

FEBRUARY, 1960

R S G B

BULLETIN

2/6 Monthly

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

VOL. 35, NO. 8

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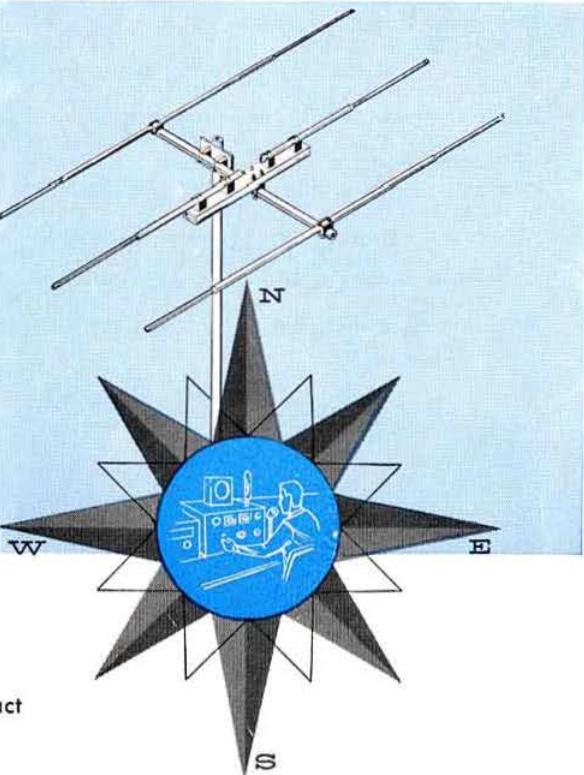
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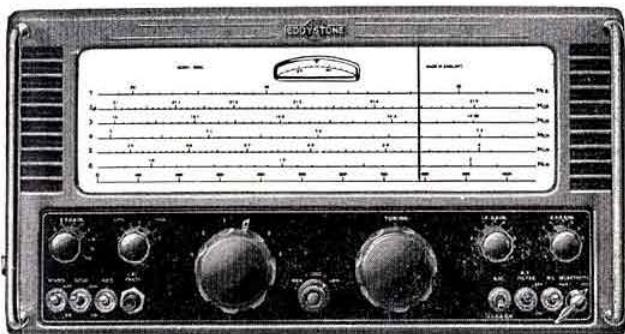
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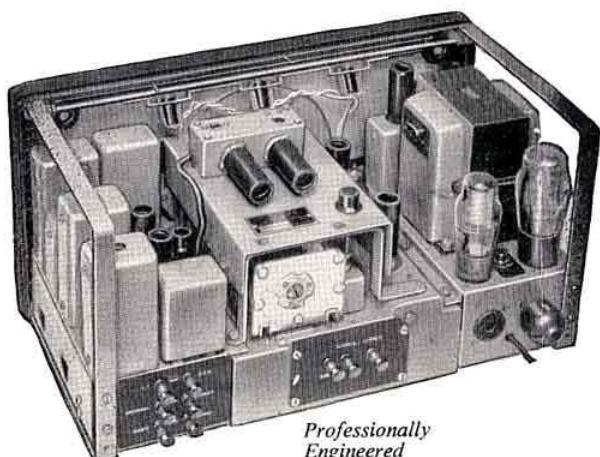
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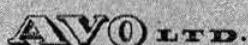


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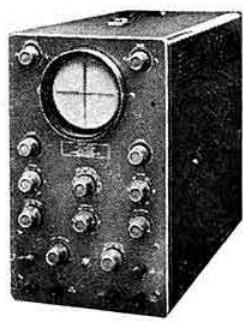


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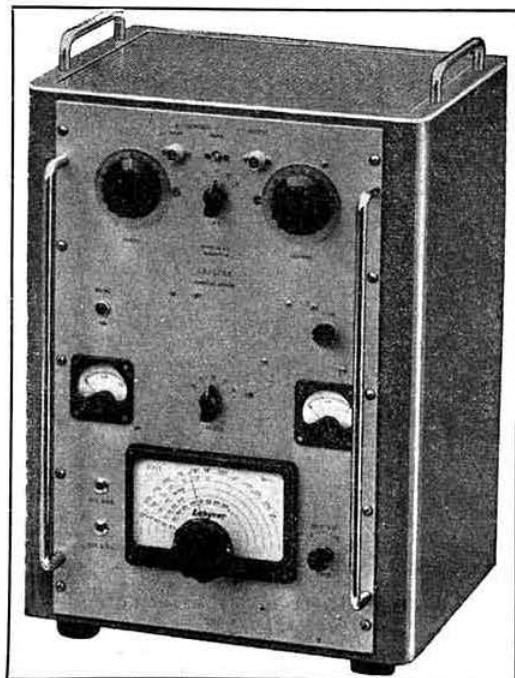
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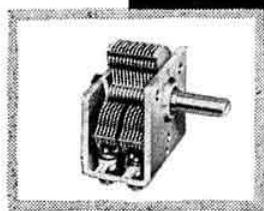


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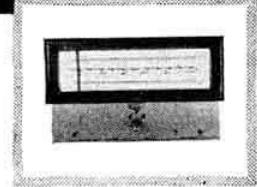
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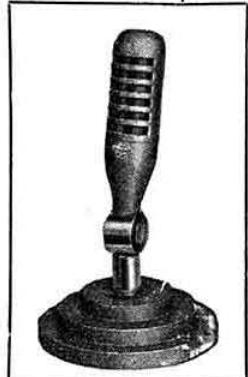
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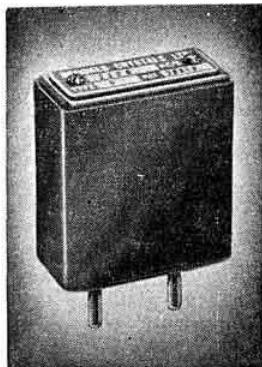
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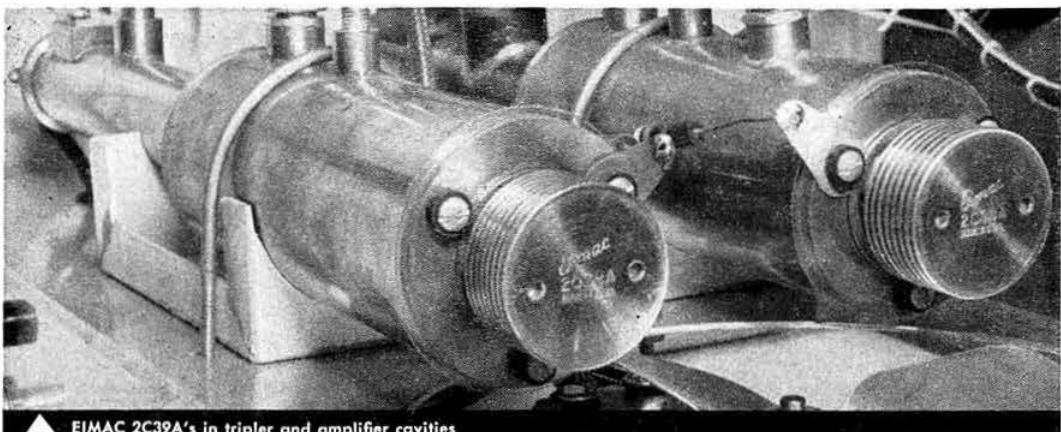
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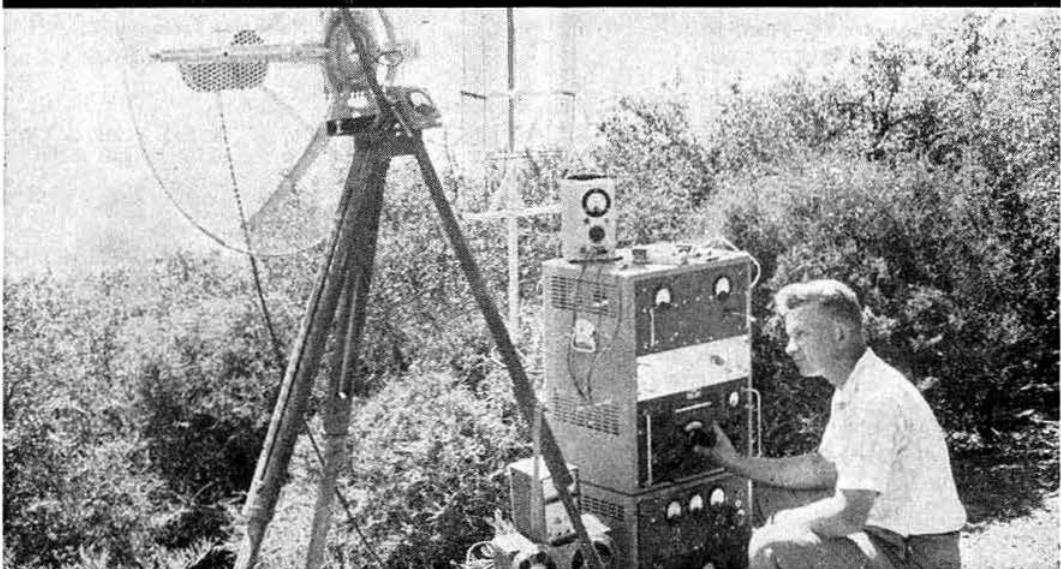
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Current Comment



discusses topics of the day

The Radio Amateurs' Examination

FEBRUARY 24 is the closing date for entries for this year's Radio Amateurs' Examination conducted by the City and Guilds of London Institute and already many hundreds of members are making arrangements with local technical colleges and institutes to sit the examination. It is therefore perhaps opportune to pass some comments on exams. in general and the R.A.E. in particular.

That there is a need for the R.A.E. is not in doubt. No one should ever be let loose with radio equipment without knowing at least the rudiments of the science in the present congested state of the amateur bands. From a purely selfish point of view, poorly operated equipment cannot be tolerated—the amateur bands are far too restricted and far too busy to permit any space, in terms of frequency, to be wasted. Our responsibilities as radio amateurs to other users of the spectrum, demand that we know how to operate without causing harmful interference to other services or to nearby television and radio receivers. So it is that the Post Office lay it down that every amateur-to-be must possess a basic knowledge of radio theory *and of the regulations* before he can be granted a licence to go on the air.

A large number of those due to take the R.A.E. in May will have been fortunate enough to attend evening classes. Others, no less determined to obtain their licence, will have been working hard and conscientiously on their own with text books and correspondence courses. Yet many are doomed to fail before they ever read the examination paper *because they do not realize the importance of Part I*. This part of the Paper is probably the biggest stumbling block to those who fail, yet it is easy to predict the subjects of the questions: one will deal almost certainly with licence conditions, the other with interference problems. Both questions will probably carry higher marks than any set in Part II.

There are, therefore, two very good reasons for ensuring that those who become candidates shall be able to write well-informed answers on both subjects. Licence conditions are not difficult to learn and are detailed in a leaflet entitled *How to Become a Radio Amateur* which is available on request from the Radio Services Dept., Radio Branch, G.P.O. Headquarters, London, E.C.1. The importance of knowing

these conditions thoroughly cannot be overstressed. For a parallel case, remember the importance of the Highway Code in the driving test: however well a person may control a car, ignorance of the Code can well mean failure to obtain a licence.

Interference is rather a different problem and although the subject is vast the syllabus of the exam. gives a fair amount of guidance for reference to various handbooks. On the question of TVI, many articles have appeared in the BULLETIN and the more important ones are available from Headquarters as reprints at a nominal cost.

A few hints for prospective candidates on passing the exam. may not be out of place. First of all, read the whole Paper carefully and thoroughly, including all the instructions, before starting work. Note particularly that Part I is compulsory: candidates must pass in this section however well they do in Part II. Endeavour to understand every question thoroughly before commencing to write. Decide how much time can be safely spent on each question and be sure to write answers to the number of questions stipulated in the instructions. Candidates who run short of time towards the end should give the relevant points of the answers to the questions still to be answered. This procedure will give the examiner a far better impression than omitting the answers altogether due to lack of time. In trying to keep to the period available for each question, beware of giving information which is not asked for—it is just a waste of precious minutes in a rather tight schedule. The usual Paper allows only about 20 minutes for each question.

When answering the questions it is a wise plan to make a series of quick notes of the main points to be covered so that they can be arranged in logical sequence in the final answer. But remember to cross through the notes so that the examiner does not regard them as part of the answer.

Handwriting should be reasonably easy to read and the answers laid out neatly. These points all help when the examiner comes to mark the paper. Allow time, if at all possible, to read through the answers and check the diagrams. It is all too easy to omit an important word or make an elementary slip in a circuit diagram which can be quickly seen and rectified on a second reading.

Finally, remember that the Radio Amateur's Examination is not competitive—provided a candidate has prepared for it with reasonable care his chances of passing first time are good.

—J.A.R.

An Alternative Sideband Generator for the G2DAF S.S.B. Transmitter

Phasing Type Exciter for a Popular Design

By G. R. B. THORNLEY (G2DAF)*

THE phasing method of sideband generation has a particular appeal to many existing or prospective sideband operators. Successful grinding of surplus FT241A crystals to the correct frequencies for a filter exciter requires practice. Additionally many of the required basic frequencies are becoming difficult to obtain from surplus sources. If purchased new the number of crystals required for a filter which will give 35db or better sideband suppression adds very considerably to the total cost of the exciter.

The phasing method is also attractive from the point of view of switching sidebands because this can be done very simply without any additional mixing or heterodyning, merely by switching the two audio outputs from the phase shift network. As the initial sideband generation may be at any frequency, it can be chosen as the one most convenient for mixing with the v.f.o. ready for final conversion to the required output.

The original G2DAF s.s.b. transmitter design† lends itself very readily to conversion to the phasing method, with some simplification as the sideband generation can be at the first intermediate frequency of 2075 kc/s. The phasing unit replaces V1, V2, V3, V4, V5 and V6 and feeds directly into the transformer IFT6 in the complete transmitter circuit diagram (Fig. 1 on pages 168 and 169, R.S.G.B. BULLETIN, October 1959.)

Design Considerations

Sideband Suppression

There is a general feeling among s.s.b. operators that the phasing method is not capable of better than 25 to 30db sideband suppression. However, with a good design and a level of operation below any overload point it is possible to get a suppression (either way round) better than a single half lattice filter, and about as good as the average two half lattice section filter.

Carrier Suppression

The filter exciter scores in having in addition to the carrier balance obtained in the balanced modulator, an additional 20db (approximately) of suppression due to the positioning of the carrier in relation to the filter response. This 20db is not available in a phasing exciter. Another disadvantage is that it is also necessary to use two balanced modulators. For this reason, it is roughly about two and a half times more difficult to obtain the same carrier suppression. This means that the balancing controls must be capable of being adjusted to fine limits and the modulators themselves must be inherently stable and not affected by changing h.t. or heater voltages, or be heat generating and have to reach a stable temperature. The obvious choice is germanium diodes, which are easily obtainable, less costly, require no power supply and, being low impedance devices, are less affected by changes in other parts of the circuit.

Audio Phase Shift

There are two generally used passive audio phase shift networks—the W2KUJ "S.S.B. Junior" type containing four resistors and four capacitors, and the Dome (R. B. Dome, W2WAM) containing six resistors and six capacitors. The simpler "S.S.B. Junior" network requires an asymmetrical input of 2.5 K ohms impedance with a precise amplitude ratio of 2:7, and an infinitely high output impedance. These requirements can be met with a standard 3:1 audio transformer to feed the input and by reducing the input loading of the post phasing amplifiers by running these valves as cathode followers. This has the additional advantage of eliminating the need for two non-standard ratio audio step down transformers to match the loading of the diode modulators.

The S.S.B. Junior network is simple to construct using Radio Spares 1 per cent, tolerance capacitors. The accuracy of an AVO Model 7 or Model 8 (or similar test meter) on the resistance range is sufficient for making up the required values from standard Erie Type 8 half watt resistors.

Sideband Suppression Failure

In a phasing exciter the sideband suppression is dependent on combining four components in the balanced modulator: two r.f. voltages with a 90° phase difference and two audio voltages, also with 90° phase difference. These four input voltages have not only to be maintained in the correct phase relationship *but have also to be balanced in amplitude*. This balance must hold correctly at all normal operating levels and throughout the audio frequency range required.

In general there is no difficulty with the r.f. phase shift network, as this operates on one fixed frequency and has an unvarying input from the carrier oscillator. The required 90° phase shift and amplitude balance can easily be obtained and, with the oscillator fed from a regulated h.t. source, should remain stable for a considerable period of time.

The audio requirements present an entirely different picture. Here the required phase shift and amplitude balance must hold good over the widely changing amplitude of a voice into the microphone. The 90° phase shift is taken care of by the audio network, and provided the two input voltages are "clean" and have a precise 180° phase difference the network will provide the required phase shift outputs within its design limitations. The coupling and by-pass capacitors in the audio voltage amplifier stages are chosen to give a "tailored" response, falling outside the required limits of 250-3,000 c/s.

It is important that the push-pull input into the phase shift network maintains the required amplitude relationship of 2:7 and 180° phase difference over the entire voice range. It is equally important that the phase shift and amplitude relationship determined by the network be maintained in the post phasing amplifiers. Any amplitude distortion here results in harmonic output that is not in the correct phase relationship to cancel out on the unwanted sideband. A high level of sideband suppression can only be obtained if the distortion products and the out of balance component is

* 5 Janice Drive, Fulwood, Preston, Lancashire.

† R.S.G.B. BULLETIN, September, October and November 1959.

kept to an extremely low figure, of the order of one per cent. The audio stages from the microphone to the balanced modulators are designed with this aim in view. Each stage is run with a considerable amount of negative current feedback. This gives the following advantages: (i) Greater stability, including constancy of characteristics with changes of valves or supply voltages; (ii) a reduction of harmonic and phase distortion; (iii) improved post phasing output balance.

In the writer's opinion much of the failure to obtain good sideband suppression with phasing exciters can be attributed, not to the r.f. or audio phase shift network, but to failure in the audio amplifier stages themselves. Finally, the designer's efforts will be immediately ruined and the available sideband suppression considerably degraded if any stage in the audio amplifier is overrun. The gain control must not be turned up in an effort to get increased drive. If this is required the extra amplification must be obtained in those stages of the main exciter after the modulator. With this unit in the G2DAF exciter, there is adequate gain available to overdrive the 6146 output valve with the audio input to the phasing section at a level well below the safety limit.

Circuit Description

Referring to the circuit shown in Fig. 1, a 12AU7 crystal oscillator and buffer (V4) feeds the r.f. phase shift network comprising the two tuned circuits L1 and L2, each with a low impedance secondary taking the two 90° phase difference r.f. outputs to the balanced OA70 diode modulators via the carrier balancing potentiometers VR3 and VR4. The coils L1 and L2 are mounted on the chassis with one inch spacing between their centres and this is sufficient to feed r.f. energy into L2 by mutual inductive coupling only. There is no direct connection other than the common h.t. feed and r.f. by-pass capacitor.

The crystal microphone audio input is amplified by V1,

an EF86 whose output feeds through the gain control VR1 into one half of V2a (12AU7). The audio signal is further amplified by V2b which has a 3:1 transformer as its anode load giving an impedance step down and a push-pull output into the audio phase shift network. The potentiometer VR2 is the audio phasing control and gives fine control of the required ratio. Muting bias is applied to the grid return of V2b to prevent audio feedback which would be caused by the microphone picking up the receiver output. The audio output for VOX operation (if this is required) is taken off the amplifier at a point before this muting bias.

V3 (another 12AU7) is used as two cathode followers feeding the phase shift outputs at low impedance into the diode modulators. The switch S1, S2 and S3 is a three bank single pole four way Yaxley unit arranged to give the following operating sequence: (i) Netting; (ii) Low Sideband; (iii) High Sideband; (iv) Amplitude or Phase Modulation. In position (i), one of the carrier balancing potentiometers is shorted to earth. This unbalances the modulator and allows sufficient carrier through to feed into the following stages at a level which will provide a netting signal. In position (iv), one audio input into V3 is open circuit and the output from the balanced modulators becomes double sideband.

The h.t. supply to the cathode followers (V3) must be well decoupled from the main h.t. line and must have a very low impedance. The $50\ \mu\text{F}$ capacitor from the anodes to earth should not therefore be reduced in value.

Any ripple on the h.t. supply line would have the effect of modulating the OA70 diode balanced modulators and would produce a carrier that could not be balanced out with the carrier balance controls VR3 and VR4. It is therefore recommended that the smoothing should be on the generous side and that a $50\ \mu\text{F}$ capacitor should be mounted near the audio section and connected across the 300 volt h.t. positive input as shown.

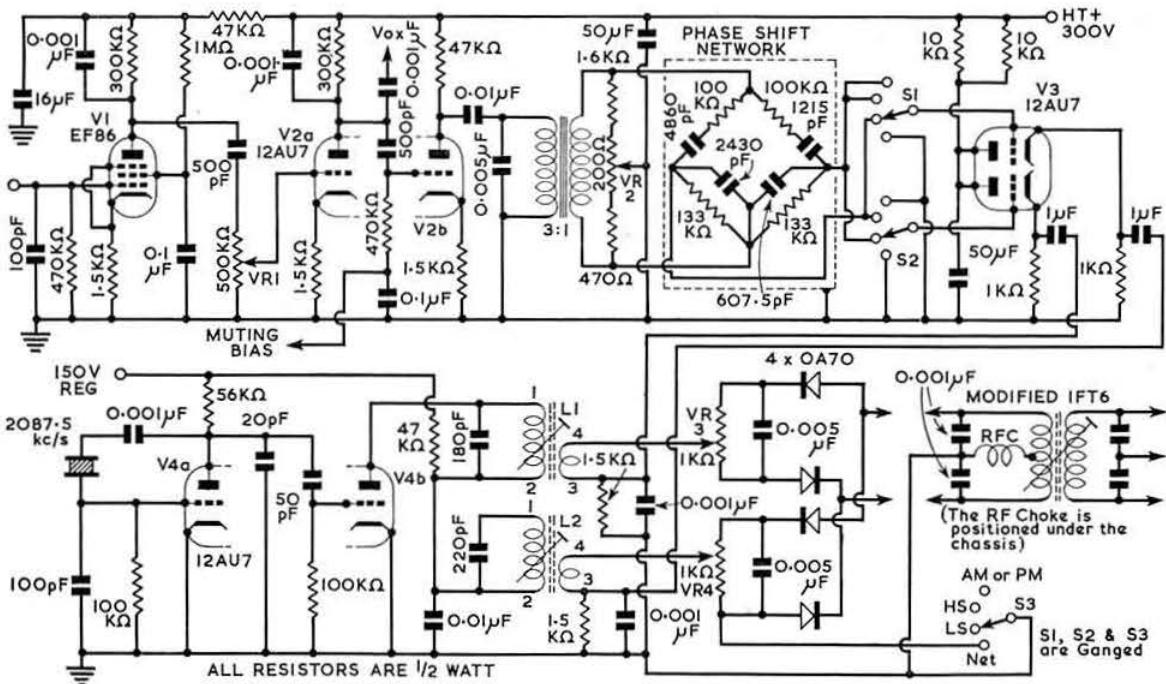


Fig. 1. Circuit diagram of the phasing type single sideband generator.

Construction

The unit is constructed to be interchangeable with the crystal filter sideband generator which it replaces. It is constructed on an aluminium sub-chassis 16 in. long, $5\frac{1}{2}$ in. wide and 2 in. deep. This is dropped into the main exciter and bolted into position. Component layout is shown in Fig. 2 and is quite straightforward, no underneath screening being necessary. The switch S1, S2 and S3 is mounted on a $2\frac{1}{2}$ in. by 2 in. bracket with a $\frac{1}{2}$ in. lip, supported by the sub-chassis side.

The carrier oscillator and buffer (V4) is positioned at the rear left hand side to keep r.f. as far away from the audio section as possible. L1 and L2 are mounted with a 1 in. spacing between centres. It is advisable to screen the audio phase shift components, the best method being to mount them in an i.f. transformer can.

Alignment

A phasing exciter cannot be satisfactorily aligned for effective sideband suppression without a selectable sideband receiver or an oscilloscope. While quite straightforward and simple in practice it is lengthy to put into words, and also is more easily followed with the aid of photographs of the expected oscilloscope traces. The procedure has been very fully and ably described by W0JSM and the constructor without experience is strongly recommended to refer to his article.[‡]

R.F. phasing is adjusted by first peaking L1 and L2 for maximum r.f. output. Correct phasing is then obtained by adjusting the resonance point of one coil slightly higher and the other coil slightly lower than the original setting—this is about quarter of a turn of the dust slug in each coil.

Carrier balance is obtained by adjusting VR3 and VR4 in turn until the best balance is obtained. (Make sure that the sideband selector switch is not in position (i).) The OA70

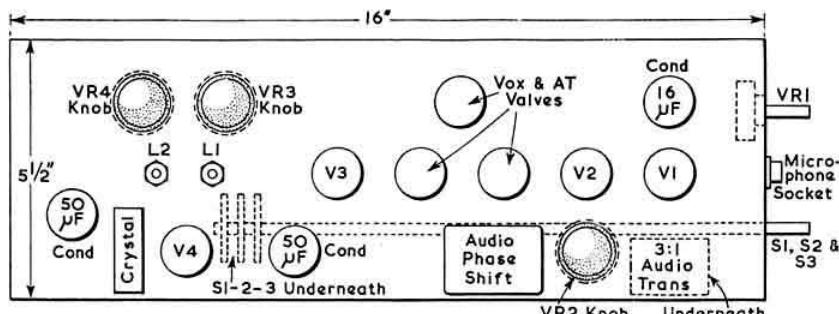


Fig. 2. Layout of the principal components. Note the separation of the r.f. (left) and audio (right) valves.

diodes obtained from stock have a very close tolerance, but it is advisable to check the forward resistance with an Avometer and select matched pairs before wiring into circuit. Heat from the soldering iron will damage these diodes so the wire ends should be left 1 in. long to allow for the use of a thermal shunt.

