal Fort, Bristol University, Woodland Road, Bristol 8.

Burnham-on-Sea (B-o-SARS).—Second Tuesday in each month, 8 p.m., Crown Hotel, Oxford Street, Burnham-on-Sea.

Camborne (CRAC).—First Thursday in each month, Staff Recreation Hall, SWEB Headquarters, Pool, near Camborne.

Exeter.—First Tuesday in each month, 7.30 p.m., George and Dragon Inn, Blackboy Road, Exeter.

Plymouth (PRC).—Tuesdays, 7.30 p.m., Virginia House, Bretonside, Plymouth.

South Dorset (SDRS).—First Friday in each month, 7.30 p.m., Labour Rooms, West Walks, Dorchester.

Torquay (TARS).—Last Saturday in each month, Club HQ, Belgrave Road, Torquay.

Weston-super-Mare.—First Tuesday in each month, 7.15 p.m., Technical College, Lower Church Road.

Yeovil (YARC).—Wednesdays, 7.30 p.m., Park Lodge, The Park, Yeovil.

REGION 10

Cardiff.—March 8, 7.30 p.m., TA Centre, Park Street, Cardiff.

Port Talbot.—March 9 (Lecture), 7.30 p.m., Workmen's Institute, 8-10 Jersey Street, Velindre, Port Talbot.

REGION 11

Bangor (UCNWARS).—Thursdays fortnightly, 5.30 p.m., Department of Electronic Engineering, University College of North Wales, Dean Street, Bangor. Details from the Hon Sec, c/o this address.

Llandudno (CVARC).—March 11 ("Audio Developments," by the Rev F. C. Dorken, GW3GCZ), March 25 (Film Show), 7.30 p.m., Cross Keys, Madoc Street, Llandudno.

Prestatyn (FRS).—Last Wednesday in each month, 8 p.m., Railway Hotel, Prestatyn. Details from A. Antley, Fairholme, Fairfield Avenue, Rhyl.

REGION 13

Edinburgh (LRS).—March 11 (Film Night), March 25 (Microwave Links," by Arthur Gavin of Ferranti Ltd.), 7.30 p.m., YMCA, South St. Andrew Street, Edinburgh.

REGION 14

Glasgow.—First and third Wednesdays in each month, Christian Institute, 70 Bothwell Street, Glasgow, C.2.

REGION 16

Basildon (BDARS).—March 17 ("Photo-telegraphy," an illustrated lecture by L. Parnell, G8PP), April 6 (Social Evening), 8 p.m., The Bullseye. Details from G3IJB.

Chelmsford (CARS).—April 6 ("Theory and Practice of Direction Finding," by G3OXY and G3HT), 7.30 p.m., Marconi College, Arbour Lane, Chelmsford.

Great Yarmouth (GYRC).—Fridays, 7.30 p.m., The Manager's Office, The Old Power Station, South Quay, Swanston's Road, Great Yarmouth. Details from G3HPR.

Norwich (NARC).—Mondays, 7.30 p.m., 140 Oak Street, Norwich. Details from G3TLC.

Southend (SDARS).—March 26 (Pocock and Hudson Cups Competitions for home constructed equipment), Executives' Canteen, E. K. Cole Ltd., Priory Crescent, Southend-on-Sea.

REGION 17

Harwell (AERE ARC).—March 16 (Talk and demonstration by H. V. Simms of the BBC Engineering Training Dept. on "Transmitting Aerials"), 7.30 p.m., AERE Social Club.

Southampton.—March 13 (200th meeting). Details to be arranged.

Clubroom (Continued from page 195)

Reigate ATS. Twenty-seven members out of a total membership of 38 attended the sixth AGM in January. The officials elected are: Chairman, P. D. Lucas, G3JDN; Honorary Secretary, F. D. Thom, G3NKT, 12 Willow Road, Redhill, Surrey; Honorary Treasurer, R. A. Eldridge, G3RAE; Contests Secretary, K. J. Wheatley, G3BBR; Social Secretary, F. E. Collins; Committee Members, G. E. Mac'Krell, G3KAX, T. Emeney, G3RIM and R. Wells, G3RIN; Honorary Auditor, J. Duckworth, G3FM. The subject of the meeting on Saturday, March 20, to be held at the George and Dragon, Cromwell Road, Redhill, had not been decided at the time of going to press.