Audio phasing is adjusted by VR2.

Diode probe valve voltmeter readings are given in Table I.

Output Connections

The output from the diode modulators is connected into the existing 2075 kc/s transformer IFT6. This transformer is modified by removing the existing primary winding and resonating capacitors, and replacing it with 30 turns of

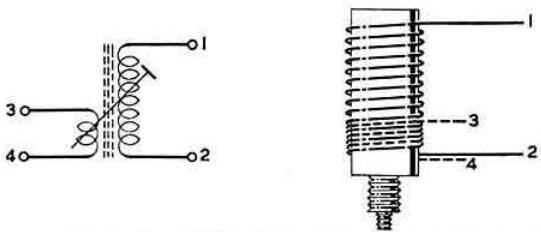


Fig. 3. Construction of L1 and L2. Primary—55 turns 24 s.w.g. enamelled wire; secondary—3 turns 24 s.w.g. enamelled wire overwound on cold end of primary (both windings in same direction). The former is $\frac{1}{2}$ in. diameter, $2\frac{1}{2}$ in. long with a $\frac{3}{8}$ in. diameter dust core (Marconi).

28 s.w.g. enamelled wire, centre tapped. To maintain balance this coil is bifilar wound by putting on 15 double turns—side by side—on the former and connecting the beginning of one winding to the end of the other winding to form the centre tap. The required resonating capacitors are two 1,000 pF mounted inside the transformer.

As the nearest type 10X crystal available was 2087.5 kc/s this was used and is perfectly satisfactory so far as the rest of the exciter is concerned.

Performance

The carrier suppression available is not less than 42db. On-the-air reports suggest it is better than this, and over a period of several weeks all reports have been 45db or more.

Sideband suppression (with a tone input of any frequency within the audio pass band) measured at the output terminal of the main exciter can be adjusted to between 40 and 45db down. It is appreciated that the suppression on voice may not be as good as that obtained with a single tone. Accordingly on-the-air reports—with the exciter driving an 813 linear amplifier in class AB1—have been obtained from those operators with selectable sideband receivers and able to give good figures.

Over a period, reports have been received from eight different 80m s.s.b. stations—in some cases the same station has reported several times. The transmitted sideband has been switched and reports asked for "both ways round." All reports have given a figure of 40db or more for the suppression of the unwanted sideband. Reports also indicate that the distortion products are low and that the suppressed sideband is readable.

From the viewpoint of the prospective constructor the maximum available sideband suppression will not be obtained if the accuracy of the components in the audio phase shift network differs from the correct value by more than 1 per cent. The writer is fortunate in having available a Marconi Universal Impedance Bridge for accurate resistance and capacitor measurement, and this was used for making up the network used in the prototype unit. Where a similar instrument is not available and the maximum possible suppression is required it is worth while obtaining 1 per cent tolerance high stability resistors. The capacitors are no problem, as 1 per cent tolerance Radio Spares types can be obtained from any radio dealer to make up the required values.

Conclusion

This unit was originally developed to be able to give a

[‡] "How to Adjust Phasing—Type S.S.B. Exciters" by Robert W. Hirlich, *Single Sideband for the Radio Amateur* (Second Edition).

TABLE I
Valve Voltmeter Check Voltages

R.F.	Anode V4b Slider VR3 and VR4	20.0 V.	
		1.0 V.	1.0 V.
AUDIO	Normal	Maximum	
	5.0 V.	36.0 V.	
	0.7 V. 0.2 V. 0.2 V. 0.2 V.	5.0 V. 1.4 V. 1.4 V. 1.4 V.	
	0.08 V. 0.08 V.	0.6 V. 0.6 V.	
S.S.B.	Balanced modulator output into primary of IFT6	0.1 V. 0.1 V.	0.3 V. 0.3 V.

All voltages R.M.S. values. Audio and s.s.b. readings taken with tone input into microphone socket. Maximum = input beyond which there is no further increase in s.s.b. output.

prospective constructor of the G2DAF S.S.B. Transmitter the choice of either filter or phasing as the method of sideband generation. It is simple to build, with straightforward construction and alignment, and will give a transmission of pleasing quality and acceptable sideband and carrier suppression. Its performance is such as to enable it to stand on its own feet—and appeal to the experienced sideband operator who demands a good level of sideband and carrier suppression, and has not yet tried the phasing method.

The long term stability is not yet known; but with allowance for possible changes in component values and valve characteristics it is felt that the sideband suppression should remain reasonably constant and not deteriorate below a value of 35db.

For the newcomer who desires to obtain experience on one or two bands before embarking on the construction of the complete G2DAF S.S.B. Transmitter, the 2087.5 kc/s output can be fed into a mixer and heterodyned with a v.f.o. giving 3 to 5 volts output and covering the tuning range 5.55 Mc/s to 6.15 Mc/s.

The mixer output—at 3.5 to 3.8 Mc/s; or else at 14 to 14.35 Mc/s—is taken to a class A amplifier and then to a driver stage to give either 80m or 20m band transmission.

Appendix

F1 = s.s.b. output on 2087.5 kc/s.

F2 = v.f.o. output.

Band	Mixing	V.F.O. Tuning
3.5 to 3.8 Mc/s	F2 — F1	5587.5 to 5887.5 kc/s
14 to 14.35 Mc/s	2F2 + F1	5956.25 to 6131.25 kc/s

The v.f.o. operates on the fundamental frequency throughout. (The mixer valve will supply the 2F2 component without any effort on the part of the constructor.)

Transmitter Ratings

FROM time to time members ask Headquarters how power input to a certain type of amateur transmitter is to be measured. Everyone is familiar with the method for A1 and A3 transmitters (p.a. anode voltage multiplied by the anode current in amps. gives the input power in watts) but other systems, particularly single sideband and grounded grid amplifiers present a somewhat different problem.

Single Sideband Transmitters

The Post Office states that: "The peak r.f. power output from an A3a transmitter shall not exceed that obtained from the A3 transmitter working at an overall efficiency of 66 per cent. The power shall be measured by the following process:

(i) Apply a pure sinusoidal tone to the transmitter and adjust the input to 150 watts d.c.; the deflection on a cathode-ray tube by the r.f. envelope shall be measured. (D.c. input power is the total d.c. input to the anode circuit of the valve(s) energizing the aerial.)

(ii) Replace the tone by speech; the maximum deflection on the cathode-ray tube showing the r.f. output caused by the peaks of speech shall not be greater than twice the previously measured deflection for the tone input."

Frequency Modulation

The Post Office states that: "The carrier frequency [of an f.m. signal] must be at least 10 kc/s within the limits of the frequency band in use and that the maximum deviation of carrier frequency shall not exceed 2.5 kc/s. The maximum effective modulating frequency shall be limited to 4 kc/s, and the audio frequency input to the frequency modulator at any frequency above 4 kc/s shall be not less than 26db below the maximum input at lower frequencies."

Although the Post Office does not state the maximum effective modulating frequency for other types of phone operation, it is good practice to restrict the bandwidth to 4 kc/s or less (a frequency response of 500 to 2500 c/s is generally considered adequate for communication purposes).

Earthed or Grounded Grid Power Amplifiers

In the opinion of the Society's Technical Committee, the

power input, effectively, to a grounded grid power amplifier stage should be reckoned as 10 per cent greater than the product of the anode voltage and anode current to that stage. One proviso is, however, that to prevent unreasonable driving power being used the power input to the driver stage should not exceed 50 per cent of the d.c. power input to the driven stage.

Pulse Modulation

The use of pulse modulation is permitted in the bands 2350-2400, 5700-5800 and 10,050-10,450 Mc/s, the systems specified being P1, P2d, P2e, P3d and P3e. These may be defined as follows:

- P1—Telegraphy without the use of a modulating audio frequency signal.
- P2d—Amplitude modulation of the pulse by audio frequencies for telegraphy.
- P2e—Width modulation of the pulse by audio frequencies for telegraphy.
- P3d—Amplitude modulation of the pulse by audio frequencies for telephony.
- P3e—Width modulation of the pulse by audio frequencies for telephony.

The maximum mean d.c. power input is 25 watts and 2.5 kW peak input power at the crest of the pulse. The limit of 2.5 kW peak d.c. input implies a maximum peak-to-mean ratio of 100 : 1, or a 1 per cent duty ratio.

The duty ratio is defined as the ratio between pulse duration and pulse repetition period. For example, if the pulse duration is t and the interval between the beginning of one pulse and the beginning of the next is T , then t/T is the duty ratio.

It is essential for a station employing pulse modulation to have a suitable cathode-ray oscilloscope in order to set up the transmitter. To display the envelope of the r.f. pulse, some of the r.f. output should be applied to the Y plates of the tube, the X plates being operated from the time base which should be locked at a sub-multiple of the repetition frequency.

A Simple T.R.F. Receiver using Miniature Valves

By G. D. ROE (G3NGS)*

FOR a considerable time there has been a need for a simple receiver which makes use of modern miniature valves and components. It is the purpose of this article to describe the construction of such a set designed by C. H. L. Edwards (G8TL) as a further step from his well-known "Three-in-One" circuit. The prototype was constructed by the writer and two other members on the Society's stand during the 1959 National Radio and Television Show where it aroused great interest amongst visitors looking for a straightforward design for the newcomer.

The circuit uses three valves: two triodes and one variable mu pentode, the triodes being contained in a single envelope. The pentode acts as an r.f. amplifier, the first triode as a detector and the second as an audio amplifier with both high and low impedance outputs.

The Circuit

The complete circuit of the receiver is shown in Fig. 1. The signal picked up by the aerial is transformer-coupled to the first tuned circuit consisting of the secondary of L1 and the tuning capacitor (or condenser) C1 and applied to the control grid of V1, the r.f. amplifier valve. After amplification the signal is fed via the untuned primary of L2 and its associated tuned secondary to the coupling capacitor C7 and so to the grid of the detector V2a. It will be observed that a third winding (connections 3 and 4) is included in the L2 assembly and wired from the anode of V3a via the variable capacitor C6 to earth. This third winding is closely coupled to the grid coil (connections 5 and 2) to provide regeneration or reaction. Regeneration increases the sensitivity of V2a as a detector and if increased far enough causes the valve to oscillate. The amount of regeneration or reaction is controlled by the variable capacitor C6. For phone work, it is best to set the control just below the point where oscillation begins but for the

A rear view of the receiver. The various components may be identified by reference to Fig. 2(b).

reception of c.w. (telegraphy) signals C6 should be advanced to the point where V2a just begins to oscillate. This point will be marked by a faint "rushing" sound in the headphones or loudspeaker. No advantage will be gained by increasing the amount of regeneration beyond this point. R6 prevents r.f. energy present at the anode of V2a feeding into the audio amplifier.

The audio signal from the detector is built up across the load resistor R5 and fed via C9 to the volume (or gain)

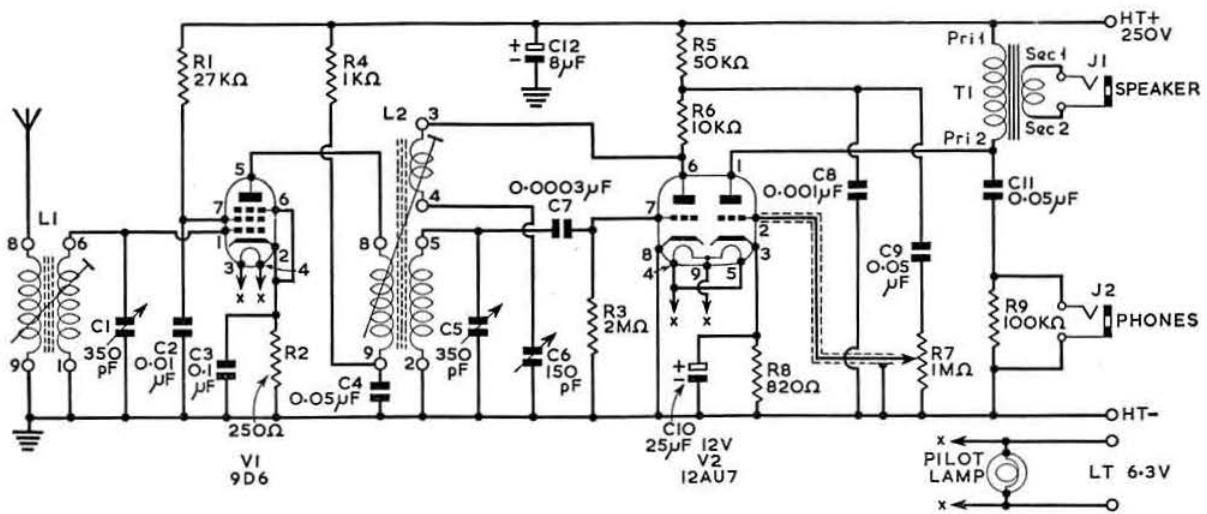
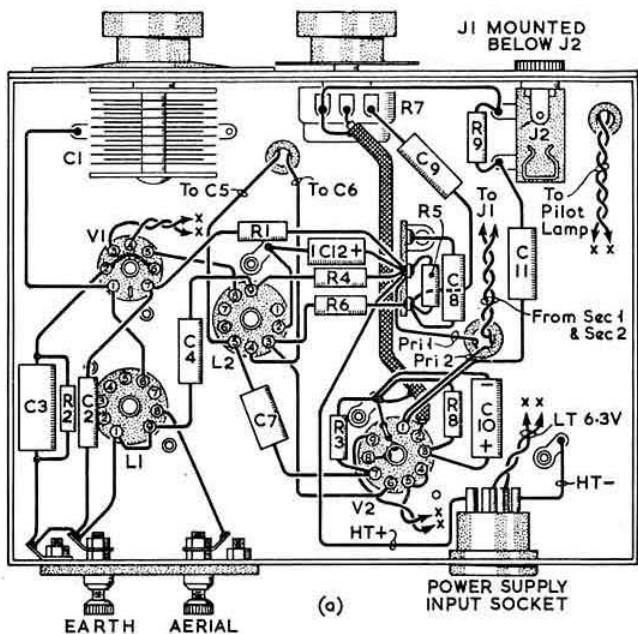
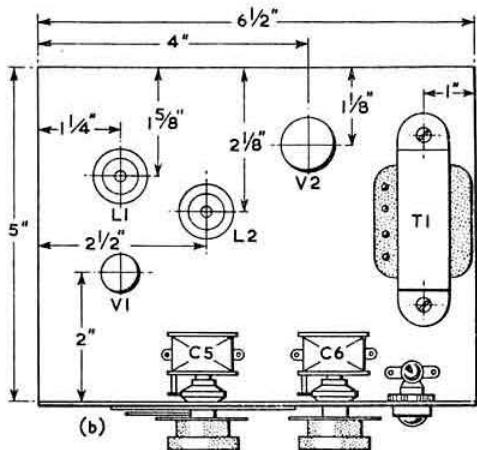


Fig. 1. Circuit diagram of the simple receiver using miniature valves described by G3NGS.

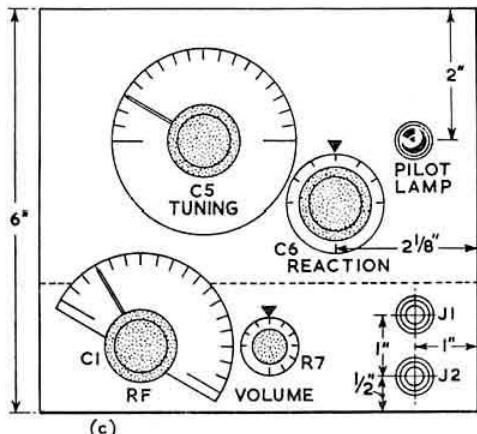


(a)

EARTH AERIAL

POWER SUPPLY
INPUT SOCKET

(b)



(c)

Fig. 2(a). Under-chassis layout of the components showing the point-to-point wiring. (b). Placement of the components on top of the chassis. (c). Arrangement of the controls in the front panel.

the necessary match for a low impedance (3 ohms) voice coil. The use of headphones is made possible by feeding the audio signal through C11 to the jack socket J2.

Construction

The complete receiver, with the exception of the power supply, can be built on an aluminium chassis measuring 6 1/2 in. x 5 in. x 2 in. fitted with a front panel 6 in. high, though the dimensions are by no means critical.

Supplies to the valve heaters should be connected with twisted heavy gauge wire to reduce hum and potential drop. One side of the heater line may be earthed at the power input socket or, if hum is prevalent, a "humdinger" should be fitted. This consists of a low-value potentiometer (about 50 ohms) with the outer two contacts connected across the heater line and the centre contact (slider) earthed. The slider should be moved around the centre of its travel until a minimum of hum is found. The potentiometer should then be left at this setting.

Component layout is not critical so long as interstage wiring is short and direct. The radio frequency amplifier (V1 and its associated components) should be well screened from the following stages to lessen the chance of feedback. For the same reason C1 should be mounted sub-chassis

(Continued on page 354).

LIST OF COMPONENTS

C1, 5	350 pF air-spaced variable capacitor (Jackson Bros. (London) Ltd., U-type miniature)
C2	0.01 μ F 350 volt working capacitor (Dubilier)
C3	0.1 μ F 200 volt working capacitor (Dubilier)
C4, 9, 11	0.05 μ F 350 volt working capacitor (Dubilier)
C6	160 pF air-spaced variable capacitor (Jackson Bros. (London) Ltd.)
C7	0.0003 μ F silver mica capacitor (Dubilier)
C8	0.001 μ F 350 volt working capacitor (Dubilier)
C10	25 μ F 12 volt electrolytic capacitor (Dubilier)
C12	8 μ F 350 volt electrolytic capacitor (Dubilier)
L1	Maxi-Q miniature coil (blue) for range desired (Denco (Clacton) Ltd.)
L2	Maxi-Q miniature coil (green) for range desired (Denco (Clacton) Ltd.)
R1	27 K ohms $\frac{1}{2}$ watt (Dubilier)
R2	250 ohms $\frac{1}{2}$ watt (Dubilier)
R3	2 Megohms $\frac{1}{2}$ watt (Dubilier)
R4	1 K ohm $\frac{1}{2}$ watt (Dubilier)
R5	50 K ohms $\frac{1}{2}$ watt (Dubilier)
R6	10 K ohms $\frac{1}{2}$ watt (Dubilier)
R7	1 Megohm potentiometer with switch (Dubilier)
R8	820 ohms 1 watt (Dubilier)
R9	100 K ohms $\frac{1}{2}$ watt (Dubilier)

Miscellaneous

T1	output transformer for speaker
2	Noval valve bases for coils (McMurdo XM9/UC1)
1	dial lamp (Bulgin D170 or similar)
2	phone jacks (Bulgin type J2)
1	9D6 valve (Brimar)
1	12AU7 valve (Brimar)
2	terminals (aerial and earth) (Bulgin)
2	knobs with skirts (Bulgin K401 and K405)
2	knobs (Bulgin K400 and K410)
1	six-way connector (Bulgin P149)
6	solder tags (Bulgin T17)
1	Noval valve base for V2 with screening can (McMurdo XM9/UC1)
1	B7G valve base for V1 with screening can (McMurdo XM7/UC1)
2	slow motion epicyclic 6 : 1 drives for C5 and C6 (Jackson Cat. No. 4511)

Diagnosis of TVI

A System of Locating the Causes of Interference

By R. H. HAMMANS (G2IG)*

This article, originally published in the June 1956 issue of the BULLETIN, will not tell you how to cure television interference but it does describe a deductive system of investigation which will help to find the cause of TVI in any particular case. Once that has been done, well-known principles which have been described in these pages many times in the past may be applied. The author is Chief Engineer of Granada TV Network Ltd. and a Past President of the Society.

BEFORE TVI can be cured, an intelligent system of tracing and diagnosis by means of available evidence is highly desirable. In this article it is intended to systematize the complex business of ascertaining the cause rather than to offer means of effecting a cure.

This conception of tracking down interference to its final elimination is based on a series of "go" or "no go" trials, leading, according to the results, down a chain of observations and tests which will provide an answer which should be conclusive. A chart or "tree" is given for rapid reference and to show more clearly than the text the logical sequence of the method.

Type of Interference

There are three categories of television interference caused by amateur transmitters:

- Harmonic or spurious radiation from the transmitter and/or its aerial system.
- Response by the television receiver to signals outside its design pass-band.
- The generation of harmonics in non-linear elements in the vicinity of the transmitter which re-radiate and enter the receiver in the same manner as if they were radiated from the transmitting aerial.

Cases in category (a) must obviously be treated at the transmitter and the amateur cannot escape responsibility. Those in category (b) can only be cured at the receiver and in general the G.P.O. is sympathetic towards the principle that the amateur is not to blame. In category (c) neither the transmitting amateur nor the receiver owner is to blame except in so far that either the amateur or the receiver owner may have somewhere about his property metalwork which, due to corrosion or other form of bad contact, is producing the trouble. A corroded receiving aerial of course comes into category (c) and the owner has the cure in his own province.

Category (a) Causes which must be dealt with at the Amateur Transmitting Station

The system to be adopted in this case is as follows:

- Connect the transmitter to a dummy load. Operate the transmitter in all other respects in the same manner as that used when interference is known to be caused.

* "Shirley," 72 Bramhall Park Road, Bramhall, Cheshire.

Possible Results:

- Interference no longer caused.
- No change in interference.
- Appreciable reduction of interference.

If the results are as in (i) then it is clear that all the trouble is brought about by the signal radiated from the transmitting aerial. It may, therefore, be due to harmonic radiation, to receiver defects in category (b) or to effects in category (c).

If the results are as in (ii) there is strong evidence of harmonic radiation from the early or final stages of the transmitter and well-known methods of cure, such as screening, filtering of leads, etc., should be applied. It is unlikely that the receiver is to blame or that non-linear elements are involved since there should be no swamping signal, as would be the case if the transmitting aerial, instead of the dummy, were in use.

If the results are as in (iii) there is every likelihood of a combination of harmonic radiation from the transmitter itself as in (ii) plus further interference falling into categories (a), (b) and (c). The procedure, therefore, is to work on the transmitter screening and filtering, etc., until interference is eliminated on dummy load.

- When all interference on dummy load has been cured, the following test should be carried out. Reconnect the aerial to the transmitter through a low-pass filter of good or known performance.

Possible Results:

- Interference no longer caused.
- No change in interference.
- Appreciable reduction of interference.

If the results are as in (i) this is the end of this particular branch of investigation and the case is closed. However, if the results are as in (ii) there is strong evidence that the transmitter was blameless even without the low-pass filter and that the case falls into either category (b) or category (c) or both.

If the results are as in (iii) the transmitting station with the low-pass filter in circuit is probably now blameless and the remaining interference is due to causes in categories (b) or (c) or both. It is, of course, necessary to make sure the low-pass filter is really effective before these assumptions can be true.

At this stage of the investigation the transmitting station and, therefore, category (a) have been eliminated and only categories (b) and (c) remain.

Category (b). Causes which must be dealt with at the Receiving Station

- The system to be adopted in this case is as follows:

Disconnect the receiver aerial and turn up the brilliance control until the raster is just visible. Modulate the transmitter by speech or keying and check whether interference persists.

Possible Results:

- No interference visible.
- Significant interference still present.

If the results are as in (i) then the interference is coming

in via the aerial and the frequency of the interfering signal should be checked. This is best done by means of a tuned trap or traps which will cover the fundamental and appropriate harmonic frequencies of the amateur signal (see section 4 following). If the results are as in (ii), then at least some interference is entering the receiver via the mains connection or is being picked up on the i.f. wiring in the receiver. Apart from putting r.f. chokes in the mains lead and trying elementary screening around obviously vulnerable i.f. circuitry there is not much that can be done by anyone but the set manufacturer.

4. Reverting to section 3 (i)—the case where on removal of the receiver aerial no trace of interference is to be seen when the transmitter is keyed—the following tests should be carried out.

Insert a parallel tuned circuit, resonant at the transmitter output frequency, in series with the inner conductor of the receiver co-axial feeder. For 14 Mc/s the tuned circuit should preferably cover at least a 3 : 1 frequency band so that at one sweep of the tuning condenser both transmitter fundamental and third harmonic can be rejected. For lower frequency bands the tuned circuit need only resonate at the transmitter output frequency but a second tuned circuit should be available to cover the television band.

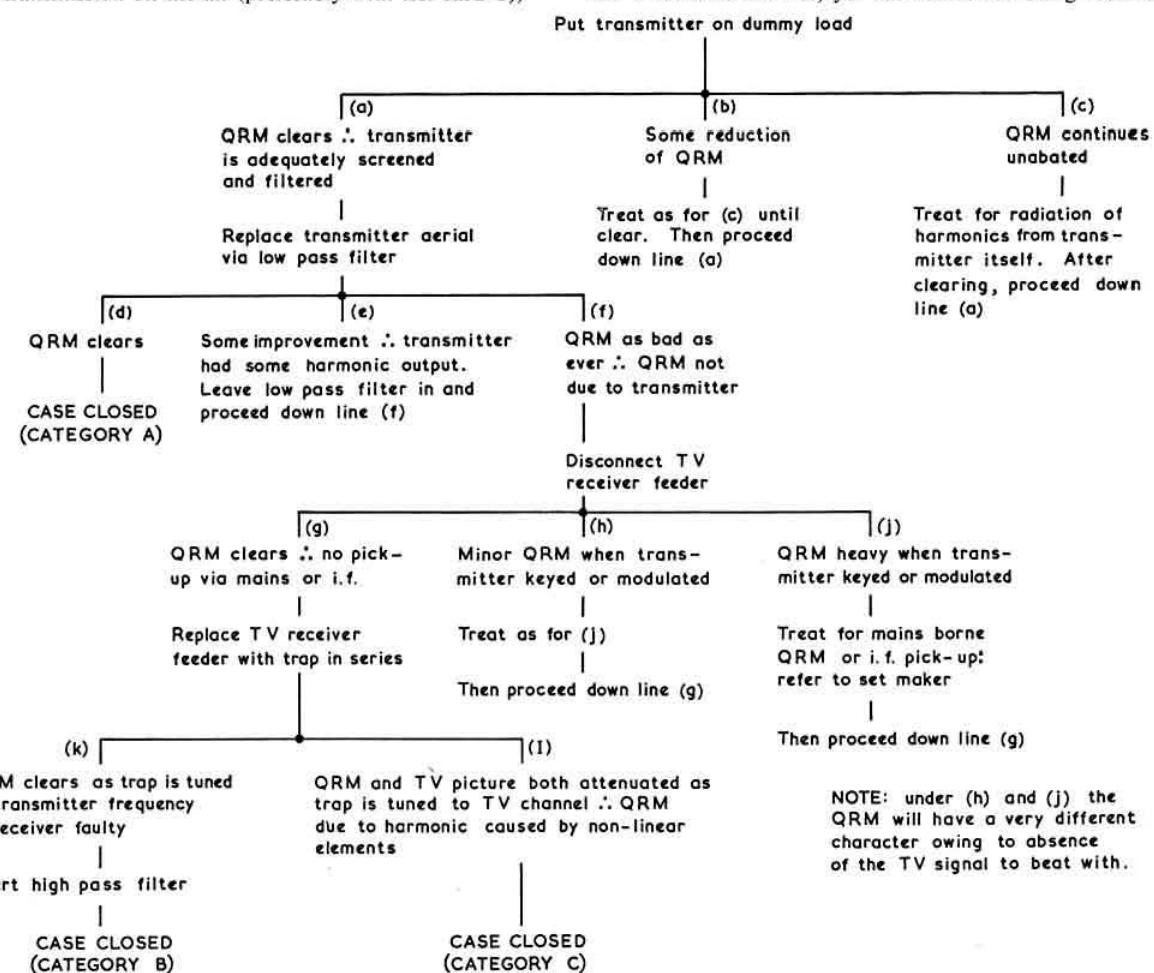
With the transmitter keyed or modulated, and the television transmission on the air (preferably with test card C),

rotate the trap condenser in the vicinity of the known resonance point for the transmitter frequency as determined with a grid dip meter.

(i) If a substantial reduction in interference is observed, then the trouble is either swamping (cross modulation) or i.f. break-through or image response. Which it is can usually be deduced from a knowledge of the receiver circuit but it is of academic interest only since the receiver is at fault anyway.

When it is found that a trap resonant at the transmitter output frequency is effective in reducing interference, a properly designed high-pass filter of known performance should be inserted in the receiver feeder. Any remaining interference is probably due to causes in Category (c).

(ii) If no appreciable reduction is observed on tuning the trap to the transmitter output frequency, the evidence is that the receiver is not at fault. Retune the trap—or insert a second trap—to the television channel. Clearly, if the trap is operating effectively, it will seriously attenuate the picture. If the interference is due to a transmitter emission (such as a harmonic or spurious signal) or to a Category (c) source, then the trap will attenuate the interference to the same extent as the picture. In earlier tests it has already been established that there is no transmitter output in the television band. Therefore, we have the case of a harmonic-free transmitter and a faultless receiver, yet harmonics are being received.



The chart devised by G2IG for the rapid diagnosis of television interference.

From this it may be deduced that the cause is in Category (c) and sheer dogged searching or inspired deduction are needed to find it and attempt a cure.

Category (c). Harmonics caused by Non-linear Elements

The process by which non-linear elements cause harmonic radiation is akin to that on which metal rectifiers and semiconductor rectifiers rely for their operation. Generally, any substantial lengths or areas of metal which make partial contact with one another will, by virtue of the existence of oxides and other substances due to tarnishing, behave like an aerial system having a detector at the centre or somewhere along its length. The metal will pick up large currents due to the strong r.f. field in the locality of the transmitter and these currents flowing through the rectifier will be of greater magnitude in one half-cycle than in the other. Thus a sine wave containing no harmonics will be converted into a wave of the same frequency but having an unpredictable and sometimes serious harmonic content. The metalwork, by the theory of reciprocity, re-radiates the original signal plus the harmonics it has itself generated.

The commonest causes are rusty joints in domestic plumbing such as gutters, drain pipes, gas pipes and electrical wiring conduit. Indeed, the phenomenon has been called for many years the "drain pipe effect" or "rusty bolt effect"—the latter, particularly in sea-going installations where an earth bolt has rusted, giving rise to the conditions described. More often than not the efficiency of the rectifier in the corroded joint is very poor and the proportion of harmonic re-radiated to the amount of the fundamental re-radiated is very low, but it must be realized that a field strength of many volts per metre at the fundamental is common in the immediate vicinity of the transmitting station, and a re-radiated harmonic field of 1/1,000,000 compared with the fundamental may be sufficient to cause TVI. Occasionally, however, the nature and condition of a rusty joint may be such as to rectify quite efficiently, with the result that any modulation of the transmitter may become audible at the joint! At the writer's station, for example, a gutter pipe 20ft. high and having a loose-fitting joint about 5ft. from the ground was found to be emitting an audible tone when the transmitter was being modulated for test purposes. On disturbing the joint by vigorously shaking the pipe, the sound output vanished but there was still a varying degree of harmonic radiation (as detected on a harmonic indicator) as the pipe was moved about.

Some of the most obscure causes, which are at the same time most difficult to cure, are rusty conduit pipes embedded in the plaster of walls. The only hope of tracing these is by means of a sensitive harmonic indicator, preferably in the form of a portable two r.f. stage battery-operated receiver working at the harmonic frequency and having a tuned loop aerial. The transmitter should be modulated and operated at full power while the portable receiver is taken around the neighbourhood exploring for the points of origin and maximum harmonic indication. The tuned loop aerial will be found quite directional enough to pin-point even hidden conductors in walls and under floors.

After the source has been located it may be an altogether more difficult problem to eliminate the generation of harmonics. In the writer's house there were probably a dozen different instances of this effect, all of which were embedded in the plaster or underneath tongued-and-grooved flooring boards. One of the most disheartening things about this particular trouble is that houses immediately either side may also contain rusty connections which in most cases cannot be dealt with.

Further Aids to Diagnosis

One of the commonest forms of TVI is the diagonal "cross hatch" pattern formed on the picture. By observing

and measuring the horizontal spacing of the light and dark bars it is possible to deduce the interfering frequency. For example, suppose the horizontal pitch of the pattern so formed is 0.25in. on a screen 10in. wide; then there will obviously be 40 complete cycles of the interference "beat" (or heterodyne) occurring in the 80 microseconds of active line duration of the television picture. If 40 cycles take 80 microseconds, then 1 cycle takes 2 microseconds and the frequency is 0.5 Mc/s. Similarly, a heterodyne of 2 Mc/s would be represented by a horizontal pitch of one-quarter of 0.25in., i.e., 1/16in.

If the transmitter is on a frequency of, say, 14.333 Mc/s its third harmonic will be exactly 43 Mc/s, and this harmonic will beat with the vision carrier of the London B.B.C. station on 45 Mc/s to produce a heterodyne of 2 Mc/s. Thus, if the interference is due to the third harmonic, a 1/16in. horizontal pitch pattern will be produced on a 10in. wide screen (or, of course, 3/32in. on a 15in. screen).

Changing the transmitter frequency to exactly 14 Mc/s will produce a 3 Mc/s heterodyne and the pitch should reduce in width to two-thirds of the previous measurement.

The pattern will not usually be stationary because the television waveform is locked to the a.c. mains which are not highly stable in r.f. terms. However, a quick inspection along one line of the raster will enable a fairly accurate pitch measurement to be made even if the pattern is moving quite rapidly. Any pattern having a pitch detectably larger than 1/16in. on a 10in. wide picture (in the case of 14 Mc/s and Channel 1, for example) is indicative of a lower frequency heterodyne than 2 Mc/s. Such should be impossible if the trouble is really third harmonic since the transmitter would have to operate outside the high frequency end of the 14 Mc/s to produce any heterodyne appreciably lower than 2 Mc/s.

On the other hand, if the trouble is due to i.f. breakthrough or image response in the receiver, heterodynes of this order can be caused. Furthermore, due to "inversion" produced by the mixing process in the receiver, it is possible to increase the pattern pitch instead of reducing it when the transmitter is changed from 14.333 Mc/s to 14 Mc/s.

Simple T.R.F. Receiver

(continued from page 351)

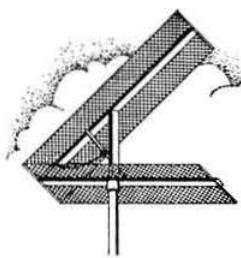
and C5 above chassis level. The only other components above the chassis are the speaker transformer T1 and the reaction control C6. Miniature slow-motion drives should be fitted to C5 and C6 to ease the tuning in of weak signals.

Fig. 2(a) shows the underchassis layout and provides a point-to-point wiring diagram. The placement of parts above chassis is shown in Fig. 2(b) and the front panel layout in Fig. 2(c). The power requirements of the receiver are very small and a power pack giving 6.3 volts at 1 amp and 250 volts at 30 milliamps will be found to be quite adequate. The live side of the mains may be brought into the set via the six-pin plug, taken through the switch on the volume control (R7), and taken out again to the primary of the mains transformer.

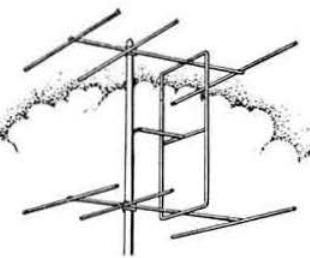
Before switching on, it is a good practice to check for any short across the h.t. terminals as this can cause serious damage to the power pack. If, on switching on, R5 and R6 heat up, check that C6 is not bent or shorted with metal filings. If the set does not function after ample time for warming up, check that the coils have the same number and are inserted correctly.

After mastering the controls any user of this set will be pleased with its performance on all bands down to 20m (14 Mc/s) provided, of course, that a good aerial is available.

A list of components is shown in the accompanying table together with the names of manufacturers of suitable items. There is, however, no reason why electrically equivalent parts of other makes should not be used.



FOUR METRES AND DOWN



Help for Newcomers to V.H.F.

By F. G. LAMBETH (G2AIW)*

THE various opinions which have been expressed lately about occupancy and activity on the v.h.f. bands leads one inevitably to question why some very active operators on the lower frequencies rarely seem to migrate to say, 2m, even when the state of their usual bands leave them sometimes in despair. Possibly the reason is that some of them are chary about the technical ability required to produce efficient equipment. This, however, need not be a deterrent, especially so far as 2m is concerned, for here we have not yet arrived at the region of radio "plumbing" and conventional methods can be used for both transmitting and receiving apparatus. In this connection some of the technically minded v.h.f. men may care to help the potential newcomers by producing some reasonably simple "sure-fire" designs which can be built without too much trouble.

There has tended to be a somewhat snobbish attitude on the part of some of the better known operators towards simple gear, and those who use it, but there is no doubt that it can be made to work, and work well. All right then, let's get help for the hoped-for migration from the lower frequencies and try to smooth the constructional path a little. Experience of the relative quiet of the v.h.f. bands after the noisy maelstrom of the Top Band for example will certainly ensure that anyone who gets on 2m will use the band regularly but they must first be convinced that the equipment is not all that difficult to build and operate.

Seventy Centimetre News

The reports indicate that conditions during the past month were probably quite poor for a large part of the period, but even so, some bright spots were noted. The strangest one is that from G3NIV (Herne Hill, S.E.24), who was heard by OZ7BZ on 434.5 Mc/s on January 11. The reception was reported by OZ7BZ on 14 Mc/s. Using a transmitter designed by himself (details of which are available to interested amateurs) G3NIV received a report of 599 using a 2m 5-element beam directed east. G3NIV is awaiting results of a sked with G3FP (Thornton Heath) before the general effectiveness can be demonstrated.

G2XV (Cambridge) has spent a lot of time "hotting up" the converter, and had QSOs with G5UM, G3KEQ and G3LTF; the latter has been putting in a really splendid signal to Cambridge. G2XV notes only two entries for the National 420 Mc/s Contest in September which he says, only goes to prove his contention that it is ridiculous to run two (and in this case three) v.h.f./u.h.f. contests during the same period. Please, continues G2XV, cannot these contests be separated so that those interested in both 70cm and 2m can enter both contests if they wish? (The purpose of these "national" events is to encourage three band operation during the European V.H.F. Contest.—EDITOR.)

G3HAZ still finds relatively plenty of activity in the Midlands; G3IOO is on again (listening only, transmission to follow). G3KQJ/T in Wolverhampton has been worked

as well as G3MYD/T at Langley. G2CIW said that a recent Sunday morning venture on 70cm netted him six QSOs before he closed down for lunch.

Two Metre News

G3BGL (Woolhampton, Reading) sent an interesting report on the activity night of December 28 when, during a longer operating period than usually possible for him, stations as far as Rustington (Sussex), Danbury (Essex) and Bristol were worked or heard. Stations were also heard from the Derby direction and several other stations called G3BGL during the evening but were not identified. The log shows a fair amount of activity, although not very DX!

G3BGL would like to see more records of the success (i.e. as a percentage of number of attempts) of G-DX and E-DX skeds—a lot of scientifically valuable and interesting data appear to be lost by the non-publication of what, to the operators, may appear only routine—for instance why not count any QSO with readability 4/5 as a "success" and invite information from anyone who has attempted a sked more than 20 times to get a percentage figure representative of conditions. (We certainly can do with a lot more news of the many skeds which are currently in operation.)

Referring to G3LTF's winter contest suggestion, G3BGL asks whether there could not be some type of contest which is not of the "rubber stamp" variety, e.g. in which each QSO must last a minimum of say five or ten minutes once it has started? Scoring should not be discriminatory as between local and DX, but might be biased to promote activity—a bonus for a QSO resulting from a "CQ" (after a period of listening around) or a bonus for a QSO resulting from calling another station which has just signed off a QSO would perhaps be novel points. Please let us have your comments on these ideas.

G2RY (Bridport) found the period one of rather poor conditions. G2NY had not been heard (up to January 16) since November 24. G3JGJ and GC2FZC have also been

SCOTTISH V.H.F. CONVENTION

Braboch Hotel, Renfrew Road, Paisley

(5 minutes from Renfrew Airport)

MARCH 12, 1960

2 p.m. to 11 p.m.

Lectures — Exhibition — Tea — Dinner
Visits to Local Amateurs

Tickets, including tea and six-course dinner, may be obtained, price 21/- each, from W. C. Bradford, GM3DIQ, 6 Langside Park, Kilbarchan, Renfrewshire. Those requiring hotel accommodation should inform GM3DIQ immediately. Council will be represented by G. M. C. Stone, G3FZL.

* V.H.F. Manager, 21 Bridge Way, Whitton, Twickenham, Middlesex.

missing for a long time, but G5MA has been heard on Monday evenings at good strength but with some fading. Most of G2RY's activity has been with G3AS/M who now works v.h.f. from his home QTH as well as while mobile. G2JM is always a reliable signal but for some reason does not hear G2RY.

G2JF (Ashford, Kent) introduces G3NRO who is a recent arrival at Ashford and hopes to be using high power on 2m soon. **G3EMU** (Canterbury) is on the band almost daily, but is not hearing many stations.

G5DW (Ashcott) reports that January 5 promised some interest in the G2NY sked, as signals both ways developed a hollow ring, but G5DW detected no further development, in spite of being on and off the band until 23.00 G.M.T. January 6 was very good and G2NY was strong and exceptionally stable with no fading at all. Later that evening signals from Manchester and the north were also good. G5DW listened to a group having a local rag-chew and apparently using v.f.o. or net frequency crystals, as all were audible on the same channel. Only one call was noted (G3HYH) but there was no fading. G3AYC (London) was heard calling CQ with G5DW's beam north but no QSO was made; indeed, despite about a dozen CQ calls on the key, no contacts were made. Since January 12, conditions have been poor indeed.

G2HCJ (Warrington) has continued the usual mobile contacts with G3IWJ mainly around 17.30 G.M.T. in the Merseyside area. The transmitter now runs 25 watts a.m. to a folded dipole, and contacts from built-up Manchester to built-up Liverpool are quite practicable. G2HCJ would be very pleased to hear of anyone who has transistorized a TNS noise limiter. G2HCJ suggests a calling frequency around 145 Mc/s on a "surplus" crystal spot. Such a frequency could also be used for possible auroral warnings. Any comments? The first general meeting of the North Western V.H.F. Group was well attended and it certainly looks as though the group will be a success, as there is already more activity on Merseyside.

Apropos the calling frequency mentioned by G2HCJ it is learnt from *Old Man* that Swiss amateurs are using 145.95 Mc/s. Each station has effectively two frequencies, the calling one and the working frequency which is resumed as soon as contact is made.

G3LRP (Wakefield) is very active on 2m with an input around 16 watts to an 832. The site is screened to the south by a small hill a little higher than the aerial, which is a 6-over-6 slot at 34 ft. The DX so far stands at nine counties worked, 11 heard.

G3HAZ (Birmingham) finds it rather quiet, although new stations keep appearing on 2m (mostly fugitives from 160m—cheers!); there are also quite a lot of new calls among them. The only time the band seemed lively was on January 3 when stations in the south-east came up. G3HAZ thinks that G3HBW deserves some small reward for his midnight (and other types) of oil burning, leading to the meteor scatter QSO with OE1WJ.

GM2FHH (our only Scottish reporter this month) says he has been hunting DX on 20m as he hasn't heard a signal on 2m for about a month!

SM6PU did well during the auroral opening on December 5, 1959, and worked OH1NL, DL6QS, DLIRX, DL3YBA and DL9ARA. In addition he heard DL3XJ(?) DJ4NGA, DL0IK, DL0HH, LA9T, LA4RD, OZ7BR, OZ5MK, SM1BSA, SM3AKW, SM5UU, SM5AMW, SM6ANR, SM6NQ and an unidentified television station on 145.26 Mc/s. Very strong auroral signals were also observed on 50.65 Mc/s and 88.100 Mc/s. The aurora began at 12.57 G.M.T. and faded out at 22.00 G.M.T.

G5MR (Hythe, Kent) reports that his station is getting back to normal after the gale damage and that his 2m 4-over-4 slot has been repaired and re-erected. Skeds have been maintained on this band with F8GH. On January 7,

F8BO (Amiens) operated by the owner's son, was worked for the first time; they are looking for more G contacts (frequency approximately 144.580 Mc/s.). During the next dry spell G5MR hopes to re-erect his 4m Yagi and to try out a new 7-over-7 435 Mc/s slot (F8GH type). The skeds with F8GH will then probably revert to those two bands. Referring to the 144 Mc/s Contest on January 31 G5MR says that although he is strongly in favour of c.w. contests it is disappointing to see that the "easy way out" scoring system is to be used. G5MR thinks we must be about the only country in Europe to take no account of distance in v.h.f. contest scoring.

Two Metre News from Wales

GW3MFY (Bridgend) heard some good 2m signals during the period January 13/18. G3LTF, on sked, peaked S9 on several occasions. Listening after this sked (at about 23.20 G.M.T.) no other DX has been heard calling GW3MFY, which would seem to indicate that stations in the east are not aware of the possibilities. The night of January 18 was an exception. G3KEQ called and a solid QSO resulted, followed by another with G5DF. Three contacts at that distance in under one hour is quite a welcome surprise at this time of year! The other good spell was January 4/5, when G3GB0 (back from overseas) was worked for the first time. G3LAR, G6OX and several weak ones were also heard. QSOs with UR2BU on 10m brought the interesting news that he worked Finland via the aurora on December 5, 1959, with five watts, which is the power limit in Estonia for 2m. UR2BU hopes to get a special permit for higher power.

Two Metre News from France

As from February 1, French stations have been using a new 2m plan.

France is surrounded by a hexagon of which one corner is in the north, and the opposite in the south. This hexagon is divided into six triangles of 60°.

On Monday of each week, from 20.00-21.00 G.M.T., stations in the east will turn their aerials in the direction of the rest of France, and all other stations will call this area. From 21.00-22.00 G.M.T. all French stations will look east for DL, HB, OE, OK and I signals. It is hoped that stations in those countries will listen for French stations. On Tuesdays a similar scheme will be used for the north-east triangle.

On Wednesdays it will be the turn of the north-west triangle. At the same time, French stations will be on the look-out for G, GC, GD, GI, GM, GW, and EI signals.

The western triangle will be dealt with on Thursdays; the south-western triangle on Fridays and the south-east triangle on Saturdays.

Worked and Heard on V.H.F.

Two Metres

G3BGL (Woolhampton, Reading) December 28, 1959. Worked: G3ASU, 3BLP, 3GDI, 3HBW, 3MDM/M, 3MNR, 3NWG, 5HZ, 6SC, 6OU. Heard: G2MV, 3BLP, 3CHW, 3HBW, 3IPR, 3KHA, 3KND, 3LSP/A, 3LTP, 4PS.

G3HAZ (Birmingham) December 25, 1959-January 18, 1960. Worked and Heard: G2HJD, 3IFA, 3JAY, 3JDM, 3LKK, 3MVT, 3MZP, 3NBQ, 3NXV.

Seventy Centimetres

G5UM (near Knebworth). First four Saturdays of January during the 7-8 p.m. activity sessions.

Worked: G2XV, 2FCA, 2HDJ, 3FP, 3AYC, 3IRW, 3KEQ, 3LTF, 5DT, 6NF, 8AL, 8RW. Heard: G2WJ, 3GDR, 4KD.

V.H.F. ACTIVITY NIGHTS

MONDAYS FROM 8 TO 10 ON TWO

WEDNESDAYS FROM 8 TO 10 ON FOUR

SATURDAYS FROM 8 TO 10 ON 70 CM

See how many stations you can work, and report the results to G2AIW (V.H.F. Manager).

The MONTH ON THE AIR

A CHRONICLE OF EVENTS ON THE HF AMATEUR BANDS

By J. DOUGLAS KAY (G3AAE)*

WELL, another B.E.R.U. contest is over and rather a patchy affair it seemed to be this year. Had it not been for the large Canadian contingent taking part it would have been very poor, as conditions to VK and ZL were not good and the African contestants were extremely few and far between. Several of the VE1-3 gang were running up formidable scores helped by the favourable transatlantic conditions, while both ZB1FA and ZC4IP should be assured of a high place when the results are known. The welcome appearance of fast operating VU2ANI on 14, 21 and 28 Mc/s certainly added a touch of spice to the proceedings and must have boosted many a country total in the process, while ZK1AK joined in the fun for a short period. All the old B.E.R.U. warriors seemed to be out in force once more, demonstrating yet again the fascination that this time-honoured contest has for its adherents. It will be a long time before the results are announced, so what about sending in a few "claimed" scores and details of the highlights worked on the individual bands?

DXpeditions

Swan Island For a one-week period starting about February 16 W3KA, W4JNE and W4KFC will operate as KS4AZ from Swan Island. During the weekend of the A.R.R.L. C.W. Contest they will only work W/VE/KL7/KH6 stations, but during the rest of their stay they will concentrate on working DX stations. Frequencies to watch are: c.w. 3507, 7007, 14,040, 21,040 and 28,040 kc/s; a.m. 7250, 14,240, 21,325 and 28,750 kc/s; s.s.b. 7205, 14,295, 21,410 and 28,650 kc/s. The address for QSLs is in *QTH Corner*. Those desiring a direct reply should enclose I.R.C.s.

Floating Raft From the West Gulf DX Club comes news that sometime in the near future a raft will leave Guatemala and attempt to float to Peru. The raft will be equipped with Collins "S" line equipment and will operate under the call-sign **TG0OA**. It will probably call at the Cocos Islands and operate as TI9OA and may also call at Malpelo Island. The operators intend to use s.s.b. exclusively!

Marcus Island Ian Cable, MP4BBW, of s.s.b. fame says that sometime in April **JAIACB** will be operating from Marcus Island, which is 1,000 miles east of Japan in the north Pacific and may well merit A.R.R.L.'s consideration for country status. It is believed that operation will probably be confined to 14 Mc/s c.w. only.

Malpelo Island Latest information on the DXpedition to Malpelo Island, details of which were given in the January *M.O.T.A.*, is that it has been delayed and will now take place towards the end of March.

Additions to the DXCC Country List

In the January issue of *QST* the A.R.R.L. announces the addition of two new countries to the official DXCC list. These countries are Cargados Carajos Shoals and the Willis Islands: the former are located in the Indian Ocean approximately 260 miles n.e. of Mauritius and have the prefix VQ8, while the latter are situated about 240 miles east of the coast of Queensland and have the prefix VK4. **VQ8BBB**, now back in Mauritius for two months, has been active in the afternoons on 14 Mc/s c.w. while it is under-

stood that the call-sign **VK4DS** has recently been issued for use on the Willis Islands. However, **VK4IA** and **VK4IC** operated from these islands during the middle 'fifties so some readers may be in the happy position of being able to add another notch in their DXCC belts without having to find and work another station.

News from Overseas

Nigeria Although Michael Dransfield (ex-G3JKO, ST2KO, etc.) had decided not to take out a licence while stationed in Nigeria the advent of B.E.R.U. proved too much for him, and he started operating as **ZD2JKO** on January 12. His gear is a Vanguard transmitter, plus dipoles and long wire aerials. Pending the arrival of a microphone, operation is at present confined to 7, 21 and 28 Mc/s c.w. He was certainly putting out a nice signal during the contest on these bands. Michael's address is given in *QTH Corner*.