Roding Boys' Society. We have been gently reprimanded by Ken Smith, G3JIX, about last month's report! There are, apparently, several good reasons for the rather small size of the group, the available space being the main limitation, a situation which is aggravated by an increasing quantity of test equipment. Even so, it will probably remain a small group whether or not a new meeting place is found, in order to retain the co-operative spirit.

Royal Naval ARS. January 28 will be remembered by over 60 amateurs in the southern area, because that was the occasion when the RNARS entertained amateurs at the RN Signal School to a social and ragchew evening. Despite the snow and bitter cold, numbers grew steadily during the evening until by 8.30 p.m. over 60 visitors had arrived. The rest of the time was obviously quite hectic, with a beer drinking contest, and plenty of dancing to a local beat group—the "Force Four"—immediately re-christened the "5 and 9 Plus."

The **Saltash and District ARC**, first mentioned in this column last month, meets every other Friday, the next meeting being on March 12. A mobile rally is planned for Whit Monday; further details will be published as soon as they are available. Honorary Secretary: D. Bowers, 95 Grenfell Avenue, Saltash, Cornwall.

Scarborough ARS. The club is now well established in its new clubroom. The transmitter and receiver have been overhauled by G3JBR, and it is hoped that the aerial will shortly be erected so that the club may once again be on the air. An interesting talk on the Codar AT5 12 watt two-band transmitter was given by G3JBR on January 28. A demonstration was also given in the clubroom in conjunction with the club receiver. Meetings are held every Thursday at 8 p.m. in the clubroom at the rear of 7 Trinity Road, Scarborough. New members and visitors from other clubs are always welcome.

The **Stoke-on-Trent ARS** is preparing for the eighth North Midlands Mobile Rally which will be held at Trentham Gardens on April 11. To assist in the smooth running of this rally, the

(*Continued on page 199*)

Letters to the Editor

Neither the Editor nor the Council of the Radio Society of Great Britain can accept responsibility for views expressed by correspondents. Letters for inclusion in this feature should be concise and preferably not more than 200 words in length.

High Stability Variable Frequency Oscillators

DEAR SIR,—Since I drew the attention of Mr Allen and of Mr Harris to the paper " Frequency Stable LC Oscillators," by J. K. Clapp, in *Proc IRE*, August, 1954, I found their two letters in the January, 1965, BULLETIN of great interest.

Two factors mentioned in the letters seem to be of particular importance; the value of the capacitor C2, and the harmonic content of the output.

I think that the operation of the circuit would be more clearly understood if it were re-drawn as shown. Apart from the layout of the drawing, this circuit is identical with that in Mr Harris's article, and in Mr Allen's letter. It is now evident that this is a Colpitts oscillator, with one of the " potential divider " capacitors replaced by the network C2, C3 and C4 (with C6). C2 also serves to isolate the grid from the positive d.c. supply voltage.

Frequency stability of the oscillator depends on

(*a*) stability of the components (C1, C2, C3, C4, C6 and L1) of the oscillatory circuit, and

(*b*) reduction to a minimum of effects on the oscillatory circuit caused by the valve and its circuit.

As Mr Allen points out, reduction of the value of C2 results, in effect, in tapping the grid down the tuned circuit. Not only does this reduce the drive and improve the waveform (as stated by Mr Allen), it also reduces the effect of variations in valve capacitances on the frequency, because C2 and C4 (with C6) also form a potential divider. Thus, for high stability, the value of C2 must be small in comparison with C4. It is also desirable for C1 and C3 to be very large in comparison, respectively, with the output and input capacitances of the valve. The latter—and their variations—will then have a minimum effect on the frequency.

There are, of course, limits to the permissible values of these three capacitors C2, C1 and C3. The drive is reduced by decreasing C2, and by increasing either (or both) C1 or C3. Eventually, these adjustments will cause cessation of oscillation.