Poland Chris Slomcynski, **SP5HS**, writes to say that there are now four grades of amateur licence in Poland, as follows:

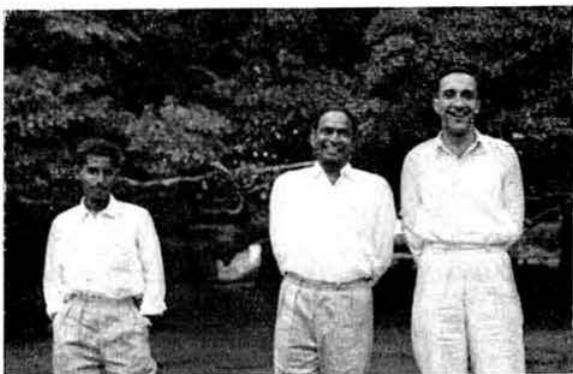
First grade, 750 watts maximum input, c.w. and phone.
 Second grade, 250 watts maximum input, c.w. and phone.
 Third grade, 60 watts maximum input, c.w. and phone.
 Fourth grade, 15 watts maximum input, c.w. only (novice).
 SP5HS does not detail the requirements covering the different grades but says that all licensed Polish citizens must be members of clubs affiliated to their national society, **PZK**.

Foreign amateurs living in or visiting Poland may obtain temporary SP licences. Applications should contain: (i) the full name and address of the applicant; (ii) address where the station will be set up in Poland; (iii) details of applicants existing amateur licence; (iv) description and power of transmitter to be used in Poland, and should be sent to:

DXotic Showcase

Call-sign	kc/s		G.M.T.	
TF5TP	3,500	c.w.	01.10	Iceland
JA3IS	7,018	c.w.	18.02	Japan
VK2GW	7,032	c.w.	18.28	Australia
UM8KAB	7,035	c.w.	18.33	Kirghiz
VP7CC	7,080	c.w.	00.10	Bahamas
ZL3VH/3	14,080	c.w.	07.45	Chatham Is.
VQ8BBB	14,085	c.w.	16.30	Cargados Is.
VQ9HB	14,110	c.w.	17.45	Seychelles
VU2ANI	14,085	c.w.	18.15	Nicobar Is.
FR7ZD	14,075	c.w.	17.15	Reunion Is.
ZM7DA	14,040	c.w.	18.30	Tokelau Is.
JT1AB	14,060	c.w.	10.10	Mongolia
ZS7M	14,058	c.w.	19.00	Swaziland
FO8AC	14,340	c.w.	09.00	French Oceania
VK0IT	14,045	c.w.	10.35	Macquarie Is.
ZL5AF	14,325	s.s.b.	19.45	Antarctica
ISGN	14,311	s.s.b.	12.15	Somalia
9NIGW	14,307	s.s.b.	12.30	Nepal
ZM7DA	14,312	s.s.b.	19.40	Tokelau Is.
KG6IJ	14,303	s.s.b.	14.25	Iwo Jima
VS4JT	14,307	s.s.b.	14.25	Sarawak
VU2ANI	21,065	c.w.	12.00	Nicobar Is.
UA0KYA	21,100	c.w.	10.45	Tannu Tuva
HCBJU	21,003	c.w.	19.15	Galapagos Is.
FK8AT	21,165	a.m.	07.50	New Caledonia
V55GS	21,120	a.m.	13.45	Brunei
YAIAO	28,100	c.w.	11.30	Afghanistan
VU2ANI	28,070	c.w.	10.45	Nicobar Is.
R18WBA	28,400	a.m.	12.40	Uzbek

* 40 Fryston Avenue, Coulsdon, Surrey.



The operators of VU2ANI: from left to right, VU2RM (Rao), VU2NR (Raja) and VU2AK (Les King).

(Photo by VU2RG)

Ministerswo Lacznosci, Centralny Zarzad Radiostacji i Telewizji, Warsaw, Poland.

DX Briefs

W1CJ/3 left Washington on January 14 and was scheduled to arrive in Nepal on January 20. He took his six-element beam with him for 14 Mc/s s.s.b. activities as 9N1CJ (*via W6YY*).

SV0WB left Rhodes on January 5 and admits to a backlog of 500 cards, which he promises to clear upon his return home to W4SSG (*via G2BVN*).

KC6PE on the Eastern Caroline Islands is known to operate a.m. around 28-6 Mc/s about 11.00 G.M.T. K8GAS was heard working W9OIL! (*via G2BVN*).

ZK2AB is due on 14 Mc/s s.s.b. at any moment, while ZK1BS is back in operation again after his recent American travels. ZD7SA is also supposed to be putting in an appearance on 14 Mc/s s.s.b. in the near future (*via MP4BBW*).

HC9JU was "unable to get started at HC8 so they did not operate" (*via K2UYG*). HC1JW, who issues the licences for Ecuador and its dependencies, says that no licence for either HC8JU or HC9JU operations was issued by his department—oh, the mystery of it all!

G8VG's not so junior op. is now active on 14 Mc/s c.w. from India as VU2XG (*via G6ZO*).

AP2BH and W4ANE are working on plans for a DX-pedition to East Pakistan. VK4YV is rumoured to have similar intentions on Willis Island. The Ted Henry s.s.b. rig has arrived in Madagascar but none of the FB8 gang have yet used it. Legitimate AC prefix stations are AC3SQ, AC3PT, AC4SQ, AC4AX and AC5PM (your scribe is endeavouring to find out whether any of these stations are, in fact, active on any of the DX bands). VR1B was given a s.s.b. rig by WA6DFH/MM and should have put it into operation by mid-January. All except two 3V8 stations have been closed down in Tunisia due to the present political situation. W8PQQ is being flooded by

QTH Corner

HKIKU P.O. Box 244, Barranquilla, Colombia.
KS4AZ Ralph Ladd, 10406 Insley Street, Silver Springs, Maryland, U.S.A.

VE4LX 53 Luxton Avenue, Winnipeg, Manitoba.

VQ6GM P.O. Box 164, Berbera, British Somaliland.

VQ9HB Harvey Brain, Mahe, Seychelles.

WA2CRE/KL7 1931 S.T.A.A.C.S. Sqdn., Box 8, A.P.O. 942, Seattle, Washington, U.S.A.

ZD2JKO Dr. M. Dransfield, Regional Research Station, Ministry of Agriculture, Samaru, Zaria, Northern Nigeria.

ZM7DA via W7PHO.

** * *

R.S.G.B. QSL Bureau: G2MI, Bromley, Kent.

QSL applications for contacts with VU2ANI. He expects to receive the log in mid-February, when he will start to reply to all the QSLs received. OK7HZ, the Czech Worldwide DXpedition, started up in Iraq on January 16 signing OK7HZ/YI—around 13.00 G.M.T. just above 14,300 kc/s seems to be a good place to look for his s.s.b. signals. W3GJY has the logs for FG7XC as far back as April 1958. W4KWC is now handling the QSL chores for FO8AC, who continues to be the most active user of that prefix.

W8VDJ left the U.S.A. on January 24 for Dominica where he will be active as VP2DX for at least the next two months. He also hopes to operate from Montserrat, Anguilla and the British Virgin Islands before returning home.

VR6AC came back on the air on January 13 using a 100 watt rig. He is active on Monday, Tuesday and Wednesday mornings commencing around 05.30 G.M.T. on 'phone between 14,100 and 14,200 kc/s. He also has a crystal for 14,324 kc/s. VR6TC is also expected to arrive back in Pitcairn and to resume operating around May.

ZD3E will leave Gambia in March. He says that ZD3S—reported heard by several contributors—is not genuine.

There will shortly be further activity from the Kermadec Islands (ZL1) following the delivery there of a new transmitter.

HP9FC/VQ8 operated from Mauritius on 14 Mc/s c.w. for one day only—January 24.

WSPQA—who operated ZM7DA recently—is reported to be planning to be on from East Pakistan in some four weeks time. (*All above via W.G.D.X.C.*)

G. P. Lovelock (G3III) of A.M.Q. 91, Royal Air Force, Colerne, Chippenham, Wilts, has 32 QSL cards for ex-ZS5AB and would like to hear from him.

28 Mc/s

This band is certainly not producing anywhere near the same volume of rare DX that its two adjacent neighbours are at the present time, but it is still the easiest medium for pleasant long S9 chats with our brethren in VE, W, ZS and VQ, etc., who continue to operate there in force.

Norman Miller G3MVV (Romford) used a.m. for contacts with RI8WBA (11.42, '350), VE1NQ Prince Edward Island (14.43, '400), RN1AAA (12.30, '350), VU2BK (14.45, '380), RA9CAR (10.28, '370), VQ6GM (14.50, '350). Eric Hancock G3BHW (Margate) used the same mode for VU2ANI (12.13, '220), VP7NY (15.00, '200), TG9TI (16.41, '400) and RI8WBA (12.40, '240).

Jim Kirk G6ZO (Edgware) used the c.w. end of the band for contacts with RA0AAA (10.30, '080), VU2ANI (10.45, '070), YA1AO (11.30, '100) and UA0SK (10.30, '060). Frank Hooson G3YF (Chingford) talked to HI8BD (16.45, '400) and VP9DV (16.50, '400).

G3AAE used a.m. to contact VQ3HG (12.43, '232), VP3MC, HK0AI (16.12, '244), VP2DY (17.18, '260) VS9AE (11.42, '260) and on c.w. worked VQ3HD (09.41, '065), VU2ANI (10.40, '068), ZD2JKO (14.16, '066) and YA1AO (11.25, '104).

B.R.S.20317 (Bromley) logged VP4LA (12.00, '300), and HI8JBG (14.37, '410) on phone while A.1980 logged HZ1AB (13.30), MP4BCC (13.50), CO2ZS (15.20), VP9DL (15.15), ZB1A (13.30) and IS1ZDT (15.25).

A.1657 (Leeds) also on phone reports hearing CO2XA (18.00), CR5SP (12.25), EA9EJ (14.10), HI8EB (14.03), HK1KU (20.00), KG4AA (17.00), PJ3AD (20.10), RD6KAR (12.00), RN1AAA (14.05), RO5AGA (13.18), TI6CU (17.05) and ZS8O (17.10).

B.R.S.15844 (Bridgend) logged a.m. signals from MP4BCC, VP4GN, VP4MM, VE3AIG/SU, VS9EA, HI8HJD, HR2MT, ZD3E, CEIAD, EL8D, CR4AV, TG9AR, VE8TO and YNIWW. A.1902 (Reading) heard HZ1AB (12.42, '520), CO2ZS (15.25, '460), IE1SMO (11.44, '105), XE3AF (14.34, '303), RO5AZB (10.20,

'040) and 9G1AA (10.25, '130), while **B.R.S.2292** heard CR6DB (17.18), HC1AM, HH2Z (14.27), HP1HC (14.18), TG9TI (16.19) and ZD3E (16.15), all on a.m., while on c.w. he logged CR6AI (14.43), HK0AI (16.37), RH8ABC (11.43), VU2BK (11.00), W6DLX/AM (17.43), ZD2GUP (11.40), ZD2JKO (16.13) and VQ2GW (12.05).

B.R.S.22249 (Lincs.) logged HC1KZ (12.23, '400), MP4BBE (18.00, '320), OQ5RS (14.00, '250), PJ3AB (15.52, '320), RN1AT (13.13, '510), VP9DC (16.28, '300), VU2ANI (11.30, '210), VU2NS (18.31, '300), XE3KF (16.06, '420) and ZD3E (16.12, '310) on phone.

21 Mc/s

At one time it did look as if 14 Mc/s was going to lose its reputation of being the premier DX amateur band to 21 Mc/s, but there is no doubt that this is not going to happen in the immediate future. However, this band still fills a very valuable role combining in a degree the brilliance and unpredictability of 28 Mc/s with the reliability and steadiness of 14 Mc/s.

G3BHW worked FB8CO (15.37, '150) and VS5GS (13.45, '120) on a.m. and HC1JW (18.32, '035), HH2CB (18.45, '050), XE1PJ (13.15, '045), ZS7M (17.43, '030) and ZS6IF/8 (17.00, '020) on c.w. **G6ZO** exchanged morse reports with VK9RH (08.15, '110), ZC5SF (08.15, '110), VK9RO (10.30, '090), OQ0FW (10.00, '020), VU2ANI (12.45, '065), YA1AO (14.00, '030), UA0KYA Tanna Tova (10.45, '100) and VP7NT (14.15, '020).

G3MVV talked to VU2ANI (14.47, '135), VP7NB (18.50, '140) and VK6SM (14.30, '145). **G6UT** (Little Hallingbury) did likewise to strange IE1SMO (15.35, '180), ZD3E (13.00, '200) and XE3CW (14.00, '230) with SPIJN/MM (15.15, '090) on c.w.

Ernest Dolman **G2DCG** (Margate) talked to VS9OM (15.18), UA0KUV (10.50), HC1JW (19.50), PJ2AE (19.45), YA1AO (13.57) and ST2AR (15.28).

B.R.S.22249 logged phone signals from PZ1AA (20.52, '210), MP4DAA Trucial Oman (13.33, '320), TF5TP (11.55, '060), VS6CL (13.23, '250), VP6JK (19.48, '275), XE3AF (18.55, '190), YS1O (19.10, '210) and ZL3AA (09.45, '340) while on c.w. he found HC0JN (19.42, '010), KR6BB (10.48, '030) and UL7FA (11.45, '030). **B.R.S.20317** on c.w. logged XE1PJ (14.20, '070), YA1AO (13.07, '015), AP4M (15.56) with KR6MCB (10.36, '250) on s.s.b.

A.1980 reports FQ8HE (20.20), KP4AEM (11.05), MP4BCC (15.35), OQ5RC (17.00), VP8DU (21.00), VP8BN (20.55) and VQ2BK (17.50) on phone. **A.1902** found IE1SMO (15.35, '350), IT1ZGY (14.25, '050), TF3MB (16.35, '075), HK1CW (19.07, '150) and VP7NB (19.16, '155). **A.1930** logged ZD6DT (16.25) and HC1CN (12.50) on phone. **A.1657** rounds off the reports for this band with EL0J/MM (14.20), OX3KW (20.56), TF3WDU (14.02) and ZD2HJG (21.05) on voice.

14 Mc/s

It seems a little strange that nearly all the h.f. DX activity on s.s.b. is concentrated in approximately the top 80 kc/s of the 14 Mc/s band. One hears a few s.s.b. stations on the other bands from time to time, but there is no doubt that 14,280 to 14,350 kc/s is the place to look for rare sideband DX. While it is known that this mode is growing in popularity in the U.K. it is rarely that anyone submits a really comprehensive log showing its full potentialities on this band.

Specially welcome, therefore, is the list of DX worked by Ian Cable **MP4BBW** (Awali, Bahrain) during the five-week period commencing December 1: ZL5AF (19.45, '325), KX6BT (11.45, '295), CR6BW (18.10, '304), 9M2GR (13.40, '306), 9M2DB (15.20, '325), YN1CX (13.15, '309), 15GN (12.15, '311), YS1O (13.20, '306), 9N1GW (16.00, '334), CE2AN (12.30, '307), VP7BI (12.10, '320), ZM7DA (19.40, '312), VU2ANI (16.05, '301), HPILO (13.50, '307),



Jack Campbell operating VE8MX at Cape Parry in the Canadian Arctic. The receiver was a Collins 514 and the transmitter a Collins 431B. Jack is now back home in Northern Ireland.

WA6IFQ/KG6 (11.45, '293), CR9AH (14.10, '306), YS1MS (14.45, '312), XZ2AD (14.25, '309), HH2LD (12.55, '315), KG6IJ Iwo Jima (14.25, '303), MP4TAE (13.00, '304), VP6WD (12.20, '320), SU1MS (14.20, '303), XE1AE (12.55, '306), VS4JT (14.25, '307), AP2CR/M (13.15, '303), XE2FL (14.10, '312), UF6BC (16.00, '324), MP4MAB (13.05, '307), XE1CV (13.25, '312), MP4QAO (13.15, '306) and W7AHW/KG6 (18.50, '303). Certainly a very weighty argument in favour of s.s.b. for seekers of the rarer variety of DX.

G6ZO used c.w. to contact VQ9HB (17.45, '110), FB8XX (18.30, '035), OR4RW (21.00, '025), VK9RH (08.45, '005), ZC5SF (08.45, '005), UPOL8 North Pole (10.00, '025), PZ1BA (21.00, '035), ZS7M (18.00, '075), VK9XK (12.15, '005), OQ0CZ (19.00, '010), OQ0FW (10.00, '020), XZ2TH (16.00, '010), MP4TAF (16.15, '055), VQ8BBB (16.30, '085), ZD6JC (18.45, '050), DU7SV (09.30, '015), VK0RH (16.45, '015), VP8EL (19.15, '010), PJ2CP (19.30, '060), FY7YE (18.00, '015), FY7YF (20.30, '005), ZD3S (16.45, '035), VU2ANI (14.30/17.15, '060/075), ZL3VB Chatham Island (08.30, '035), ZM7DA—long path over South Africa (18.30, '045), CP3CD (22.45, '010), VK0TF (16.30, '070), ZL3VH Chatham Island (07.45, '080), KX6BQ (07.45, '035), KC6AU (09.00, '025), ZK1AK (08.30, '020), FB8CK (15.45, '050), and many UA0 stations between 07.45 and 10.30.

G3YF keyed with FO8AC (16.15, '058), UH8AK (13.50, '050), JT1AB (10.10, '060), ZS7M (19.00, '058), FR7ZD (19.20, '080), FB8CE (17.15, '010), MP4TAF (17.10, '016), KR6GF (10.50, '004), VU2ANI (15.30, '043), LA1NG/P (10.10, '036), VK0IT (10.35, '045), FK8AW (07.45, '040), XZ2TH (15.30, '012), KC6KR (14.50, '052), UA0KYA Zone 23 (07.45, '080) and KX6BQ (10.45, '045).

G3BHW used c.w. to contact MP4TAF (18.07, '020), VP4WD (18.50, '040), TA2AR (17.41, '080), VU2ANI (18.17, '085), ZM7DA (18.37, '040), ZS7M (17.45, '075), and ZS6IF/8 (18.44, '011). R. F. Stevens **G2BVN** (Romford) used s.s.b. when talking to 15GN (19.35), ET2US (19.45), HB9FC/MM (18.00), LA3SG/P (17.35), OH0NC (10.30), HI8SKE (19.55), SU1MS (16.00), 9N1GW (13.45) and KH6DLF (18.25).

Francis Garnett **G6XL** (Leeds) had c.w. QSOs with FR7ZD (17.15, '075), ZS7M (20.10, '088), VU2ANI (14.25, '075), VP4WD (22.50, '050), and heard VQ8BBB (17.00, '090), HK0AI (00.20, '075), VK9RH (08.35, '003), with 9N1GW (14.25, '310) on s.s.b.

Leslie Hill **G8KS** (Farnborough) exchanged s.s.b. reports with VS4JT (09.15, '320), KA2KC (11.30, '100), WA6IFQ/KG6 (12.50, '293), HH2JT (18.07, '305), XE1BV (23.50,

LIST OF COUNTRIES ARRANGED IN PREFIX ORDER

AC3	...	...	...	Sikkim	JY, ZC7	...	...	Jordan	VK2	...	...	Lord Howe Island
AC4	...	...	...	Tibet	JZ0	...	...	Netherlands New Guinea	VK9	...	...	Admiralty Island
AC5	...	...	...	Bhutan	K, KN, W, WN, WA, WV...	...	...	U.S.A.	VK9	...	...	Christmas Island
AP	...	...	...	Pakistan	KA0, KG6i	...	...	Bonin & Volcano Islands	VK9	...	...	Cocos Island
AR8	...	...	...	(See OD)	KB6	...	...	Baker, Howland & American	VK9	...	...	Nauru Islands
BV	...	...	...	Formosa	KC4	...	...	Phoenix Islands	VK9	...	...	Papau Territory
C	...	...	...	China	KC6	...	...	Navassa Island	VK9	...	...	Territory of New Guinea
C9	...	...	...	Manchuria	KC6	...	...	Eastern Caroline Islands	VK9	...	...	Norfolk Island
CE	...	...	...	Chile	KC6	...	...	Western Caroline Islands	VP1	...	...	British Honduras
CE0A	...	...	...	Easter Island	KG4	...	...	Guantanamo Bay	VP2	...	...	Anguilla
CE0Z	...	...	...	Juan Fernandez	KG6	...	...	Mariana Islands	VP2A	...	...	Antigua & Barbuda
CM, CO	...	...	...	Cuba	KH6	...	...	Hawaiian Islands	VP2V	...	...	British Virgin Islands
CN2, EK & KT	...	...	...	Tangier	KJ 6	...	...	Johnston Island	VP2D	...	...	Dominica
CNB	...	...	...	French Morocco	KL7	...	...	Alaska	VP2G	...	...	Montserrat
CP	...	...	...	Bolivia	KM6	...	...	Midway Islands	VP2M	...	...	St. Kitts & Nevis
CR4	...	...	...	Cape Verde Islands	KP4	...	...	Puerto Rico	VP2K	...	...	St. Lucia
CR5	...	...	...	Portuguese Guinea	KP6	...	...	Palmyra Group, Jarvis Island	VP2S	...	...	St. Vincent & Dependencies
CR5	...	...	...	Principe, Sao Thome	KR6	...	...	Ryukyu Islands (e.g., Okinawa)	VP3	...	...	British Guiana
CR6	...	...	...	Angola	KS4	...	...	Swan Island	VP4	...	...	Trinidad & Tobago
CR7	...	...	...	Mozambique	KS6	...	...	American Samoa	VP5	...	...	Cayman Islands
CR8	...	...	...	Goa (Portuguese India)	KV4	...	...	Virgin Islands	VP5	...	...	Jamaica
CR9	...	...	...	Macau	KW6	...	...	Wake Islands	VP5	...	...	Turks & Caicos Islands
CR10	...	...	...	Portuguese Timor	KX6	...	...	Marshall Islands	VP6	...	...	Barbados
CT1	...	...	...	Portugal	KZ5	...	...	Canal Zone	VP7	...	...	Bahama Islands
CT2	...	...	...	Azores Islands	LA, LB	...	...	Jan Mayen	VP8	...	...	Falkland Islands
CT3	...	...	...	Madeira Islands	LA, LB	...	...	Norway	VP8, LU-Z	...	...	Grahamland
CX	...	...	...	Uruguay	LA, LB	...	...	Svalbard (Spitzbergen)	VP8, LU-Z	...	...	South Georgia
DI, DL, DM	...	...	...	Germany	LU	...	...	Argentina	VP8	...	...	South Orkney Islands
DU	...	...	...	Philippine Islands	LX	...	...	Luxembourg	VP8, LU-Z	...	...	South Sandwich Islands
EA	...	...	...	Spain	LZ	...	...	Bulgaria	VP8, LU-Z	...	...	South Shetland Islands
EA6	...	...	...	Balearic Islands	MI	...	...	San Marino	VP8, LU-Z	...	...	CE9, VK0, OR4, KC4, 8J1, ZL5
EA8	...	...	...	Canary Islands	MP4	...	...	Qatar	...	...	...	Antarctica
EA9	...	...	...	Ifni	MP4	...	...	Trucial Oman	VP9	...	...	Bermuda
EA9	...	...	...	Rio de Oro	MP4B	...	...	Bahrein Island	VQ1	...	...	Zanzibar
EA9	...	...	...	Spanish Morocco	MP4T	...	...	Muscat	VQ2	...	...	Northern Rhodesia
EA0	...	...	...	Spanish Guinea	OA	...	...	Peru	VQ3	...	...	Tanganyika Territory
EI	...	...	...	Eire (Rep. of Ireland)	OD5	...	...	Lebanon	VQ4	...	...	Kenya
EL	...	...	...	Liberia	OE	...	...	Austria	VQ5	...	...	Uganda
EP, EQ	...	...	...	Iran (Persia)	OH	...	...	Finland	VQ6	...	...	British Somaliland
ET2	...	...	...	Eritrea	OH0	...	...	Aland Islands	VQ7	...	...	Aldabra Islands
ET3	...	...	...	Ethiopia	OK	...	...	Czechoslovakia	VQ8	...	...	Agalega Islands
F	...	...	...	France	ON	...	...	Belgium	VQ8	...	...	Chagos Islands
FA	...	...	...	Algeria	OQ5	...	...	Belgian Congo	VQ8	...	...	Mauritius
FB8	...	...	Amsterdam & St. Paul Islands	Comoro Islands	OO0	...	...	Ruanda Urundi	VQ8	...	...	St. Brandon
FB8	...	...		Kerguelen Island	OX, KGI	...	...	Greenland	VQ8	...	...	Seychelles
FB8	...	...		Madagascar	OY	...	...	Faeroes	VQ9	...	...	Gilbert & Ellice Is.; Ocean Is.
FB8	...	...		Tromelin Islands	PA, PI	...	...	Netherlands	VRI	...	...	British Phoenix Islands
FC	...	...		Corsica	PJ2M	...	...	Sint Maarten	VR1	...	...	Fiji Islands
FD	...	...		French Togoland	PJ 2, 3	...	...	Netherlands West Indies	VR2	...	...	Fanning & Christmas Islands
FE8	...	...		French Cameroons	PK1, 2, 3	...	...	Java	VR3	...	...	Solomon Islands
FF8	...	...		French West Africa	PK4	...	...	Sumatra	VR4	...	...	Tonga (Friendly) Islands
FG7	...	...		Guadeloupe	PK5	...	...	Netherlands Borneo	VR5	...	...	Pitcairn Island
FI8	...	...		Viet-Nam	PK6	...	...	Celebes & Molucca Islands	VR6	...	...	...
FK8	...	...		New Caledonia	PX	...	...	Andorra	VS1	...	...	Singapore
FL8	...	...		French Somaliland	PY	...	...	Brazil	VS4	...	...	Sarawak
FM7	...	...		Martinique	PY0	...	...	Trinidad Island	VSS	...	...	Brunei
FO8	...	...	French Oceania (e.g., Tahiti)	Clipperton Island	Fernando de Noronha Islands	...	...	Fernando de Noronha Islands	VS6	...	...	Hong Kong
FO8	...	...		St. Pierre & Miquelon Islands	PZ	...	...	Netherlands Guiana	VS7	...	...	(See 457)
FQ8	...	...		French Equatorial Africa	SM, SL	...	...	Sweden	VS9	...	...	Aden & Socotra
FR7	...	...		Reunion Island	SP	...	...	Poland	VS9	...	...	Maldives Islands
FS7	...	...		Saint Martin	ST2	...	...	Sudan	VS9	...	...	Oman
FU, YJ	...	...		New Hebrides	SU	...	...	Egypt	VU2	...	...	India
FW8	...	...		Wallis & Futuna Islands	SV	...	...	Greece	VU	...	...	Laccadive Islands
FY7	...	...		French Guiana & Inini	SV	...	...	Dodecanese (e.g., Rhodes)	VU	...	...	Andaman & Nicobar Islands
G	...	...	England	TA	...	...	...	Crete	W, KN, WN, K	...	...	United States of America
GB	...	...	Special Calls used at Exhibitions, etc.	TF	...	...	...	Turkey	XE	...	...	Mexico
GC	...	...		Channel Islands	TG	...	...	Iceland	XZ4	...	...	Revilla Gigedo Islands
GD	...	...		Isle of Man	TI	...	...	Guatemala	XZ2	...	...	Burma
GI	...	...		Northern Island	T19	...	...	Costa Rica	YA	...	...	Afghanistan
GM	...	...		Scotland	UA1, 3, 4, 6	...	...	Cocos Island	YI	...	...	Iraq
GW	...	...		Wales	UA9, 0	...	...	European Russian S.F.S.R.	YK	...	...	Syria
HA	...	...		Hungary	UA0	...	...	Asianic Russian S.F.S.R.	YN	...	...	Nicaragua
HB	...	...		Switzerland	UB5	...	...	Vrangel Island	YO	...	...	Rumania
HC	...	...		Ecuador	UC2	...	...	Ukraine	YS	...	...	Salvador
HC8	...	...		Galapagos	UD6	...	...	White Russian S.S.R.	YU	...	...	Yugoslavia
HE	...	...		Liechtenstein	UF6	...	...	Azerbaijan	YY	...	...	Venezuela
HH	...	...		Haiti	UG6	...	...	Georgia	YY0	...	...	Aves Islands
HI	...	...		Dominican Republic	UH8	...	...	Armenia	ZA	...	...	Albania
HK	...	...		Colombia	UI8	...	...	Turkoman	ZB1	...	...	Malta
HKO	...	...		San Andres & Providencia	UJB	...	...	Uzbek	ZB2	...	...	Gibraltar
HL	...	...		Korea	UL7	...	...	Tadzhik	ZC4	...	...	Cyprus
HP	...	...		Panama	UM8	...	...	Kazakh	ZC5	...	...	British North Borneo
HR	...	...		Honduras	UNI	...	...	Kirghiz	ZC6	...	...	Palestine
HS	...	...		Siam	UO5	...	...	Karelo-Finnish Republic	ZD1	...	...	Sierra Leone
HV	...	...		Vatican City	UP2	...	...	Moldavia	ZD2	...	...	Nigeria
HZ	...	...		Saudi Arabia (Hedjaz & Nejd)	UQ2	...	...	Lithuania	ZD3	...	...	Gambia
I, IT	...	...		Italy	UR2	...	...	Latvia	ZD6	...	...	Nyasaland
I,	...	...		Trieste	VE, VO	...	...	Estonia	ZD7	...	...	St. Helena
15, MS4	...	...		Italian Somaliland	VK	...	...	Canada	ZD8	...	...	Ascension Island
IS	...	...		Sardinia	VKO	...	...	Australia	ZD9	...	...	Gough Island
JA, KA	...	...		Japan	VKO	...	...	Australian Antarctica	ZD9	...	...	Tristan da Cunha
JTI	...	...		Mongolia	VKO	...	...	Heard Island	ZE	...	...	Southern Rhodesia
						...	...	Macquarie Island	ZKI	...	...	Cook Islands

LIST OF COUNTRIES ARRANGED IN PREFIX ORDER—continued

ZKI	...	...	...	...	...	Manihiki Islands	ZS	...	...	...	...	Union of South Africa	4WI	...	...	...	...	...	Yemen
ZK2	...	...	...	...	...	Niue	ZS2	...	...	...	...	Marion Island	4X4	...	...	...	...	...	Israel
ZK3	...	...	...	...	...	Tokelau Island	ZS3	...	...	...	...	South-west Africa	5A	...	...	...	...	...	Libya
ZL	...	...	...	...	...	New Zealand	ZS7	...	...	...	...	Swaziland	7G1	...	...	...	...	...	Republic of Guinea
ZLI	...	...	...	...	...	Kermadec Island	ZS8	...	...	...	...	Basutoland	9S4 (now DL8)	...	...	...	...	...	Saar
ZL3	...	...	...	...	...	Chatham Island	ZS9	...	...	...	...	Bechuanaland	9G1	...	...	...	...	...	Ghana
ZL5	...	...	...	...	...	New Zealand Antarctica	3A2	...	...	...	...	Monaco	9K2	...	...	...	...	...	Kuwait
ZM6	...	...	...	...	...	British Samoa	3V8	...	...	...	...	Tunisia	9M2	...	...	...	...	...	Malaya
ZP	...	...	...	...	...	Paraguay	3WB	...	...	...	...	Cambodia, Viet Nam	9N1	...	...	...	...	...	Nepal
							4S7	...	...	...	...	Ceylon							

'305) and ZM7DA (17.32, '040), PX1AI (18.20, '069), ZK1AK (08.30, '027), VU2XG (17.05, '074) and VU2ANI (16.47, '076), on c.w. **G3AAE** on the latter mode worked ZS7M (18.15, '048), VU2ANI, ZK1AK (08.20, '024), ZD1AW (08.15, '050), VP4WD (00.02, '022), UPO18 (08.20, '028) and YA1AQ (16.30, '088).

A.1930 logged phone signals from XE3AF (22.50), XE3CW (23.00), VP6FO (23.25), UL7PN (19.55), TF2WDS (22.35) and MP4DAA Trucial Oman (22.00). **A.1902** located LX1JW (10.37, '227), KP4ES (20.30, '294), MP4BBW (16.15, '318), VS9OC (19.11, '167), MP4BCR (20.23, '310), and ET2US (22.36, '325). **B.R.S.2292** reports c.w. signals propagated by CR4AH (16.00), CR6AI (18.34), DU7SV (08.12), OR4RW (18.50), PJ2CE (21.15), PJ2CP (20.34), VU2PI (19.16), VP4TR (19.49), XZ2TH (15.58) and YY6VR (21.13).

B.R.S.20317 on c.w. reports hearing OQ0CZ (19.03, '015), UA0IK Zone 19 (10.14, '018), ZS61F/8 (19.30, '008), LA8FG/P (15.02, '016), VS9OM (18.00, '062), MP4TAF (15.39, '079) and VP8AI (22.24), with TI2RC (18.40, '310), 15GN (18.47, '313), and VQ3GX (17.38, '323) on s.s.b. **A.1657** heard CT2AK (22.25), HH3DL (22.02) and VP6FO (22.20) on phone while **A.1980** used the same mode for CR7AG (18.25), IT1ZGY (19.30), KG4AL (20.20) and the popular VP6FO (22.10).

7 Mc/s and Lower

All the excitement on the higher bands has again resulted in a dearth of information on the three lower ones, but the B.E.R.U. contest did result in ZB1FA, ZC4IP, ZC4GF, ZD2JKO, ZD2GUP, VP9BO and VQ3CF being worked on 7 Mc/s, while ZB1FA and ZC4IP were reported on 3.5 Mc/s. No doubt various other prefixes were also worked on these bands.

G3KSH reports VE6AAE/SU (22.40, '002), VP7CC (23.55, '050) and curious ETE3CE (02.30, '010). **B.R.S.2292** logged CN2AO (20.44), K4JXK/KL7 (06.45), UL71F (20.54), VP2GAE (06.39), VE6SZ (08.24), YV6BO (22.42), ZD2JKO (23.11) and sundry PYs. **A.1902** reports IE1SMO who has been reported on higher bands and whose status and location seem to have eluded all contributors: can anyone throw any light please?

Commonwealth Competition

	28 Mc/s	21 Mc/s	14 Mc/s	7 Mc/s	3.5 Mc/s	Total
G8KP ...	15	27	28	14	15	99
G3AAE ...	23	11	14	14	—	62
G5VU ...	15	14	17	4	9	59
G8DI ...	10	7	6	10	18	51
MP4BBBW ...	—	28	—	—	—	28
G3KSH ...	7	9	4	4	3	27
G3MGL ...	5	2	5	4	—	16
 B.R.S.2292	13	19	18	9	—	68
 B.R.S.21008	19	29	13	4	3	68
 A.1980 ...	13	8	5	—	—	26
 B.R.S.22249	8	5	—	2	—	17

Band Leaders

Band Leaders	
28 Mc/s—G3AAE	21 Mc/s—B.R.S.21008
14 Mc/s—G8KP and MP4BBW	7 Mc/s—G8KP and G3AAE

B.R.S.20317 logged UL71G (19.10, '040), CO8FH (23.55, '030), OX3RH (00.10, '036), YV5ABL (00.00, '082), JA3IS (18.02, '018), VK2GW (18.28, '032), UM8KAB (18.33, '035), ZS6IW (22.49, '010), CO7RV (23.24, '002), VP7CC (23.47, '034), ZS6R (23.53, '008), ZD2GUP (00.16), VQ3HD (01.20), ZD2JKO (02.04), VQ2CZ (02.22) and VQ3CF (23.05, '005). A very nice report.

Dropping down to 3.5 Mc/s we find **B.R.S.20317** again getting amongst some good stuff such as UO5SM (18.45, '504), ZC4GF (20.50, '503), UL7JA (18.15, '516), and UA9JR (18.43, '514). **A.1657** unearthed LX1SJ (21.02).

The Commonwealth Competition

This month sees the debut of the Commonwealth Competition, and considering that only two and a half weeks' operation was possible before this issue closed for press the number of entries received so far, though small, seems satisfactory. With the completion of the B.E.R.U. Contest and a full month it is hoped that many more members will join in the fun and send in their scores by February 18. In case anyone is still in doubt about the simple rules, they are based on the list of call areas published on page 226 of the November BULLETIN; each area heard or worked on 28, 21 and 14 Mc/s is good for one point per band, while two points are given for areas on 7 Mc/s and three for 3.5 Mc/s. Participants in the British Isles should not count G, GC, GD, GI, GM or GW contacts for points.

LATE FLASH!

With effect from March 10, the U.S. 14 Mc/s phone band will be extended to 14,200-14,350 kc/s, according to the *Voice of America*.

The response to the appeal for photographs was excellent and readers will have noticed that an increased number of photographs has been used during the past few months. Now, if only we could have some Top Band DX reports and a few more new QTHs each month! Cheerio for now and good DXing on the bands.

Phonetic Alphabet

After many hours spent in discussing the pros and cons of the various phonetic alphabets now in use, the Geneva Radio Conference finally decided to adopt the present I.C.A.O.-N.A.T.O. alphabet. The new phonetic alphabet is set out below:

A	Alfa	N	November
B	Bravo	O	Oscar
C	Charlie	P	Papa
D	Delta	Q	Quebec
E	Echo	R	Romeo
F	Foxtrot	S	Sierra
G	Golf	T	Tango
H	Hotel	U	Uniform
I	India	V	Victor
J	Juliet	W	Whisky
K	Kilo	X	X-ray
L	Lima	Y	Yankee
M	Mike	Z	Zulu

BC454: Top Band Mobile Receiver

By W. FARRAR, B.Sc. (G3ESP/M)*

DO not be misled by the title—there is no misprint. This article describes how the BC454 Command receiver may be easily and cheaply converted from its normal range of 3-6 Mc/s to cover the high frequency end of Top Band where mobile activity is concentrated.

‘Research Work’

The writer’s receiver had already been converted for use with a 12 volt l.t. supply and fitted with a gain control and b.f.o. switch. The problem was quickly to make it suitable for Top Band mobile work. First thoughts were to change the 1415 kc/s i.f. cans for 465 kc/s and fit new signal and oscillator tuning coils. This would have been rather expensive. To reduce costs, this plan was modified to use signal and

r.f. and mixer circuits were far out of alignment. This was corrected by removing the 390pF capacitors from these two stages and replacing them with 300pF. The r.f. stage was then slightly deficient in capacity so a 30pF trimmer was placed across the existing aerial input trimmer. A little juggling with the trimmers and the variable part of the oscillator padder and the receiver was tuned up “on the nose” and received a medium strength signal in noisy conditions better than the R107 station receiver, which has always been very good on 160m.

No attempt has been made to get the tuned circuits to track properly across the whole range 1.8-2 Mc/s. Mobile operation (in the North, at any rate) appears to be confined to frequencies between about 1930 and 2000 kc/s and alignment was effected therefore by using a signal on about 1960 kc/s and peaking the trimmers. No further trimming was required as the tuning was changed above and below that point, within the limits specified.

Practical Points

The sides of the BC454 are liberally sprinkled with screw heads, and unless one is familiar with the construction of the unit, various components might become detached in attempting to remove the covers. The bottom cover can be removed by undoing the *plated* screws at the bottom edge of the chassis. This will expose the aerial input trimmer, among other things. The top cover of the receiver is removed by unscrewing the *plated* screws just above chassis level. The tuning capacitor is covered by an aluminium can which is removed by undoing screws (which will be obvious) around its rim. Two screws facing the valve section can best be extracted by pulling out the valves and the i.f. cans which are retained by two screws at the bottom of each can. All this unscrewing takes some time, but is necessary to expose the appropriate parts of the receiver.

The Modified Receiver in Action

In September 1959 a holiday trip was made to the south coast and G3ESP/M was in action *en route*. Several contacts at distances up to 20 miles were had on the way down, with reception at S9. On the return journey, a contact was finished at 25 miles because 10 per cent of the received signal was being missed down in the dips. In Bournemouth, in daylight, a signal from Leicester (about 130 miles direct) was peaking up to S9 on ‘phone. Sensitivity therefore was quite adequate. Because of poor selectivity, which is inherent in the BC454, there was some adjacent channel interference but it was never serious. One advantage of the poor selectivity was that the receiver did not need to be accurately tuned, and while driving any signal about 10 kc/s either side of the frequency to which the receiver was nominally tuned was easily picked out.

So, for the price of three fixed silvered mica capacitors (300pF for the r.f. and mixer and 390pF for the oscillator) and a preset 30pF trimmer across the aerial input, the BC454 can be converted into an adequate Top Band mobile receiver. The sub-band is spread across about one-third of the dial coverage, giving good bandspread, while the large amount of capacity in the oscillator circuit makes for increased stability under mobile conditions.

Fig. 1. The positions of the existing trimmers (looking down on top of the receiver) and points where the fixed capacitors can be soldered into position.

oscillator coils suitable for 1600 kc/s i.f. in the hope that they could be persuaded to work with the 1415 kc/s i.f. stages. This would still have meant 12s. to 15s. for the coils, however. It was thought that perhaps it would be best to rewind the coils, so the “works” were exposed, and, while pondering ways and means, the “penny dropped”: it should be possible to lower the frequency coverage by putting extra capacity across the r.f., mixer and oscillator stages.

Development

The approximate inductance of the r.f. coil was obtained from its physical dimensions and some calculation with a reactance slide rule showed some 400pF needed. As a first attempt a 390pF silvered mica capacitor of 1 per cent tolerance was put in parallel with each section of the tuning capacitor. A signal from the station transmitter was received, showing that the oscillator was now set for Top Band, but an S1 signal from a station a mile away soon proved that the

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Single Sideband

By G. R. B. THORNLEY (G2DAF)*

IN recent years reception by means of a crystal controlled converter feeding into a main receiver has gained considerable popularity amongst amateurs, and not without good reason. The principle employed is well known, and consists of mixing the incoming signal in the converter with a crystal controlled frequency in order that it may be received on the existing receiver, which need only cover a relatively small frequency range.

When the converter is used for the reception of various amateur bands it is necessary to employ a different crystal for each band. Unless the crystals employed lie exactly on frequency the scale calibration on each range will differ. This means in practice that for all band coverage at least six crystals will be required—each one carefully ground to within a few cycles of the correct value.

Single Crystal Control

It is natural that over the years many amateurs (and professionals too) have attempted to evolve the "dream" receiver with all the advantages of crystal stability but without the necessity of multiple crystal changing. One design now made commercially in this country is the Racal RA17 using harmonics from a 1 Mc/s crystal. The second method, suitable for amateur construction, was developed by a Danish amateur.

Many of the early sideband operators will remember the "Harmonica" designed by S. H. Hasselbalch (OZ7T). This was published as an article in the March 1953 issue of the Danish Amateur Radio magazine *OZ*. The "Harmonica" (harmonic generator) used a single 1 Mc/s crystal in a tri-ter oscillator circuit, followed by three r.f. amplifiers, and a final cathode follower. Each r.f. amplifier had a single coil anode circuit tuned by a three gang variable capacitor of about 420 pF maximum capacity. The tuning capacitor swing covered 6.5 to 25.5 Mc/s so that any harmonic from 7 to 25 could be selected as required and fed into the con-

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version mixer. If the main receiver covered the range 4 to 5 Mc/s, all frequencies from 2 to 30 Mc/s could be received in 1 Mc/s steps.

The G3MPO and G3MTT Transmitter

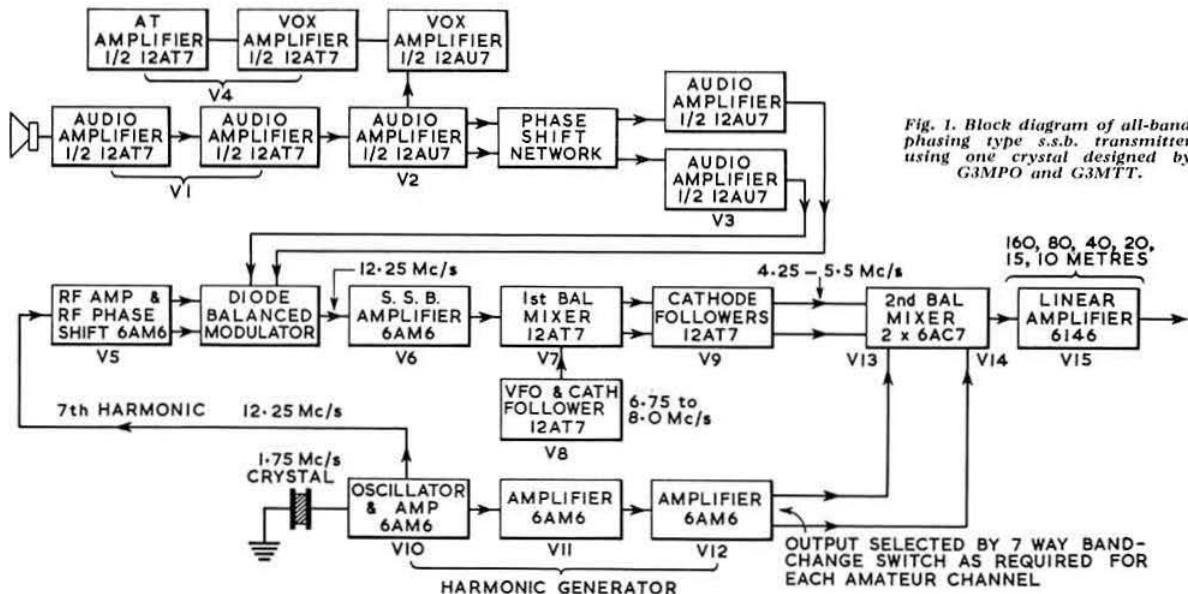
Obviously, the advantages of using one crystal in a receiver are just as applicable in an all band transmitter. For this reason the transmitter designed and constructed by L. J. Robinson (G3MPO) and A. W. Marsh (G3MTT) is of particular interest. There was only space last month to give this very brief mention, but here are all the details at present available.

The design is most intriguing because not only are the harmonics of one crystal used for the final conversion, but a harmonic of the same crystal is used for the original carrier frequency control. The sideband generation is by the phasing method at a frequency of 12.25 Mc/s and this is mixed with the v.f.o. output covering the range 6.75-8 Mc/s, giving a tunable s.s.b. output from 4.25 to 5.5 Mc/s. This tunable s.s.b. output is fed into the conversion mixer; the required harmonic of a 1.75 Mc/s crystal is selected and amplified in a three valve harmonic generator to heterodyne the s.s.b. output into the required amateur band (from 160 to 10m). The initial carrier frequency of 12.25 Mc/s is the seventh harmonic of the 1.75 Mc/s crystal and is from the anode circuit of the first valve in the harmonic generator.

Final conversion to each band is as follows: 160m—7 Mc/s; 80m—8.75 Mc/s; 40m—12.25 Mc/s; 20m—19.25 Mc/s; 15m—26.25 Mc/s; 10m—33.25 Mc/s for the first half of the band from 28 to 29 Mc/s and 24.5 Mc/s for the second half of the band 29 to 30 Mc/s.

A block diagram of the complete line-up is given in Fig. 1 from which it will be noted that the basic transmitter is a straightforward phasing exciter with a diode balanced modulator followed by an amplifier and the first mixer taking the input from the v.f.o. This is followed by a 12AT7 for impedance matching into the cathodes of the two 6AC7 valves forming the balanced conversion mixer. The heterodyning input is fed in push-pull to the grids.

The choice of the various operating frequencies throughout the transmitter has been carefully worked out to avoid as far as possible spurious intermodulation products and



a neutral frequency has been selected for the tunable s.s.b. output to ensure that harmonics cannot fall in any required band. This is good design practice. However, the most interesting section—the heart of the transmitter—is the harmonic generator, V10, 11 and 12.

Output from the crystal oscillator valve V10 is fed to two voltage amplifiers V11 and V12. Each of these valves has a single screened coil in the anode circuit in a can $1\frac{1}{4}$ in. in diameter and 2 in. long, with about 20 turns of enamelled wire on a $\frac{1}{2}$ in. diameter former. Each coil is tuned by seven pre-set capacitors brought into circuit as required by a three-bank, one-pole, seven-way Yaxley switch. The trimmers are set in each switch position to tune to the required harmonic for the chosen heterodyning frequency as already given for each band, and the switch therefore becomes the "band" selector control giving the final transmitter s.s.b. output on all amateur bands from 1.75 to 30 Mc/s.

As this is a phasing type generator, sideband switching is obtained by reversing the 90° audio outputs into the balanced modulator. It is also possible to transmit d.s.b.s.c., A3, c.w. and p.m.

Construction is on two chassis measuring $18 \times 4 \times 2\frac{1}{2}$ in. One chassis contains V1 to V9 and the other the harmonic generator, the conversion mixer and the linear amplifier, V10 to V15.

There are certain limitations in the design—the initial sideband generation is at a rather higher frequency than normal, and the v.f.o. in its coverage swings across the amateur bands from 40m up, and will beat into the receiver. These two points have been raised with G3MPO and G3MTT who state that they have not had any trouble with drift of the r.f. phasing circuitry, or with excessive drift from the v.f.o. which is also on a higher frequency range than normal. In regard to the v.f.o. beating into the receiver they have pointed out that the harmonic and the transmitted frequency coincide at 7, 14, 21 and 28 Mc/s and separate rapidly as the transmitter is moved up the band, except on 40m where the breakthrough into the receiver is the v.f.o. fundamental. Here both the final transmitter output and the v.f.o. frequency will be the same, and will remain in step throughout the band. The breakthrough appears as a weak carrier on the transmitted frequency such as might be obtained with rather poor carrier suppression. It does not affect normal operation in any way, and judging from the noise one usually hears on the 40m band, a weak carrier into the receiver would not be noticed anyway.

Complete control of an all band s.s.b. transmitter with one crystal is certainly an achievement. This is a most interesting and original design and the two amateurs concerned are to be congratulated on what is without doubt a very fine effort.

* * *

Finally, notes, news and technical information for inclusion in the March BULLETIN should reach the writer not later than February 20.

Amateur Radio Teletype

THE Western Electric Company, Patent Department, have drawn attention to the fact that as the word, "Teletype" is a Registered Trade Mark it must not be used as a common noun.

The word "Teletype" is the registered Trade Mark of Teletype Corporation in respect of printing telegraph apparatus and should therefore only be used as a trade mark to indicate the goods of that Corporation.

Enquiries Regarding Bulletin Articles

MEMBERS who write to the authors of BULLETIN articles are asked to enclose stamped addressed envelopes if they require replies.

Learn MORSE the CANDLER way

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Amateur Radio Handbook

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Annual General Meeting

Minutes of the 33rd Annual General Meeting of the Radio Society of Great Britain, held at Over-Seas House, Park Place, St. James's Street, London, W.1, on Friday, December 11, 1959, at 6.30 p.m.

Present: The President (Dr. R. L. Smith-Rose, C.B.E., in the Chair), the Honorary Treasurer (Mr. N. Caws, F.C.A.), the Immediate Past President (Mr. L. E. Newnham, B.Sc.), the Penultimate Past President (Mr. D. A. Findlay, D.F.C., A.C.A.), Messrs. H. A. Bartlett, J. D. Kay, A. O. Milne, W. A. Scarr, M.A. (Ordinary Members of the Council), Messrs. E. G. Ingram, P. H. Wade, E. W. Yeomanson (Zonal Representatives), Mr. John Clarricoats, O.B.E. (General Secretary and Editor), Mr. John A. Rouse (Deputy Editor) and Miss May Gadsden (Assistant Secretary). About 100 other members were also present.

Apologies: Apologies for absence were received from the Executive Vice-President (Mr. W. R. Metcalfe) who was indisposed and Mr. C. H. L. Edwards, A.M.I.E.E. (Member of the Council).