The value of C2 used by Mr Allen prior to his experiments is essentially the same as that recommended in Mr Harris's article, in the RSGB *Amateur Radio Handbook* and in the March 1956 article in the BULLETIN by Mr Deacon. That value is much greater than that of C1, C3 and C4, and some 300 times greater than that determined experimentally by Mr Allen! The value was, in fact, so great that its effect on the frequency stability was negligible, and it is no serious exaggeration to describe C2 in the Deacon/*Handbook*/Harris circuit merely as a d.c. blocking capacitor.

I suggest that the smallness of C2 is the essential feature of the Vackar circuit; that it is misleading to describe the Deacon/*Handbook*/Harris circuit as a Vackar; and that the stability of the Deacon/*Handbook*/Harris circuit is no better than that of the " High-C Colpitts " as used by amateurs some 30 years ago!

I do not understand Mr Harris's " conviction that this oscillator had a superior performance to that of the Clapp." The measurements quoted in Mr Harris's article show that—at the lower frequencies—the stability of his oscillator is inferior to that of a Clapp which I built some 15 years ago, and used for about 10 years.

Neither Mr Allen nor Mr Harris suggests that he has made precise measurements of harmonic content. Nevertheless, their figures are of value. In his article, Mr Harris states that one of the reasons for the stability of the Vackar is that " The valve operates virtually in Class A so holding harmonic circulating currents and phasing effects to a minimum." He now discloses that the oscillator he describes has a second harmonic only about 15 db down; in other words, his so-called Class A stage produces about 18 per cent second harmonic distortion! Mr Allen's figure is 0·2 per cent.

It is true that low harmonic content contributes to the stability of an oscillator, but it should be appreciated that the harmonic content is determined primarily by the operating conditions of the valve, and not by the circuit configuration. Component values are important because they control the operating conditions of the valve.

Finally, may I strongly recommend to members interested in stable variable frequency oscillators the paper by Clapp (*Proc IRE*, August, 1954) and two other papers to which he refers, viz., Clapp, *Proc IRE*, March 1948 and Gouriet, *Wireless Engineer*, April, 1950. All three papers discuss the " Clapp Oscillator," or " Gouriet-Clapp Oscillator," to use the description graciously given by Mr Clapp in recognition of the independent (and earlier) development of the circuit by G. G. Gouriet of the BBC.

As stated by Mr Allen, the 1954 Clapp paper also describes the Vackar circuit, and refers to the paper " LC Oscillators and their Frequency Stability," by Jiri Vackar, Tesla Tech. Reports (Czecho-Slovakia), December, 1949.

Yours faithfully,
T. LYELL HERDMAN, G6HD

P.S.—Since submitting the above letter, I have—through the good offices of the EDITOR, to whom I offer my sincere thanks—obtained a copy of the original Vackar paper.

This confirms my conclusions regarding the capacitance values, for Vackar bases his analysis on the conditions that:

C2 is much smaller than (C4 + C6),
C2 is much smaller than C3
and (C4 + C6) is much smaller than C1.

Here, and in the quotation below, I have changed Vackar's symbols to correspond with those in the BULLETIN.

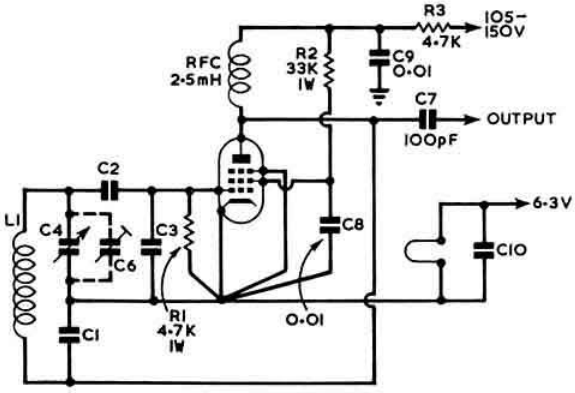
He quotes figures for design and performance of an oscillator covering 1700-2000 kc/s, and states that " To fulfil the optimum condition of stability . . . C1/(C4 + C6) = C3/C2 = 6."