* * *

Notice convening the Meeting

The General Secretary read the notice convening the meeting.

Minutes

It was moved by Mr. G. Leicester, seconded by Mr. P. J. H. Matthews and RESOLVED that the Minutes of the Thirty-second Annual General Meeting as published in the January 1959 issue of the R.S.G.B. BULLETIN be approved and confirmed.

Annual Report of the Council

The Annual Report of the Council, as published in the October 1959 issue of the R.S.G.B. BULLETIN, was submitted by the President.

Questions were asked concerning the delay in publishing a new edition of *The Amateur Radio Handbook* (Mr. C. E. Newton and Mr. G. R. M. Garratt), the absence of a separate financial statement in respect to the Radio Hobbies Exhibition (Mr. R. H. Pounder) and the absence of a record of the number of attendances of non-Council members at Committee meetings (Mr. D. Deacon).

It was stated that the delay in publishing the *Handbook* was due primarily to the failure of certain contributors to complete and submit copy by the promised date. In certain cases manuscripts had been submitted which were not entirely suitable. New authors had then to be found. The Council had recently appointed Mr. J. P. Hawker to succeed Mr. S. K. Lewer, B.Sc., as General Editor of the *Handbook*. The Council confidently hoped that the new edition would appear during 1960 but no definite guarantee could be given as Mr. Hawker had not yet completed his examination of the material which had been contributed.

The Treasurer stated that the Council had decided that the net cost of the Society's participation in the Earls Court and Radio Hobbies Exhibitions should be shown in the form set out in the accounts.

It was stated that the 1960 Council would give consideration to the point raised by Mr. Deacon in regard to the publication or otherwise, of a record of the number of attendances of non-Council members at Committee meetings.

The President moved and it was RESOLVED that the Annual Report of the Council be adopted.

The General Secretary read to the meeting a short Supplementary Report of the Council dealing with events and happenings that had taken place since July 1, 1959 (The

Supplementary Report is published on page 368 of this issue.—EDITOR.)

Referring to the paragraph "Geneva Radio Conference" Mr. Deacon expressed the opinion that if, in fact, amateurs in Regions I and III were to be deprived of a band 50 kc/s wide between 7100-7150 kc/s, such a loss must be regarded as serious. Mr. Newnham (who had attended the Geneva Radio Conference as a technical adviser on Amateur Radio matters to the United Kingdom delegation) agreed that the loss of even a few kc/s was to be deplored but in view of the tremendous pressure for more frequencies for h.f. broadcasting around 7 Mc/s the loss of 50 kc/s, if confirmed, would be considerably less than at one time seemed probable.

Mr. Deacon also commented on the decision of the Post Office to permit amateurs to use R.T.T.Y. He considered that great difficulty would be experienced in identifying the call-signs of stations using that system of transmission. Mr. Newnham explained that users of R.T.T.Y. equipment would be required to transmit their station call-sign at regular intervals.

Report of the Honorary Treasurer and the Audited Accounts

Before formally moving the adoption of his Report the Honorary Treasurer (Mr. Caws) explained to the members the reasons for the increases and decreases of the various items in the Income and Expenditure Account and the Balance Sheet as compared with the previous year. Mr. Caws stated that he had been requested in writing before the Meeting to deal with certain queries and accordingly stated that the cost of the QSL Bureau was made up of postages, paper, string, etc., £218, honoraria to QSL Sub-Managers, £78, part-time salary to Mrs. Milne, £172 less an anonymous donation, £5. He went on to state that the cost of providing meals for those attending Council and Committee Meetings was £192 as shown in the Accounts, and added that during the year under review there had been 61 Council and Committee Meetings.

Mr. Caws also explained that the amount of £1,500, referred to in Note 4, had been a fair estimate by the Council at the time of the preparation of the Accounts of the liabilities incurred in respect of the *Handbook*. He stated that as this amount was only an estimate and would in any case have been carried forward in the Balance Sheet and would not have affected the Income and Expenditure Account, it was considered quite reasonable to refer to this amount in the form of a note. The greater proportion of this amount represented the cost of paper for the *Handbook*, which was now held in stock in readiness for the final printing, and the cost of the composing work carried out to the date of the Accounts; the balance being the estimate for work done on drawings and blocks and for amounts due to contributors.

During the subsequent discussion Mr. C. E. Newton questioned the wisdom of investing the monies of the Society in Defence Bonds. Mr. Caws stated that monies invested in Defence Bonds could be redeemed at par by giving six months' notice and on demand by sacrificing six months' interest.

Mr. R. C. Hills referred to the restrictions placed on the Society in investing surplus monies in industrial ventures. Mr. Caws stated that the Council had recently discussed with the Board of Trade the question of amending the present

Articles of Association to enable the Council to deal more readily with surplus monies and that it was intended in due course to place a revised Article dealing with the Society's Investments before the Members for their consideration.

Mr. Garratt considered that the Council in past years should have given more thought to the possibility of the investment of the Society's funds in industrial shares. Mr. Caws commented that he personally would not have recommended investments of this nature.

Mr. Deacon inquired where the money donated to the Society by Mr. P. A. Thorogood in connection with the Radio Hobbies Exhibition had been shown in the Accounts. Mr. Caws explained that Mr. Thorogood had asked that this should be used to offset the cost of the Society's participation in the Exhibitions. The amount was not fixed but Mr. Thorogood in his agreement with the Society had guaranteed a sum not less than £100 each year. The amount for the 1958 Exhibition was £135.

The President explained that the Exhibition was sponsored by the Society without any financial liability falling upon the Society.

Questions were then asked regarding the possible sale of foreign stamps received by the QSL Bureau. Mr. H. V. Wilkins (a Vice-President of the Society and a past member of the Council) recalled that when Mr. Milne first offered to undertake the duties of QSL Manager the Council had informed him that he could retain stamps affixed to packets of QSL cards.

After several other questions had been dealt with Mr. W. E. Green and Mr. W. F. Thomson spoke of the unpleasant remarks that had been made by a few members present. Mr. Thomson also referred to the fact that the Council had been elected by the members to govern the Society and that it had done this to the satisfaction of the majority of members. Mr. J. W. Mathews said he considered it was a matter of opinion whether the present Council had governed the Society to the satisfaction of members.

It was then moved by Mr. Caws, duly seconded and RESOLVED, with four members dissenting, that the Report of the Honorary Treasurer and the Audited Accounts for the year ended 30th June, 1959 be approved and adopted.

Election of Council, 1960

The President announced that the following members had been elected without opposition to serve on the Council for the year 1960: President, Mr. W. R. Metcalfe; Zone B Representative, Mr. F. K. Parker.

The President announced that in the ballot for the office of Executive Vice-President, Mr. S. L. Hill had obtained 927 votes and Mr. N. Caws 664 votes. In the ballot to fill the four vacancies due to occur on December 31, 1959, among the Ordinary Members of

Council, Mr. A. O. Milne had obtained 1,260 votes, Mr. C. H. L. Edwards, 1,131 votes, Mr. R. C. Hills, 906 votes, and Mr. G. M. C. Stone, 890 votes. The unsuccessful candidates were Mr. D. Deacon, 798 votes, Mr. G. C. Price, 698 votes, and Mr. W. J. Green, 569 votes.

In the ballot to fill the vacant office of Zone D Representative, Mr. F. A. Russell, had obtained 97 votes, and Mr. D. T. Boffin, 49 votes.

The President declared that Messrs. Metcalfe, Hill, Milne, Edwards, Hills, Stone, Parker and Russell had been duly elected to serve on the Council. The President announced that the scrutineers accepted 1,620 ballot papers for the main election and 146 for the Zone D election. Thirteen ballot papers were rejected.

The President congratulated the successful candidates and thanked those who were not successful for agreeing to stand for election. He also thanked Messrs. F. W. Fletcher, F. F. Ruth, R. F. Stevens and Miss B. Fletcher for scrutinising the Ballot.

The President announced that the following members of the 1959 Council were not required to stand for election in their respective offices:

Dr. R. L. Smith-Rose	..	Retiring President
Mr. L. E. Newnham	..	Retiring Immediate Past President
Mr. N. Caws	..	Honorary Treasurer
Mr. H. A. Bartlett	..	Ordinary Member
Mr. K. E. S. Ellis	..	Ordinary Member
Mr. J. D. Kay	..	Ordinary Member
Mr. E. G. Ingram	..	Zonal Representative
Mr. P. H. Wade	..	Zonal Representative
Mr. A. C. Williams	..	Zonal Representative
Mr. E. W. Yeomanson	..	Zonal Representative



Trophy winners with the President after the Annual General Meeting on December 11, 1959. From left to right (seated), D. A. G. Edwards (G3DO), C. E. Newton (G2FKZ), Dr. R. L. Smith-Rose, H. F. Smith (G2DD), N. H. Hales (G2DTO); (standing) G. A. Jeapes (G2XV), David Deacon (G3BCM) representing Croydon Group, F. G. Lambeth (G2AIW), N. H. R. Munday (G5MA), Eric Woods (G3FST) of Gravesend Radio Society, R. B. I. Rutherford (A.1495), H. T. Rogers (G3NHR), L. W. Belger (G3JLB), of Gravesend Radio Society, P. J. H. Matthews (G3BPM), R. C. Taylor (GW2HCJ) and C. F. Hubbard (G5OX). (Photo by G2AHL)

Auditors

It was moved by Mr. Caws, duly seconded and RESOLVED that Edward Moore & Sons be reappointed Auditors for the year to June 30, 1960, at a fee of 100 guineas.

The Meeting terminated at 7.50 p.m.

Informal Discussion

AT the termination of the Annual General Meeting an informal discussion took place.

* * *

Mr. Deacon enquired why no report on the informal discussion after last year's Annual General Meeting had been published in the Society's journal. Mr. Yeomanson stated that due to pressure of business he had been unable to transcribe the tape recording of the meeting.

Transistors

Mr. C. E. Newton remarked that for the seventh time he wished to know what had become of the transistors donated to the Society more than seven years ago. The transistors themselves were now, of course, out-of-date but he still wanted to know why the Society had not benefited in the way of technical information based on experiments with these transistors.

The General Secretary stated that he had copies of the several letters written to the ex-Council member concerned regarding the transistors but there was nothing further he could do. He shared Mr. Newton's concern in not giving proper credit on this occasion to the firm concerned. Mr. G. R. M. Garratt commented that the transistors were obviously such early examples they might be useful to the Science Museum!

Amateur Radio Handbook

Mr. J. W. Mathews asked why there had been so long a delay in the appointment of a new Editor. Four months or so was a long time to add to the already lengthy period of production.

The General Secretary, replying for the Council, stated there had been considerable delay in getting back the material from the original Editor. Messrs. Caws and Newnham had been deputed to discuss with Mr. Hawker the possibility of his taking over the editorship and Mr. Hawker had been sent his letter of appointment about three weeks ago. Mr. Mathews commented that the General Secretary's remarks appeared to show lack of a plan or any foresight on the part of the Council.

Mr. Lewer then asked for a formal statement on the reasons for his dismissal from the Editorship. Mr. Newnham stated that he and Mr. Caws had had discussions with Mr. Hawker and that delays in producing the *Handbook* were, he felt, in part due to personal troubles but everything was now being done to finish the job as soon as possible.

Mr. Mathews remarked he thought the Council had apparently lost faith in the *Handbook* Committee as they had not been kept fully informed of developments.

The President then ruled that discussion on this subject should close.

Vote of Thanks to President

Mr. Hills moved a vote of thanks to Dr. Smith-Rose for the distinction he had placed on the Society by acting as President during 1959. Mr. Hill's comments were carried unanimously with sustained applause.

The President, thanking Mr. Hills for his remarks, said he had not expected any such tribute—he was sorry that he had not been able to do more for the Society during his term of office.

The informal discussion ended at 8.15 p.m.

Philip Ray Coursey

A CLOSE link with the Transatlantic Tests of 1920 and 1921 was broken last month by the death, at the age of 68 years, of Philip Ray Coursey, B.Sc.(Eng.), M.I.E.E. It was Mr. Coursey who undertook the responsibility of organizing the Tests from the United Kingdom side and it was undoubtedly due to his enthusiasm that success finally came to British amateurs.

Mr. Coursey was closely associated with the Wireless Society of London and the Radio Society of Great Britain just after the first World War. During that period he was a member of the Committee and in 1923 succeeded Mr. Leslie McMichael as Honorary Secretary of the Society. At that time he held the call G2JK.

Mr. Coursey was educated at University College, London, where he subsequently worked as an assistant to Professor Sir Ambrose Fleming. From 1920 to 1923 he was assistant editor of *Radio Review* and research editor of *Wireless World*. It was during this period that he organized the Transatlantic Tests on behalf of *Wireless World*. Philip Coursey was the author of many books, of which *Telephony without Wires* and *Radio Experimenter's Handbook* are perhaps the best remembered.

At the time of his death Mr. Coursey had been associated with the Dubilier Condenser Co. for 37 years during which period he had held many important positions including that of Technical Director from 1931 until his retirement from active directorship in 1957. He was the organizer of a number of developments and the holder of several patents.

Mr. Coursey's handsome moustache made him an outstanding figure at meetings and social gatherings.—J.C.

Radio Amateur Old Timers' Association

A REUNION of the members of the Radio Amateur Old Timers' Association will take place at the Horse Shoe Hotel, Tottenham Court Road, London, W.C.1, on Friday, April 1, 1960. The cost, including service, will be 25/-.

Radio amateurs who have held a full licence issued by the United Kingdom Postmaster General continuously, including the war years, for at least 25 years are eligible to apply for membership of R.A.O.T.A. and to attend the Reunion. The life membership subscription of the Association is 21/-. In addition members are invited to contribute to the R.A.O.T.A. Benevolent Fund.

An application form for membership can be obtained by sending a stamped and addressed envelope to the Founder of the Association, Mr. John Clarricoats, O.B.E. (G6CL), 16 Ashridge Gardens, London, N.13.

The Association has nearly 100 members including a number of past presidents of the R.S.G.B. and several holders of pre-1914 call-signs. Members receive a specially designed lapel badge.

New Director of Radio Research Station

M R. J. A. RATCLIFFE, C.B.E., F.R.S., has been appointed to succeed Dr. R. L. Smith-Rose, C.B.E., as Director of the Radio Research Station, D.S.I.R., who retires from that position at the end of September 1960.

The Council for Scientific and Industrial Research has authorized changes in the terms of reference of the Station under which investigations of the upper atmosphere and outer space by both radio and non-radio methods will be undertaken. The work has already been enlarged to include the use of radio and optical methods for tracking satellites and steps have been taken to provide a radio telescope. It is the intention to extend the space research further and, at the invitation of the present director, Mr. Ratcliffe will assist in planning the future research programme pending taking up his appointment.

Supplementary Report of the Council*

THE Report which follows refers briefly to some of the more important events and happenings that have taken place since the Society's financial year ended on June 30, 1959.

Geneva Radio Conference

Mr. L. E. Newnham, B.Sc., G6NZ (Immediate Past President) represented the Society during the first three weeks of the Geneva Radio Conference and again for 10 days during October and November. Mr. Newnham was attached to the United Kingdom Government delegation as a technical adviser on Amateur Radio matters.

The General Secretary (Mr. John Clarricoats, O.B.E., G6CL) also attended the Conference for three separate periods, totalling about eight weeks, in his capacity as Head of the International Amateur Radio Union team of observers. Mr. Arthur O. Milne, G2MI (Past President) joined the I.A.R.U. team for two weeks in October, whilst Mr. J. D. Kay, G3AAE, was in Geneva for one week early in November.

The Conference, which commenced on August 17, 1959, is due to complete its work on December 16, 1959, but whether it will do so remains to be seen. Until the Conference has ended no official statement can be made in respect to decisions that have been reached, but it is anticipated that the new frequency allocation table will show no very marked changes, compared with the Atlantic City Radio Conference table, insofar as the Amateur Service is concerned.

A reduction of 50 kc/s in the width of the present 7 Mc/s band is expected but in view of present conditions on that band the loss, whilst unwelcome, cannot be regarded as serious, particularly in view of the very great demand for more broadcasting frequencies in that part of the spectrum.

[These words were written some time before the conference ended. Readers will have seen from the report published in the January issue that *status quo* has been maintained for all current amateur bands and that the only loss has been 50 kc/s between 7.1 and 7.15 Mc/s—EDITOR.]

The Council is glad to report that members of the United Kingdom Government delegation, as well as members of several other delegations, have spoken at the Conference in high praise of the Amateur Service and of the work done by radio amateurs, particularly in times of emergency.

Exhibitions

The Society's stand at the National Radio and Television Show, held at Earls Court, London, during the late summer, attracted a good deal of attention. About 60 new members were enrolled at the stand where sales of publications were satisfactory.

The third annual Radio Hobbies Exhibition sponsored by the Society and organized by Mr. P. A. Thorogood, G4KD, was held in the Old Hall of the Royal Horticultural Society, London, from November 25 to November 28. The Exhibition was opened by the Chief Naval Electrical Officer, Rear Admiral K. R. Buckley, who is also Director of Naval Engineering and Electrical Training.

An outstanding feature of the exhibition was a display of communications receivers loaned by British, American and Italian manufacturers.

The Exhibition was supported by more than 30 firms, several of whom were making their début at an exhibition of amateur equipment in England. Ninety-six new members were enrolled.

The Council records its thanks to Mr. F. F. Ruth, G2BRH,

who acted as manager of the Society's stands at both Exhibitions, and to all who undertook stand duties.

New R.S.G.B. Publications

The 1960 edition of the *R.S.G.B. Amateur Radio Call Book* was published on the opening day of the R.S.G.B. International Radio Hobbies Exhibition. This edition reflects the 1,500 changes that have taken place since the previous edition appeared in November 1958.

Plans are being made to produce a new R.S.G.B. publication to be called *The R.A.E. Manual*. Mr. B. W. F. Mainprise, B.Sc., G5MP, is preparing the material.

R.S.G.B. Bulletin Costs

Following the settlement of the recent dispute in the printing industry the Society, in common with other publishers, was notified in August 1959 that printing charges for the R.S.G.B. BULLETIN would be increased immediately by approximately 10 per cent. The effect of this increase means that, on the basis of 12 48-page issues, printing charges will rise by approximately £720 in a full year.

In order to offset, in some measure, the effect of this serious increase in production costs a substantial increase in membership is vitally necessary.

Official Regional Meetings

Official Regional Meetings were held in Glasgow (September 12), Ayr (September 13), Southampton (September 20) and Cardiff (September 26).

The Council records its thanks to those who were responsible for organizing the meetings, all of which were well attended.

Mobile Rallies

A National Mobile Rally organized on behalf of the Radio Society of Great Britain by the recently-formed Amateur Radio Mobile Society took place at Woburn Abbey, Bedfordshire, on Sunday, September 13, 1959.

Mobile rallies were also held in several other parts of the country during the summer and autumn months and good attendances were reported from them all.

Licence Matters

The Council recently informed the G.P.O. that the Society would raise no objection to the use by United Kingdom amateurs of the systems of transmission known as radioteletype and Facsimile. The Council recommended, however, that the former system should not be permitted on frequencies in the band 1800-2000 kc/s and that facsimile should be restricted to 420 Mc/s and other higher frequency amateur bands.

It is understood that the G.P.O. will authorize individual amateurs upon application to use these particular systems of transmission, and that the position in respect to RTTY will be reviewed in the light of experience in 12 months' time.

Radio Amateurs' Examination

The examination arranged by the G.P.O. during October 1959 resulted in 159 passes and 51 failures. The percentage of passes (76 per cent) was considerably higher than the percentage of passes (59 per cent) recorded in the examination arranged by the City and Guilds of London Institute during May 1959.

The increased percentage of passes in the October examination probably resulted from a determined effort to succeed on the part of many who had failed the May examination.

(Continued on page 370)

* Read to the members present at the Annual General Meeting of the Society held on December 11, 1959.

Society News

Mr. H. A. Bartlett (G5QA) Appointed Executive Vice-President

THE Council at its meeting held on January 21, 1960, accepted, with regret, the resignation of Mr. S. L. Hill (G8KS) from the office of Executive Vice-President to which office he was elected by ballot in December 1959.

In consequence of Mr. Hill's resignation the Council declared that a casual vacancy existed in the office of Executive Vice-President. To fill the vacancy the Council invited one of the Ordinary Elected Members of the Council, namely, Mr. H. A. Bartlett (G5QA) of Exeter, to serve in the office of Executive Vice-President. Mr. Bartlett, who was President of the Society in 1955, accepted the Council's invitation.

To fill the casual vacancy thus created among the Ordinary Elected Members the Council invited Mr. David Deacon (G3BCM) of London, S.E.25, to join that body. Mr. Deacon, who polled the highest number of votes among the unsuccessful candidates at the recent election, accepted the Council's invitation. Mr. Deacon was Chairman of the Society's TVI/BCI Committee during 1959 and was a member of the Technical Committee.

London Lecture Meeting

ABOUT 40 members were present at the Institution of Electrical Engineers on January 22, 1960, to hear Dr. R. L. Smith-Rose, C.B.E. (Immediate Past President) lecture on Radio Aspects of the I.G.Y. The lecture was illustrated by a number of diagrams and colour transparencies. At the conclusion of the lecture the Society's chief co-ordinator during the I.G.Y. (Council Member G. M. C. Stone, G3FZL) described some of the special projects undertaken by radio amateurs. A vote of thanks to the speakers was proposed by Council Member R. C. Hills, B.Sc.(Eng.), G3HRH.

The Chair was taken by Mr. L. E. Newnham, B.Sc. (G6NZ), (Penultimate Past President) who had the support of Council Members N. Caws, G3BVG (Honorary Treasurer); A. O. Milne, G2MI (Past President); D. Deacon, G3BCM; K. E. S. Ellis, G5KW; E. G. Ingram, GM6IZ; J. D. Kay, G3AAE and E. W. Yeomanson, G3IIR.

"High Fidelity Sound Reproduction for the Amateur"

IN his lecture to the Society at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, on March 25, Mr. H. A. M. Clark, B.Sc.(Eng.), M.I.E.E., G6OT, will explain what is meant by and what qualities are desirable in a high-fidelity sound reproduction system. This will be followed by a brief discussion of some of the fundamental principles involved and the practical problems encountered when such a system is installed in a domestic setting. Mr. Clark will then review some of the types of equipment available.

A number of short demonstrations will be given throughout the lecture to illustrate the points made. In conclusion there will be a short recital of typical recorded items.

Visitors to this important meeting will be welcome. Buffet tea will be served free at 6 p.m. and the meeting will commence at 6.30 p.m.

Bulletin Stencil Plates

IT occasionally happens that a stencil plate used for the preparation of a particular BULLETIN wrapper becomes worn or loses ink, with the result that the Post Office experience difficulty in tracing the address.

Members who notice that the address on the wrapper used for their copy of the BULLETIN is indistinct, or in any way faulty, are asked to advise Headquarters.

Committees of the Council 1960

THE following members have been appointed to serve on the committees of the Council for 1960:

Contests. *Council Members:* K. E. S. Ellis (G5KW), R. C. Hills (G3HRH); *Non-Council Members:* P. M. Elton (G3GOZ), D. A. Findlay (G3BZG), M. Harrington (B.R.S.20249), W. H. Matthews (G2CD), H. W. Rees (G3HWR), A. W. W. Timme (G3CWW), F. E. Woodhouse (G3DC).

Exhibition. *Council Members:* C. H. L. Edwards (G8TL), G. M. C. Stone (G3FZL), E. W. Yeomanson (G3IIR); *Non-Council Members:* G. W. Norris (G3ICI), F. F. Ruth (G2BRH), A. J. Worrall (G3IWA).

Finance and Staff. *Council Members:* H. A. Bartlett (G5QA), N. Caws (G3BVG), E. G. Ingram (GM6IZ), L. E. Newnham (G6NZ) and P. H. Wade (G2BPJ).

G. P. O. Liaison. *Council Members:* J. Douglas Kay (G3AAE), A. O. Milne (G2MI), L. E. Newnham (G6NZ). *Non-Council Members:* H. A. M. Clark (G6OT).

Membership and Representation. *Council Members:* H. A. Bartlett (G5QA), E. G. Ingram (GM6IZ), J. Douglas Kay (G3AAE), F. K. Parker (G3FUR), F. A. Russell (G3BHS), P. H. Wade (G2BPJ), A. C. Williams (GW5VX), E. W. Yeomanson (G3IIR).

R.A.E.N. *Council Members:* C. H. L. Edwards (G8TL), L. E. Newnham (G6NZ), E. W. Yeomanson (G3IIR). *Non-Council Members:* G. A. Allcock (G3ION), C. L. Fenton (G3ABB), A. C. Gee (G2UK), E. A. Matthews (G3FZW).

Technical. *Council Members:* D. Deacon (G3BCM), R. C. Hills (G3HRH), G. M. C. Stone (G3FZL). *Non-Council Members:* H. A. M. Clark (G6OT), D. N. Corfield (G5CD), G. C. Fox (G3AEX), J. W. Mathews (G6LL), R. F. Stevens (G2BVN).

TVI/BCI. *Council Members:* D. Deacon (G3BCM), L. E. Newnham (G6NZ), E. W. Yeomanson (G3IIR). *Non-Council Member:* J. W. Mathews (G6LL).

V.H.F. *Council Members:* N. Caws (G3BVG), K. E. S. Ellis (G5KW), G. M. C. Stone (G3FZL). *Non-Council Members:* W. H. Allen (G2UJ), J. H. Hum (G5UM), F. G. Lambeth (G2AIW), A. L. Mynett (G3HBW).

Scientific Studies. *Council Members:* R. C. Hills (G3HRH), G. M. C. Stone (G3FZL). *Non-Council Members:* J. W. Mathews (G6LL), A. L. Mynett (G3HBW), C. E. Newton (G2FKZ).

The 70.2-70.4 Mc/s Band

THE Society is pleased to announce that the Post Office has been able to agree to the continued use by U.K. amateurs of the frequency band 70.2-70.4 Mc/s, and to lift the restriction on amateur operation within 50 miles radius of the Jodrell Bank Observatory.

Previously the foregoing facility had been authorised on a year-by-year basis and was restricted to amateurs living more than 50 miles from Jodrell Bank.

The decision to lift the restriction followed the completion of some special tests carried out by Mr. A. Smith (G3AYT) of Hyde, Cheshire, in collaboration with engineers at the Jodrell Bank Observatory.

British Amateur Radio Teletype Group

THE Society has been informed that the title of the British Amateur Radio Teletype Group has been changed to British Amateur Radio Teleprinter Group. The Hon. Secretary of the group is Dr. A. C. Gee (G2UK), "East Keal," Romany Road, Oulton Broad, Lowestoft, Suffolk.

Extension of GB2RS R.S.G.B. News Bulletin Service

FOR some time the Council has had under consideration the question of extending the scope of the Society's 3-6 Mc/s News Bulletin service. Last November an *ad hoc* Committee was set up to discuss how best this could be achieved and as the result of the deliberations of this Committee it has been decided to operate the service from five instead of two centres as at present.

The full schedule of Sunday transmissions is as follows:

Area	Commencing Time
South-East England	09.30 hours
Severn	10.00 hours
North Midlands	10.30 hours
North-East England	11.00 hours
South-West Scotland	11.30 hours

The following members have accepted an invitation extended to them by the Council to join the team of News Readers:

Severn Area	Mr. L. W. Lewis, G8ML
	Mr. M. D. Mason, G6VX (Reserve)
North Midlands	Mr. F. C. Ward, G2CVV
	Mr. B. C. Brown, G3JFD (Assistant)
	Mr. S. Swindell, G3NG (Reserve)
South-West Scotland	Mr. S. E. Hincks, GM3ASM
	Mr. D. Macadie, GM6MD (Reserve)

Mr. A. O. Milne (G2MI) will continue to read the Bulletin for the benefit of listeners in South-East England with Mr. C. H. L. Edwards (G8TL) as Reserve. Mr. J. W. Swinnerton (G2YS) and Mr. A. C. Dunn (G2ACD) will continue to perform a similar service in North-East England.

The extended service will commence not later than Sunday, March 6, 1960.

Marconi International Marine Company honour G.P.O. Delegates to Geneva Conference

THE General Secretary (Mr. John Clarricoats, O.B.E.) and Mr. Arthur Milne were among the guests at a private luncheon given by The Marconi International Marine Communication Company Ltd. at the Savoy Hotel, London, on January 14, 1960, in honour of the senior members of the General Post Office delegations to the I.T.U. Conferences held last year in Geneva.

The chair was taken by the Managing Director of the host company, Mr. Roland R. Ferguson (G4VF), who had the support of many of his top executives.

Mr. W. A. Wolverson, C.B. (Director of Radio Services, G.P.O.) and Captain Charles F. Booth, C.B.E. (Deputy Engineer-in-Chief, G.P.O.), leaders of the U.K. delegations to the Plenipotentiary and Radio Conferences respectively, were the principal speakers after the chairman had expressed thanks for the help given by the Post Office members of the two delegations to those whose chief interest lies in maritime matters.

R.S.G.B. QSL Bureau G3AAA—BZZ Sub-Manager

FOR business reasons, Maurice Hassall (G3EMD) has had to relinquish the duties of QSL Sub-Manager for the G3AAA-BZZ series. With effect from January 11, 1960, C. C. Olley (G3AIZ), 157 Wanstead Park Road, Ilford, Essex, assumed responsibility for the dispatch of QSL cards to members with call-signs in this group. Envelopes for the collection of cards should be sent direct to Mr. Olley.

Revision Notes Available

COMPREHENSIVE revision notes for the use of members who are preparing for the City and Guilds of London Institute examination on Friday, May 6, 1960, are available from Headquarters, price 1s. per set, post paid.

Radio Astronomy

THE Geneva Radio Conference agreed to set aside certain bands of frequency for Radio Astronomy purposes. As some of the bands in question are also allocated to other services, administrations are to be asked to consider the needs of the Radio Astronomy service when making allocations within the bands concerned to those other services. The following is a list of the Radio Astronomy allocations as recorded in the Geneva Frequency Table: 150-153 Mc/s (Region I); 404-410 Mc/s (Regions II and III); 406-410 Mc/s (Region I); 606-614 Mc/s; 1400-1427 Mc/s; 2690-2700 Mc/s; 4900-5000 Mc/s.

Administrations are to be urged to protect the Deuterium Line frequencies 322-329 Mc/s.

The band 400-406 Mc/s is to be used by stations which provide Met. Aids.

Space and Air-space

IT was agreed at the Geneva Radio Conference 1959 to allocate certain bands of frequency for Space and Air-space research. In general the allocations will be shared with the Fixed and Mobile services but in one case, at least, the sharing will be with Broadcasting and in another with the Radiolocation service.

The following is a list of the Space and Air-space allocations as recorded in the Geneva Frequency Table: 136-137 Mc/s; 183-1-184-1 Mc/s; 400-401 Mc/s; 1427-1429 Mc/s; 1700-1710 Mc/s; 2290-2300 Mc/s; 5250-5255 Mc/s; 8400-8500 Mc/s; 15-15-15-25 Gc/s; 31-5-31-8 Gc/s.

New Year Honours

CONGRATULATIONS are offered to Wing Commander H. E. Bennett, A.M.Brit.I.R.E. (G8PF) who became an M.B.E. in the New Year Honours' List. Senior Electronics Plans Officer on the staff of the Air Officer Commanding-in-Chief, Fighter Command R.A.F., "Benny" recently moved to 21 Beamish Drive, Bushey Heath, Herts.

Supplementary Report of the Council

(Continued from page 368)

A meeting of the City and Guilds of London Institute Advisory Committee for the Radio Amateur's Examination, on which the Society is represented, took place during November.

R.S.G.B. News Bulletin Service

Instances have occurred recently of what appears to be deliberate attempts to jam the R.S.G.B. News Bulletin Service. The matter has been reported to the G.P.O. who are carrying out an investigation.

An *ad hoc* Committee of the Council has given consideration to ways and means of extending the scope of the present service. The Council hope to implement the recommendations of the Committee early in the New Year.

V.H.F. Matters

The Society's new v.h.f. beacon transmitter has not yet commenced operations from the site of the B.B.C. station at Wrotham, Kent, but plans are well advanced. It is expected that the first transmissions will commence shortly.

The Society's V.H.F. Manager (Mr. F. G. Lambeth, G2AIW) attended a meeting of I.A.R.U. Region I V.H.F. Managers in The Hague during October when a number of matters of general interest to v.h.f. enthusiasts were discussed.

* * *

The Council trust that the information given in this Supplementary Report will prove of interest to members generally.

Radio Amateurs' Examination

ANY member who wishes to sit for the Radio Amateurs' Examination, to be held on Friday, May 6, 1960, should apply without delay to his local technical college who will make the necessary arrangements with the City and Guilds of London Institute. The closing date for making such arrangements is February 24 but in exceptional circumstances entries may be accepted, subject to a late fee of £1, up to March 22, 1960. In cases of difficulty candidates should apply to the Director of Education for the county concerned.

The fee for the examination is £1, plus, in some cases, a small local accommodation fee.

The Radio Amateurs' Examination is a pass examination consisting of a single question paper of three hours' duration. The paper is divided into two parts. Part I contains only two questions each of which must be attempted. Part II consists of eight questions, six of which must be attempted. Candidates will be required to achieve a pass in each Part separately; failure in either Part will entail failure in the examination as a whole. Part I of the Syllabus deals with licensing conditions and transmitter interference and Part II with the theory of electricity and magnetism, radio principles, valves and circuitry, receivers, low power transmitters, propagation, aerials and measurements.

The examination is open to all candidates, whether they have attended a course of tuition or not. A certificate is issued to those who are successful.

* * *

As the result of a suggestion made to the Society by Mr. A. D. Taylor (GW8PG), the City and Guilds of London Institute has agreed to allow the use of log tables as well as slide rules at the Radio Amateurs' Examination in 1960 and subsequently. An appropriate amendment has accordingly been made to the schedule which is sent to each of the colleges so that log tables will be available to all students who feel they require them.

British Institution of Radio Engineers

THE Thirty-third Annual Report of the Council of the British Institution of Radio Engineers reveals that, owing to the continued growth of the organization, steps are being taken to acquire a suitable site for a new headquarters building and that a consultant architect has been appointed. Membership has increased during the last four years by 42 per cent in the graduate grade. The number of elections and transfers to the grade of Associate has, however, decreased in recent years.

Pleasant Company

READERS of a *Women's Realm* quiz were asked to state whether a hamster is: (a) someone who works in a bacon-curing factory; (b) a small rodent kept as a pet; (c) an Amateur Radio enthusiast who operates his own transmitter.

Silent Key

MARK HOLLINSHEAD (G5QG)

It is with deep regret that we record the sudden death, on December 24, 1959, of Mr. Mark Hollinshead (G5QG), one of the best-known radio amateurs in Birmingham. Although he was operating his Amateur Radio station at the time, his death was not connected with his equipment.

Mark Hollinshead had held a licence for 28 years and many who obtained their licences during that period owe much to him for his help and encouragement. Amateurs throughout the world will remember him for his cheerfulness and great love of Amateur Radio.

To Mrs. Hollinshead, his son and daughter the deepest sympathy is extended.

G3WF.

Now Available

R.S.G.B. AMATEUR RADIO CALL BOOK

1960 Edition

Lists practically all United Kingdom and Eire call-signs.

Price 3/6 (by post 4/-)

Special trade terms on orders for a dozen or more.

R.S.G.B. BOOKSHOP

New Ruskin House, Little Russell Street, London, W.C.1.

R.S.G.B. Film Library

THE following films are available on loan to R.S.G.B. Groups and Affiliated Societies:

1947 D.F. Event	..	..	..	..	(Print)
1947 N.F.D.	..	..	..	..	(Print)
1951 Festival Convention	..	..	..	..	(Print)
1952 N.F.D.	..	..	..	..	(Print)
1954 Bristol Convention	..	..	..	..	(Reversal Original)
1956 Publicity Film, R.S.G.B.	..	..	..	..	(Print)
1958 "Humanity in Action"	..	..	..	..	(Print)

The latter is a R.A.E.N. sequence from a British Red Cross film of that name.

Applications to book films should be made as far in advance as possible and should be sent to Mr. C. W. Austin (B.R.S. 22019), 135 Shaftesbury Avenue, Kenton, Harrow, Middlesex.

Those borrowing films are asked to take great care of them and to return them promptly after use by registered post.

R.S.G.B. QSL Bureau Sub-Managers

THE following is a list of the R.S.G.B. QSL Bureau Sub-Managers showing the call-sign groups for which they are responsible:

G2 and DL2 calls:	G. Verrill (G3IEC), 10 Seahorse Street, Gosport, Hants. (Certificates Manager).
G3, 4 and 5 two-letter calls & GC	E. G. Allen (G3DRN), 65a Melbury Gardens, London, S.W.20.
G6 calls:	A. J. Mathews (G6QM), 62 Ashlands Road, Hesters Way Estate, Cheltenham.
G8 calls:	A. W. Gover (G4AU), 20A, Cambridge Road, Bromley, Kent.
G3AAA-BZZ:	C. C. Olley (G3A1Z), 157 Wanstead Park Road, Ilford, Essex.
G3CAA-DZZ:	C. A. Bradbury (B.R.S. 1066), 13 Salisbury Avenue, Cheltenham.
G3EAA-HZZ:	W. J. Green (G3FBA), 790 Rochester Way, Sidcup, Kent.
G3IAA-KZZ, B.R.S. and A numbers	C. Usher (G2CCD), 24 Carlisle Road, Dartford, Kent.
G3LAA-MZZ:	G. C. Voller (G3JUL), 13 Marlborough Road, Ashford, Middlesex.
G3NAA onwards:	G. Verrill (G3IEC), 10 Seahorse Street, Gosport, Hants.
GD calls:	T. R. Moore (GD3ENK), "Glyn Moar," St. John's, Isle of Man.
GI calls:	W. H. Martin (G15HV), "Swallow Lodge," Greenisland, Co. Antrim, Northern Ireland.
GM calls:	D. Macadie (GM6MD), 154 Kingsacre Road, Glasgow, S.4.
GW calls:	J. L. Reid (GW3ANU), 28 Walterston Road, Gabalfa, Cardiff.

Envelopes for the collection of cards may be sent direct to the Sub-Manager concerned or to the QSL Manager (Mr. A. O. Milne). Outgoing cards should not be sent to the Sub-Manager unless they are in the call-sign group for which he holds envelopes. For example, the holder of a G3J- call may send cards for calls in the series G3IAA-G3KZZ to his own Sub-Manager, together with envelopes for the collection of cards, but he should not send to him cards in any other call-sign series. Sending cards for general distribution to the Sub-Managers only involves the cards in delay and the Society in needless expense.

Mr. Milne's address is 29 Kechill Gardens, Bromley, Kent.

R.A.E.N. Notes and News

By E. ARNOLD MATTHEWS (G3FZW) *

HIGH tides at near-danger levels on the East Coast at predicted and also unpredicted times; gales over most of the country; and several areas of inland flooding all serve as a warning to R.A.E.N. members that their services might be required at any time and that their equipment should be always maintained ready for instant use. At the time of writing no calls had yet been received for our services. The worst of the winter weather may not be over and what is generally considered to be the "mobile" season lies some months ahead. For R.A.E.N. there is no mobile season. It extends through the whole year, and the worse the weather, the greater the possibility of serious activity.

Around the Groups

The highspot of activity during last month was undoubtedly the Essex Group's communications test held on January 10 when over 50 stations took part in an exercise designed to ascertain communications between Essex hospitals and County Police headquarters.

Of the 123 hospitals in Essex, 59 were selected and mobiles were sent to these according to a prearranged plan. Upon arrival, stations were given a message from a B.R.C.S. officer. They also had to send details of the nearest police station, ambulance depot and fire station. All information received by the Control was relayed from Chelmsford to the B.R.C.S. H.Q. station, G3NAT, manned by London members. All messages sent were received and all messages planned to be sent were in fact sent, with the exception of those which had been allotted to certain Suffolk stations which had unfortunately to cancel their arrangements at very short notice. The time schedule provided for a message every eight minutes, thus allowing the 23 mobile stations engaged to move from one hospital to another and be in position for the next message. This highly successful exercise finished within the scheduled time, and much very useful publicity was gained from articles in local newspapers. C.C. G8TL and his officers are to be complimented on the thorough planning which ensured such a high standard.

Things are moving on the South Coast. The Dorset group has commenced net exercises and is gaining much useful information, reports C.C., G2HCD. The Bournemouth A.C., G3HLW, finds that his group still require to work cross-band 160/2m since it will maintain contact with the Dorset group as well as working in Hampshire.

In the West Country, G5TN is again picking up the threads of R.A.E.N. in Somerset and recently addressed a St.J.A.B. officers' training conference at Bridgewater. During the lively discussion which followed, R.Adm. Royer Dick, St.J.A.B. Deputy Commissioner-in-Chief, stressed the importance of communications and suggested that St.J.A.B. officers should be trained in message writing. As a result, the County St.J.A.B. offered facilities for R.A.E.N. in all their divisional H.Q.s. They wish to hold an exercise with R.A.E.N. shortly. G5TN is anxious to form R.A.E.N. Groups in Bath, Taunton, Yeovil and Ilminster. Members are required in all these places and there is also a considerable need for Area Controllers. Interested amateurs are asked to contact G5TN without delay.

Co. Durham Group has also made firm contact with St.J.A.B. and recently gave a short demonstration to the Area Commissioner. C.C., G2TG, reports that stations participating worked hard to make this entirely successful.

* 1 Shortbutts Lane, Lichfield, Staffs.

London Meeting
Friday, March 25, 1960

"High Fidelity Sound Reproduction for the Amateur"

by H. A. M. Clark, B.Sc.(Eng.), M.I.E.E., G6OT

The lecture will be illustrated throughout with demonstrations

at the

Institution of Electrical Engineers
Savoy Place, Victoria Embankment

Buffet Tea 6 p.m.

Lectures 6.30 p.m.

Worcestershire Group is hoping to gain recruits from the number of new licensees in the county. Although at the time of writing the flooding in the area has not occasioned any R.A.E.N. activity, the emergency equipment is maintained in regular use "just in case."

Electrical Engineers' Exhibition

THE ninth National Electrical Engineers' Exhibition at Earls Court, London, will be opened by the President of the Board of Trade, the Rt. Hon. Reginald Maudling, M.P., on April 5.

Among the many features, will be electrical and electronic equipment from *H.M.S. Victorious* and *H.M.S. Hermes* and the new *S.S. Canberra*. An electrolier, believed to be the largest in the world, will be suspended from the 110 ft. high roof of the exhibition hall. Measuring 75 ft. in circumference, it will comprise an entirely new design based on molecular models and incorporate many specially designed accessories. The exhibition will remain open until April 9.

CONTESTS DIARY

February 20-21 A.R.R.L. DX Contest
(C.W. Section)

February 27-28 First 1.8 Mc/s Contest
(Rules in this issue)

February 27-28 French (R.E.F.) Contest
(C.W. Section)

March 5-6 144 Mc/s Open Contest*
(Rules in this issue)

March 5-6 A.R.R.L. DX Contest
(Phone Section)

March 19-20 A.R.R.L. DX Contest
(C.W. Section)

March 26-27 1250 Mc/s Tests
(Rules in this issue)

April 9-10 French (R.E.F.) Contest (Phone Section)

April 9-10 Low Power Contest

April 24 D/F Qualifying Event

May 8 First 144 Mc/s Field Day*

May 15 D/F Qualifying Event

May 22 420 Mc/s Contest

May 29 D/F Qualifying Event

June 11-12 National Field Day
(see page 276, December 1959)

June 19 70 Mc/s Contest

July 3 Second 144 Mc/s Field Day*

July 10 D/F Qualifying Event

September 3-4 European V.H.F. Contest

September 3-4 National 144, 420 and 1250 Mc/s Contests*

September 4 D/F National Final

September 25 Low Power Field Day

October 2 R.A.E.N. Rally

November 6 Second 1.8 Mc/s Contest

November 19-20 R.S.G.B. Telephony Contest

R.S.G.B. Telephony Receiving Contest

* To coincide with Region 1 I.A.R.U. v.h.f. contest dates.

CONTEST NEWS

— RESULTS — REPORTS — RULES —



First 1-8 Mc/s Contest 1960

THE rules for this contest, which will be "short," are as follows.

When: 21.00 G.M.T. on Saturday, February 27 to 03.00 G.M.T. on Sunday, February 28, 1960.

Eligible Entrants: All fully paid-up Corporate Members of the R.S.G.B. resident in G, GC, GD, GI, GM and GW.

Contacts: C.w. (A1) contacts only in the 1-8 to 2 Mc/s band.

Scoring: Contacts with stations in the British Isles (G, GC, GD, GI, GM and GW) will score one point only; contacts with stations outside the British Isles will score three points.

Contest Exchanges: RST reports followed by the contact number starting with 001. All reports must be acknowledged with "R."

Logs: (a) Must be tabulated in columns headed (in this order) "Date/Time G.M.T.", "Call-sign of station worked," "My report on his signals and serial number sent," "His report on my signals and serial number received," "County of station worked," "Bonus Points," "Points Claimed."

(b) The cover sheet must be made out in accordance with R.S.G.B. Contests Rule 5. The declaration must be signed.

(c) Entries must be postmarked not later than **Monday, March 14, 1960**.

Power Input: The power input to the final stage or any preceding stage of the transmitter must not exceed 10 watts.

Awards: At the discretion of the Council of the R.S.G.B., the **Somerset Trophy** will be awarded to the winner and certificates of merit to the stations placed second and third. In addition, the **Maitland Trophy** will be awarded to the Scottish station with the highest aggregate number of points in this contest combined with the Second 1-8 Mc/s Contest 1959. A certificate of merit will be awarded to the non-transmitting member submitting the best check log in the opinion of the judges.

The General Rules for R.S.G.B. Contests published on page 348 of the January 1959 issue of the R.S.G.B. Bulletin apply to the contest.

R.S.G.B. 1250 Mc/s Tests 1960

THE Council and the Contests Committee hope that the fifth series of R.S.G.B. 1250 Mc/s Tests will attract the support of more u.h.f. workers than was the case last year. The rules are as follows:

Rules

The event will have few fixed rules, other than the duration, which will be from 17.00 G.M.T. on Saturday, March 26, to 22.00 G.M.T. on Sunday, March 27, 1960, and the provision that all entries must be from fully paid-up Corporate members of the R.S.G.B. and accompanied by the declaration set out below. Entries can be accepted only on behalf of an individual station, though no limitation is placed on the number of operators or assistants. Entries from receiving stations will be welcome and will be eligible for the award.

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. The entrant submitting the best entry in the opinion of the judges will 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, New Ruskin House, Little Russell Street, London, W.C.1, and be postmarked not later than **April 11, 1960**. 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

144 Mc/s Open Contest 1960

R.S.G.B. members throughout Europe are invited to take part in this popular v.h.f. contest. Both phone and c.w. may be used.

The details are as follows:

When: 17.00 G.M.T. on Saturday, March 5, to 19.00 G.M.T. on Sunday, March 6, 1960.

Eligible Entrants: All fully paid-up members of the R.S.G.B. resident in Europe.

Contacts: May be made on either A1, A2, A3 or A3a.

Scoring: For each completed contact within the United Kingdom 10 points may be claimed; in addition a bonus of 25 points may be claimed

for the first contact in each new county in accordance with the list below. The whole of the London Postal Districts will count as one county only. For contacts outside the United Kingdom, a flat rate of 25 points for each completed contact may be claimed.

Contest Exchanges: RST or RS reports followed by the band identification letter A, the contact number and the location (e.g., RST559A001 6SE Oxford).

Logs: (a) Must be tabulated in columns headed in this order "Date/Time G.M.T.", "Call-sign of station worked," "My report on his signals and serial number sent," "His report on my signals and serial number received," "County of station worked," "Bonus Points," "Points Claimed."

(b) The cover sheet must be made out in accordance with R.S.G.B. Contests Rule 5 and the declaration signed.

(c) Entries must be postmarked not later than **March 21, 1960**.

Awards: At the discretion of the Council, the **Mitchell-Milling Trophy** will be awarded to the winning entrant and a certificate of merit to the entrant placed second. A certificate of merit will also be awarded to the non-transmitting member submitting the best check log in the opinion of the Contests Committee.

The General Rules for R.S.G.B. Contests published on page 348 of the January 1959 issue of the R.S.G.B. Bulletin apply to this contest.

LIST OF U.K. COUNTIES

England (G).			
1. Bedford	15. Hereford	28. Nottingham	
2. Berkshire	16. Hertford	29. Oxford	
3. Bucks	17. Huntingdon	30. Rutland	
4. Cambridge	18. Kent	31. Shropshire	
5. Cheshire	19. Lancashire	32. Somerset	
6. Cornwall	20. Leicester	33. Stafford	
7. Cumberland	21. Lincoln	34. Suffolk	
8. Derby	22. London (Postal Districts)	35. Surrey	
9. Devon	23. Middlesex	36. Sussex	
10. Dorset	24. Monmouth	37. Warwick	
11. Durham	25. Norfolk	38. Westmorland	
12. Essex	26. Northampton	39. Wiltshire	
13. Gloucester	27. Northumberland	40. Worcester	
14. Hampshire		41. Yorkshire	
Scotland (GM).			
42. Aberdeen	54. Fife	66. Renfrew	
43. Angus	55. Inverness	67. Ross & Cromarty	
44. Argyll	56. Kincardine	58. Roxburgh	
45. Ayr	57. Kinross	69. Selkirk	
46. Banff	58. Kirkcudbright	70. Shetland	
47. Berwick	59. Lanark	71. Stirling	
48. Bute	60. Mid-Lothian	72. Sutherland	
49. Caithness	61. Moray	73. West Lothian	
50. Clackmannan	62. Nairn	74. Wigtown	
51. Dumbarton	63. Orkney		
52. Dumfries	64. Peebles		
53. East Lothian	65. Perth		
Wales (GW).			
75. Anglesey	79. Caernarvon	83. Merioneth	
76. Brecknock	80. Denbigh	84. Montgomery	
77. Cardigan	81. Flint	85. Pembrokeshire	
78. Carmarthen	82. Glamorgan	86. Radnor	
Northern Ireland (GI).			
87. Antrim	89. Down	91. Londonderry	
88. Armagh	90. Fermanagh	92. Tyrone	
Channel Islands (GC).			
93. Alderney	95. Jersey	96. Sark	
94. Guernsey			
97. Isle of Man (GD).	98. All Stations outside the United Kingdom.		

French R.E.F. Contest 1960

THE C. W. Section of the French Society's DX contest will commence at 13.00 G.M.T. on February 27 and end at 21.00 G.M.T. on February 28. The Phone Section will be held between the same hours on April 9 and 10. Contest exchanges will consist of the RST or RS reports followed by the number of the contact (e.g., 579014). Each contact will score three points.

Entries should be sent to Lucien Aubry (F8TM), Traffic Manager, Réseau des Émetteurs Français, Boite Postale 42-01, Paris RP, France.

The contest provides an excellent opportunity to work stations in connection with the D.U.F. and other French operating awards.

R.S.G.B. Contest Forms

SPECIALLY printed log forms and cover sheets for the use of members taking part in contests are available from Headquarters on receipt of a s.a.e.

The Sign of Good Tape!



Wherever you see this poster you can be sure to buy Emitape—the World's finest recording tape, preferred by professionals and amateurs alike.