The values of the components in the tuned circuit used by Vackar are—from an amateur viewpoint—unusual. The variable C4 is 100pF, but this is shunted by C6 of 1000pF (plus). Then, C1 becomes 7200pF. The chosen value for C2 is 100pF, and C3 becomes 600pF.

With a value of C6 more normal for amateur purposes, Vackar's reasoning shows that C1/(C4 + C6) = C3/C2 will be even greater than 6. The ratio C1/(C4 + C6) in Deacon/*Handbook*/Harris is not entirely unreasonable, but the ratio C3/C2, which should be of the order of 6, is given as about 0·1!

Readers should be warned that the values quoted in Deacon/*Handbook*/Harris are therefore not conducive to high stability.

It is evident, however, that the Vackar oscillator (with, of course, proper choice of component values) is well worthy of study. As far as I can see at the moment, there is little to choose for amateur transmitter purposes between the Vackar and the Gouriet-Clapp. For wider frequency coverage (e.g., general coverage communications receivers), the Vackar is probably preferable. G6HD



G6HD's re-arranged layout of the Vackar oscillator circuit.

The Vackar Oscillator

DEAR SIR,—When the article by Mr Paul Harris, G3GFN, first drew my attention to the Vackar oscillator circuit, I was a little surprised by the large ratio C2 : C3, in view of the heavy grid swamping and reduced loading on the tuned circuit reported to be associated with the arrangement. Shortly after building a test

oscillator, however, I became interested in transistor v.f.o.s and never investigated the matter further.

When Mr Allen's letter was published in the January, 1965 issue of the BULLETIN, my interest was revived and I decided to carry out some experiments with the Vackar oscillator that had previously been built to the specifications given by G3GFN.

I tried reducing the value of C2 as Mr Allen suggested, and this did produce some improvement in stability, but C2 and C3 then formed only a very small part of the capacitance in the tuned circuit, and it was felt that the full potentialities of the Vackar v.f.o. were not being exploited.

After some experiment, I came to the conclusion that the most promising values were given simply by interchanging C2 and C3. This produced no change in the tuning range or balance of the circuit, considerably increased the swamping of the grid-cathode capacitance of the valve and tapped the grid well down the tuned circuit, thereby reducing the damping effect of any grid current, and reducing the r.f. currents flowing in the tuned circuit. There was a slight reduction of output, but the improvement in stability, especially short term, was quite remarkable, and I began to wonder whether C2 and C3 had been accidentally transposed in the original source of these values, and the error passed on from author to author. Unfortunately I have not been able to check this out, but perhaps some member who has access to Vackar's original paper might care to do so.

Whether or not this turns out to be the case, anyone who is not satisfied with the performance of his Tesla oscillator might care to try out this simple modification. If anyone is able to carry out a more thorough investigation, I should be very interested to hear the results of their experiments.

Yours faithfully,
A. J. SHEPHERD, G3RKK

Queen's College, Oxford.

The ZE Beam Raiser

DEAR SIR,—I read with interest the article which appeared in the October, 1964 issue of the BULLETIN, describing this mast. To this very good idea I have made a couple of modifications, and these are illustrated in Figs. 1 and 2.

Fig. 2 shows a modified locking system which allows a greater margin of error in alignment of the carriage when raising it to the top of the mast. The circular key and keyway have been changed to a triangular form, which provides a latitude of 1 in. of the carriage position, but still locks it securely.

An additional safety precaution is shown in Fig. 1. A spring-loaded mild steel pawl has been incorporated, and this prevents the carriage from falling should the cable break or slip. It also helps to eliminate this possibility by taking the tension off the carriage when it is raised. The distance between the pawl step

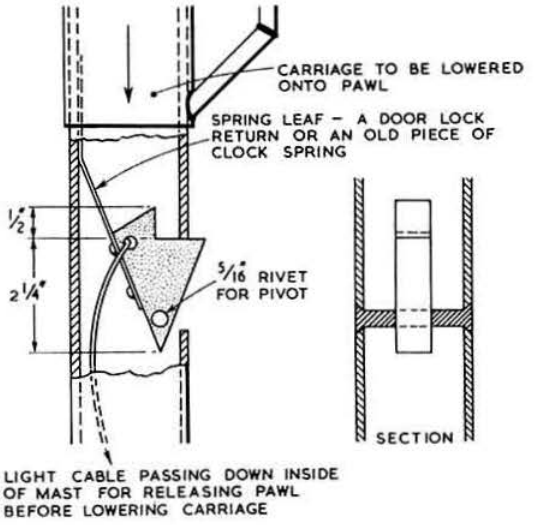


Fig. 1. The spring-loaded pawl attachment.

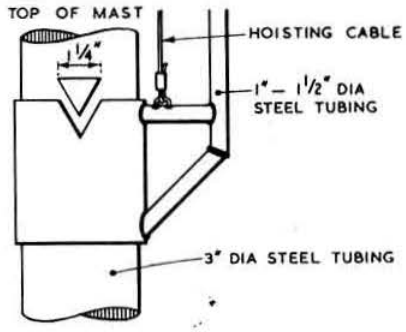


Fig. 2. Modification to the key and keyway of the ZE Beam Raiser.

and the triangular key is governed by the height of the carriage used, less ¼ in.

Yours faithfully,
D. A. R. POULTER, A4048

Morden, Surrey.

Clubroom

(Continued from page 197)

society is enlisting the aid of the other societies in the area, i.e., the University of Keele RS, Burslem RS, Stanfield Junior Tech. RS, English Electric Apprentices RS, ATC Squadron, and the RSGB Group. V. J. Reynolds, G3COY, ASR for the Stoke-on-Trent ARS, is particularly anxious that more of the work should be done by the younger people, and there is already a marked swing towards having " youth at the helm " for this rally.

Surrey Radio Contact Club. The next meeting, on March 10, will be a sale of members' surplus gear; those submitting any apparatus, however, are asked to note that anything that remains unsold will be presented back to the original owner. The AGM will be on April 14, and the annual constructional contest is not far off either—this year it will be on May 12. The Kingston and District ARS has invited members of SRCC to attend their " Sausage and Mash Supper " at the Fountain Hotel, New Malden, on April 30; tickets cost 5s. per person. Honorary Secretary: S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon, Surrey.

South Dorset RS. The February meeting was a social evening for members, YLs, XYLs and friends. A tape, with slides, about a DXpedition to St Pierre and Miquelon was played, followed by three films of general interest loaned by Shell. The March meeting will be a further talk on meteorology by Mr Box, B.Sc. The AGM will be held in April. Honorary Secretary: C. E. Biggs, 54 Prince of Wales Road, Dorchester, Dorset.

South Shields and District ARC. A very full programme, including film shows and demonstrations on Communication, by a member of the Post Office, and Electromagnetic Waves, having been arranged for the near future. Activity within the club has been very high recently, and the Annual Dinner was proof of this when 50 members and friends attended—credit for the arrangements of that event must go to the Honorary Secretary, G3KZZ. Preliminary arrangements for a mobile rally to be held at Bent's Park, South Shields, during the summer are now being made.

Thames Valley ARTS. Once again member Roy Steverson, G3JEQ, used his key to good effect in the recent Affiliated Societies Contest. From what he has told the Club, the members hope that the TVARTS will be well up in the results table when it is published. They wish to record their thanks to him for his efforts. On January 22, member Brian Meaden, G3BHT, was entertained to dinner by the club before his return north to Region 1. He will be missed by all the members and the loss of his counsel on the committee will be greatly felt. The next meeting will be an open one, but the equipment owned by the late G2FM will also be offered for sale on behalf of his widow.

Torbay ARS. At the January meeting, a talk on DX communication was given by B. Curnow, of the Plymouth Radio Club. Meetings are held on the Saturday in each month at the Club HQ, Bath Lane (rear of 94 Belgrave Road), Torquay. The date of the TARS Mobile Rally has been fixed for July 11.

K. W. Corner No. 7

LABORATORY TEST EQUIPMENT

We were surprised to learn recently that a British manufacturer (upon his own admission) was unable to measure exactly, or even to ±20%, the R.F. power output of his transmitters. We were informed that only a lamp was used. In our opinion Test Equipment is a very important facet in Design, Development, Test and Service.

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