Emitape

...and remember—

the **B.B.C.** use Emitape **9** times out of **10**!

"44" Popular (Acetate)

"88" General Purpose

"99" Long Play, giving 50% increased playing time

"100" Double Play

EMI SALES & SERVICE LTD (Recording Materials Division) HAYES · MIDDLESEX · Telephone: SOuthall 2468
ES/R/80

Letters to the Editor . . .

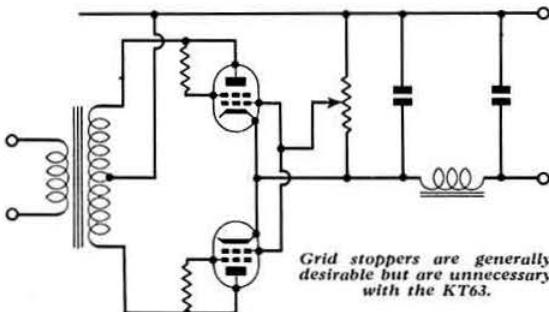
Neither the Editor nor the Council of the Radio Society of Great Britain can accept responsibility for views expressed by correspondents.

Variable Output Power Supply

DEAR SIR.—In his article entitled "A Variable Output Power Supply" (July 1959) Mr. Thompson refers to an earlier paper by A. H. B. Walker. When that paper appeared in *Wireless World* I referred Mr. Walker (and perhaps I may now refer you), to a short article that appeared in *Short Wave Magazine* for March 1949.

Since good regulation is generally unimportant in this type of power supply, I do not feel that the added complication of a separate rectifier for the grid supply is worth while. If the grids are controlled by a potentiometer connected between the cathodes and the negative line the regulation is not as good, and the cut-off is nothing like as sharp, but I find that the circuit gives an entirely adequate performance—and it is so simple that I tend to use it for all my odd power packs.

The choice of valve is determined, for most of us, by cost. The 807 is not as good a triode as the KT66, but it is far cheaper on the surplus market, and will in addition stand more voltage on the anode. But in my opinion the most useful valve for this circuit is the 2A3. This valve starts by being a triode, with low a.c. resistance, and has the added attraction of a 2.5 volt heater; two in series work happily off the ordinary 5 volt rectifier winding. In addition to releasing the usual 6.3 volt



winding, this means that the rectifier filaments will be running off a winding that is designed to work "up in the air"—which is sometimes an important consideration.

Finally, what a brutal way of measuring the resistance of a meter! I once wrote to you (and you published the letter) about the "text book" method for measuring the resistance of a meter: in this case the absolute value is unimportant, and it should be comparatively simple to pad it up to 10 ohms.

Yours faithfully,
J. B. ROSCOE (G4QK).

Message Handling

DEAR SIR.—For some time now we have been hearing that the Post Office is not making a profit from the handling of telegrams and that the telegram service may eventually cease, so we can safely presume that the Post Office does not now look upon this service as a profitable source of revenue, and may even consider it a liability.

Amateurs are investing increasing sums of money in equipment, and with the widening range of commercial gear, this capital investment will undoubtedly increase. To this has been added RTTY (radioteleprinting), a great gift to the experimenters, and the more mechanically minded amateurs, but at the same time leading to even more extensive installations. Yet all this apparatus is used purely for, to all intents and purposes under the present regulations, amusement only. That is, except when

Post Office communications are knocked out by disaster, but, as we know, in this country, such things, though they can happen, very seldom do.

With the abolition of the one year compulsory Morse operation for the newly licensed amateur there is not the incentive to pursue c.w. for its own sake, for naturally, in our quest for ease of communication it is often discarded as tedious in preference for telephony. Yet those who have the gift, or ability to enjoy c.w., those who like electronic keys and so on, will readily admit that there are many who have missed the thrill, that personal satisfaction, which comes to an amateur who is at ease, in an efficient and well-run station, when receiving a steady 30 w.p.m.

Surely all this adds up to the fact that amateurs in this country should be allowed to handle traffic. Yes, traffic—third party messages. But what do we mean by traffic? It is essentially, social messages from family to family, from friends at work, the folks next door, to their friends away from home, about everyday things. (Exclude anything of commerce, sport, clubs, and all the usual things on this theme, as in our licence). Of course, these are sent between us without any form of remuneration or gift whatsoever, from any party. But there is one big difference from commercial telegrams. The amateur cannot guarantee delivery, he cannot know when it will take place, he cannot even know whether the message he sends will ever be delivered at all. He can only trust other amateurs to do what he does, give of his best and leave it at that. So people who pass messages to amateurs will know full well that the only place for the urgent message is the Post Office, and we shall, quite rightly, only carry secondary traffic.

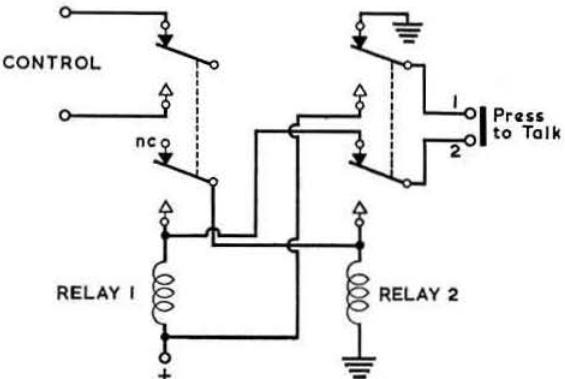
As the telephony sections of the amateur bands are already bearing a very heavy load it would be quite wrong to handle traffic by this mode, so a suggestion is made that it be restricted to c.w. and RTTY only. I visualise amateurs forming nets in the c.w. portion of the bands, and that only those to whom the idea appeals, will participate.

Now I call upon all members to voice their opinions, by Letters to the Editor, at the O.R.M.s and at local meetings. Let us see if we cannot, by majority, prevail upon our representatives to approach the Post Office with a view to amending the present ruling in this matter.

Yours faithfully,
ALLAN L. TAYLOR (G3JMO).
(We await the deluge!—EDITOR.)

Electrical Latching Switch

DEAR SIR.—It was with great interest that I read the article by G3HRH—"An Electrical Latching Switch"—in the September 1959 issue. I am using a similar switch in both my home station and the mobile rig with much success. Since the arrangement below works without delay and is a little cheaper to build I decided to forward it to you.



It is very important that the two relays have identical coils and that the two lines going to the push button should be "floating." If only one line to ground is available, an additional relay can be used to close point one to two.

Yours very truly,
E. J. KING (VE6QZ).
Calgary, Alberta, Canada.

Geneva and After: A Comment from Three Private Members

DEAR SIR,—Just as at the Atlantic City Telecommunications Conference in 1947, so at Geneva 12 years afterwards, the main brunt of stating the Amateur Radio case has fallen upon the shoulders of two British delegates, namely, G6CL and G6NZ, enjoying, happily, much more support from Official Authority than was given 12 years ago, and from many other countries—particularly Commonwealth ones—where Amateur Radio is looked upon with favour.

Every generous-minded member, will, we feel, wish recognition to be paid to the continued efforts made at the I.T.U. conference over many months by these two amateurs in particular.

It would be encouraging to think that the facts about these efforts could be noised abroad among the small minority of British radio amateurs who still pretend (though goodness knows why) that the R.S.G.B. does not exist, and that concerted action on an international basis doesn't matter very much.

Congratulations are in order on a second count: for the admirable exposition in the January BULLETIN by the General Secretary of what happened at Geneva, in language every member could understand.

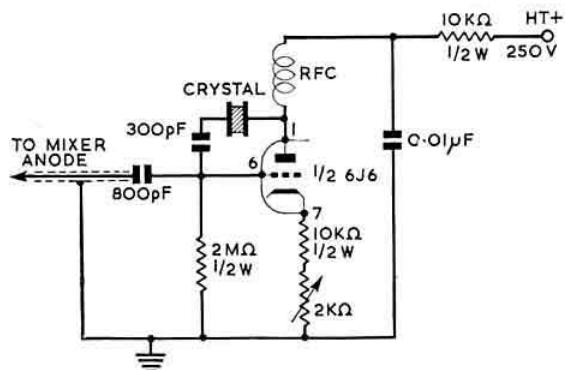
Yours faithfully,
GERALD GIBBS (G3AAZ).
JACK HUM (G5UM).
ERLE SPARRY (G3BJC).

(Respectively Hon. Treasurer, Town Representative and Assistant Town Representative of the Welwyn Garden City Group, writing in our private capacities.)
Hertfordshire.

Crystal Controlled Q Multiplier

DEAR SIR,—After reading G2BVN's article on "Q-Multipliers," in the August 1959 BULLETIN, I thought of employing a crystal in place of the oscillator coil used in the original.

The crystal is the one formerly used in the filter circuit of my BC342 receiver, at the intermediate frequency of 470 kc/s. The circuit is shown below. After fitting the Q Multiplier, the



i.f. transformers were touched up to peak at the crystal frequency. The insertion loss of the original filter circuit was changed to a quite considerable gain, whilst the bandwidth appears to be the same.

Yours faithfully,
P. J. BALL (G3HQT).
Morden, Surrey.

Top Band Impressions

DEAR SIR,—As a newcomer to Top Band, I think some comments may be of assistance to others who are also new to that band.

My first comment applies to phone and c.w. operators. Because the Worked All British Counties certificate exists, there are a number of much sought after British stations. After a CQ call, or at the end of a QSO, these "rare birds" are sometimes given a "20 by 20" call at the end of which a QSO with someone else is well under way. The long caller then has to wait for another chance. Those who operate on the real DX bands soon learn that the best type of call is a "3 by 3," but the lack of

DX on Top Band gives people little opportunity to learn these techniques. So, Top-banders, keep your calls short.

My second comment applies to phone operators only. For some reason many, but not all, Top Band phone stations sound like hi-fi, with the bass turned up and the treble turned down. While this may narrow the bandwidth the lack of penetration is partially offset by turning up the volume, thus giving an enormous bandwidth. Motto—when designing an amplifier put in the top-cut but don't forget the bass-cut. A very simple bass-cut arrangement which can be used with crystal microphones is to use a relatively low value of first grid resistor. A 100 K ohm resistor usually produces a drop of at least 3db at 500 c/s and more at lower frequencies.

Yours faithfully,
Newmilns, Ayrshire.
A. D. MACDONALD (GM3NPM).

QSL Bureau

DEAR SIR,—May I, through the medium of the BULLETIN, thank the many users of the G3EAA to G3HZZ section of the R.S.G.B. QSL Bureau for their very kind co-operation during my change of residence from Bath to the London area?

Although fairly optimistic that the change could be effected without interruption to the service, some complications arose because part of the s.a.e. "stock" was in store with my furniture for nearly three months. My grateful thanks to those members who provided extra s.a.e. and refunded postage.

The address below is permanent. My wife and I anticipate that when we are more settled, we shall meet more of our "customers" in person. Incidentally we hold quite a lot of nice DX cards for people who do not send s.a.e. for their collection. All have been informed.

Yours faithfully,
790 Rochester Way,
Sidecup, Kent.
W. J. GREEN (G3FBA).

Intruder Watch

DEAR SIR,—Members will like to know that considerable interest was shown in the Society's Intruder Watch report at the Geneva Radio Conference. The G.P.O. continue to give us excellent support. Several intruders have been removed and more protests are well under way. We are trying to arrange for a more complete exchange of information with other countries and, so far as the U.S.A. is concerned, W6YY has already promised help. The British Amateur Radio Teleprinter Group has offered much needed assistance with identity of RTTY intruder stations. Progress is also being made in this direction by amateurs in the three Services.

Reports have not been forthcoming from certain members who registered with the Watch. I should like to thank them for their past services and through the medium of this letter ask them to note that their names have been removed from the circulation list. With the absence of clerical assistance I must keep papers to an essential minimum.

May I repeat my appeal for at least one monitor station in each of the following areas: GC, GI, GW, and GM?

Yours faithfully,
D. W. J. HAYLOCK (G3ADZ),
3 Norris Gardens, Hon. Organizer, R.S.G.B. Intruder Watch,
Grange Estate, Havant, Hants.

Take the High Road to the Highlands

for the
NORTH EAST OF SCOTLAND
REGIONAL MEETING AND HAMFEST

ABERDEEN—MAY 21-22, 1960

Forthcoming Events

Details for inclusion in this feature should be sent to the appropriate Regional Representatives. T.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 copy in the style used below.

DATES FOR YOUR DIARY

March 25.—London Lecture Meeting at the I.E.E.
 April 24.—North Midlands Mobile Rally.
 May 1.—Amateur Radio Mobile Society Rally.
 May 8.—Cheltenham Mobile Rally.
 May 15.—Harwell Mobile Rally and Hamfest.
 May 21-22.—Region 12 O.R.M.
 May 22.—Northern Mobile Rally at Harewood House, near Harrogate (Provisional).
 June 15-18.—Region 1 I.A.R.U. Conference, Folkestone.
 June 19.—Amateur Radio Mobile Society Rally.
 June 26.—Longleat Mobile Rally.
 June 26.—Region 2 O.R.M. at Redcar.
 July 17.—Southern Counties Mobile Rally.
 August 14.—Derby Mobile Rally.
 August 28.—South Manchester Radio Club and Stockport Radio Society Joint Rally.
 September 10.—British Amateur Television Club Convention.
 September 15-18.—R.S.G.B. National Convention, Cambridge.
 September 18.—Lincoln Hamfest and Mobile Rally.
 November 22-26.—R.S.G.B. International Radio Hobbies Exhibition.

REGION 1

Ainsdale.—Wednesdays, 8 p.m., 37 Hawthorne Grove, Southport.
 Blackburn.—Fridays, 8 p.m., The Corporation Park Hotel, Revidge Road.
 Blackpool (B. & F.A.R.S.).—Tuesdays, 8 p.m. (March 1, Annual General Meeting) Squires Gate Holiday Camp.
 Bury (B.R.S.).—March 8 ("Simple Test Equipment," by G2FMU), George Hotel, Kay Gardens.
 Chester.—Tuesdays, 8 p.m., Y.M.C.A.
 Crosby (C.A.R.S.).—Tuesdays, 8.30 p.m., Colonsay, Crosby Road South, Waterloo.
 Liverpool (L. & D.A.R.S.).—Tuesdays, 8 p.m., February 23 (to be announced); March 1 (Swap night); March 8 (Stereo Amplifiers); March 15 (Open night); March 22 (Panadapters, by G2AMV), Gladstone Mission Hall, Queens Drive, Stoneycroft.
 Macclesfield (M. & D.R.S.).—February 23, March 8, 22, The Bruce Arms, Crompton Road.
 Manchester (M. & D.R.S.).—March 14, 7.30 p.m., Wellington Hotel, Nicholas Croft, High Street, off Market Street.
 Manchester (S.M.R.C.).—Fridays, 7.30 p.m., Ladybarn House, Mauldeth Road, Fallowfield.
 Preston (P.A.R.S.).—February 23, March 8, 22, 7.30 p.m., St. Paul's School, Polar Street. (Please note new venue.)
 Southport.—Thursdays, 8 p.m., The Esplanade.
 Stockport (S.R.S.).—February 17 (Wirral N.F.D. Film); March 2 (Electronic Musical Instruments); March 16 (Annual General Meeting), 8 p.m., The Blossoms Hotel, Buxton Road.
 Wirral (W.A.R.S.).—February 19, March 4, 18, 8 p.m., No. 4 Hamilton Square, Birkenhead.

REGION 2

Barnsley.—February 26 ("Break-in Keying," by P. Carbutt, G2AFV), March 11 (Slade Club Recorded Talk), 7.30 p.m., King George Hotel, Peel Street.
 Bradford (B.A.R.S.).—February 23 (Junk Sale), March 8 ("Broadcast and Television Interference," by J. C. Belcher, A.M.Brit.I.R.E., G3FCS), March 22 (A.G.M.), 7.30 p.m., Cambridge House, Little Horton Lane, Bradford 5.
 Cleckheaton (S.V.A.R.S.).—February 17 (Film Show), March 2 (Open Meeting), March 16 (Visit to Mains Radiograms Ltd., Bradford); March 30 ("Electronics in Industrial Research,"

by Dr. N. H. Chamberlain of Leeds University), 7.30 p.m., George Hotel, Cleckheaton.

Halifax.—February 16 (Ragchew), March 1 (Film Show), March 15 (N.F.D. Arrangements), March 29 (Informal), 7.30 p.m., Sportsman Inn, Ogden. Leeds (L.A.R.S.).—February 17 (Visit to Mains Radiograms Ltd., Bradford), February 24 (Receiver Contest Night), March 2 (Demonstration of photo-electric devices by E. Sollitt), March 16 (Demonstration of Hi-fi Equipment, by Fane Acoustics Ltd.), March 23 (Demonstration of home-built table-top transmitter, by W. Ripley), Swarthmore Education Centre, Woodlands Square, Leeds 3. March 9 (Film Show), Dept. of Psychology.

Scarborough (S.A.R.S.).—Thursdays, 7.30 p.m., Chapman's Yard, North Street.

REGION 3

Birmingham (Slade).—February 26 ("Electronics in the Search of Oil," by G. T. Peck, M.B.E.), March 11 ("Modern Broadcast Reception"), 7.45 p.m., Church House, High Street, Erdington; March 4, Mullard Film Meeting at Bennett Hall, Snow Hill, Birmingham.

Birmingham (South).—February 18 ("Club Activities," with films, by G3IBP), 7.30 p.m., Friends Meeting House, 220 Moseley Road, Birmingham 12. March 6 (Sunday), 160m Mobile Rally, Lickey Beacon, 10.30 G.M.T., 18.75 kc/s.

Coventry (C.A.R.S.).—February 15 ("R.S.G.B. Tape Lecture"); February 22, 29 ("Discussion"); March 14 ("R.S.G.B. Tape Lecture"), 8 p.m., 9 Queens Road, Coventry.

Stourbridge.—February 19 (Informal), 8 p.m., White Horse, Amblecote. March 1 (Annual General Meeting), 8 p.m., Brotherhood Hall, Scots Road, Stourbridge.

Wolverhampton.—February 22 (Visit to Walsall Power Station); February 29 (R.A.E. Class); March 7 (Rag Chew); March 14 (R.A.E. Class), 8 p.m., Nechells Cottage, Stockwell Road, Tetschenhall.

REGION 4

Derby (D. & D.A.R.S.).—February 17 (Open Evening), February 24 ("Magnetic Materials,"—lecture and demonstration by J. Barnes), March 2 (Surplus Sale), March 9 (Open Evening), March 16 ("A Top Band Converter for the S.W.L."), 7.30 p.m., Room No. 4, 119 Green Lane, Derby. March 18, Annual Dinner and Social at Irongates Grill.

Derby (D.S.W. Exp. S.).—Sundays, 10.30 a.m. February 18, 25, March 3, 10, 17, Club Room, 7.30 p.m., Nunsfield House, Boulton Lane, Alveston, Derby.

Melton Mowbray (A.R.C.).—February 18 (Electrical Installation, Safety, Earthing and Electrical Topics," by D. W. Lilley, G3DFD), 7 p.m., Wilton Road Technical College, Melton Mowbray. March 17, Shack Visit and Rag Chew at R. Winters (G3NVK), 64 Victoria Street, Melton Mowbray. Assemble 7.30 p.m.

Leicester (L.R.S.).—February 15 ("History of Valves," by W. A. Mead, G5YY), March 7 ("Matching Networks," by S. D. Hoff, G3AWM), 7.30 p.m., Old Hall Farm, Braunstone Lane, Leicester.

Lincoln (L.S.W.C.).—February 24, March 9, 7.30 p.m., Technical College, Cathedral Street, Lincoln.

Nottingham (A.R.C.).—February 23 (Demonstration and Lecture by C. L. Wright, G3CCA, of Production Engineering Research Association). Club nights each Tuesday and Thursday, 7.30 p.m., Community Centre, Woodthorpe House, Mansfield Road, Sherwood, Nottingham.

REGION 6

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

REGION 7

Acton, Brentford and Chiswick.—February 16 ("Amateur TV," by G3MEO/T); March 15 ("Getting Going on 2m," by G3EOH), 7.30 p.m., A.E.U. Rooms, 66 High Road, Chiswick.

Barnet (B. & D.R.C.).—February 23 ("Transistors," by Siemens-Edison-Swan); March 29 (Lecture and film on radio conditions in Antarctica, by Major Gus Watson, ex-VP8BP), 7.30 p.m., Red Lion Hotel, Barnet.

Bexleyheath (N.K.R.S.).—February 25 (Demonstration of Audio Equipment by Broadway Radio), Congregational Hall, Bexleyheath, Kent (near the Clock Tower).

Croydon (S.R.C.C.).—March 8, 7.30 p.m., "Blacksmith's Arms," South End, Croydon.

Norwood (C.P. & D.R.C. and S.L. Group).—March 12, 8 p.m. ("K.W. Products," by R. Shears, G8KWW) and second Saturday and last Tuesday in each month, 8 p.m., Windmere House, Westow Street, Crystal Palace.

Dorking (D. & D.R.S.).—Second and fourth Tuesdays in each month, 8 p.m., Star and Garter Hotel, Dorking.

Ealing.—Sundays, 11 a.m., ABC Restaurant, Ealing Broadway, London, W.5.

East Molesey (T.V.A.R.T.S.).—March 2, Carnarvon Castle Hotel, Hampton Court.

Enfield and District.—February 25, 7.30 p.m. ("P.T.F.E. and all that," by Dr. Bloomfield, G2NR), George Spicer School, Southbury Road, Enfield.

Harlow and District.—Tuesdays, 7.30 p.m., rear of G3ERN (G. E. Read), High Street, Harlow.

Holloway (G.R.S.).—Mondays, Tuesdays and Wednesdays (R.A.E. and Morse); Fridays (Club); February 19 ("The Importance of Sensitivity," by Taylor Electrical Instruments); March 4 ("DX Working," by P. Solder, G5FA), 7 p.m., Montem School, Hornsey Road, N.7.

Ilford.—Thursdays (Lectures) 8-10 p.m., 579 High Road, Ilford (near Seven Kings Station).

Kingston.—Lectures alternate Thursdays, Theory and Morse Classes weekly, 7.45 p.m., Y.M.C.A., Eden Street, Kingston.

New Cross (C.A.R.S.).—Fridays, 7.30 p.m., 225 New Cross Road, London, S.E.14.

Romford (D. & D.R.S.).—Tuesdays, 8.15 p.m., R.A.F.A. House, 18 Carlton Road, Romford.

South Kensington (C.S.R.S.).—February 16 (Informal); March 1 ("Transmitters and Transmission Problems," by R. Shears, G8KWW), 6 p.m., Science Museum, South Kensington.

Welwyn Garden City.—March 10 (Constructor's Competition); April 14 ("The I.G.Y.," by G. M. C. Stone, G3FZL), 8 p.m., I.C.I. Restaurant, Blackfan Road, Welwyn Garden City.

LONDON MEMBERS' LUNCHEON CLUB

will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road, at 12.30 p.m. on Fridays, February 19, March 18 and April 8, 1960.

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

REGION 8

Brighton (B. & D.R.C.).—February 17 (Film Show), February 24 ("A Home-built Tape Recorder," by D. Hemsley), March 2 (Informal), March 9 ("The Design of Communications Receivers," by H. R. Henly), March 16 (Film Show), Home Guard Club, British Legion, 76 Marine Parade, Brighton.

Tunbridge Wells (W.K.A.R.S.).—February 19 (Informal), March 4 (Film strip lecture), March 18 (Practical demonstration of Wiring and Layout), 7.30 p.m., Culverden House, Culverden Park Road, Tunbridge Wells.

REGION 9

Bristol.—February 19 ("Television Servicing," by R. E. Griffin, M.I.R.E., G5UH), 7.15 p.m., Carwardine's Restaurant, Baldwin Street, Bristol 1.

Yeovil (Y.A.R.C.).—Wednesdays, 7.30 p.m., Grove House, Preston Road, Yeovil.

(Continued on page 378)

REGION 10

Cardiff.—March 14, 7.30 p.m. ("A Reflectometer," by GW3GHC, followed by N.F.D. arrangements). Sgts. Mess, T.A. Centre, Park Street, Cardiff.

Penarth.—February 29, 7.30 p.m. ("V.H.F. Receivers," by Frank Hattemore, B.R.S.21476, Y.M.C.A., Penarth).

REGION 12

Aberdeen.—March 1, Aberdeen Members'

Luncheon Club, 12.45 p.m., Royal Atheneum Restaurant (phone GM3HTL, Aberdeen 34928, for reservations). (**A.R.S.**)—February 19 ("Test Gear at GM3ICS"), February 26 ("N.F.D. Arrangements"), March 4 ("Sale of Surplus Gear"), March 11 ("The ALZ Transmitter"), 7.30 p.m., 6 Blenheim Lane, Aberdeen.

REGION 13

Edinburgh (L.R.S.).—February 25 (Surplus Sale),

March 10 ("Radio Control of Models"), 7.30 p.m., Y.M.C.A., 14 St. Andrew Street, Edinburgh 2.

REGION 17

Portsmouth.—Tuesdays, 7.30 p.m., Scarr's, 183a Albert Road.

Southampton.—First Saturday in each month, 7 p.m., Prospect House (back of Gas Board Showrooms), Above Bar.

Regional and Club News

Amateur Radio Club of Nottingham.—Recent activities have included participation in the Affiliated Societies' Contest, a demonstration of the Racial RA17 receiver by G6XM, the making of recordings for inclusion in a B.B.C. Midland Home Service programme and a visit to Nottingham University for a lecture by Mr. Porter. On February 23 G3CCA is to give a talk entitled "A 150 watt transmitter," while the A.G.M. will be held on March 22. Morse instruction is given by G3CDC on Tuesdays and an R.A.E. class is held on Thursdays under the supervision of G3LXL. Further information may be obtained from the Hon. Secretary: E. C. Weatherall, 16 Avebury Close, Clifton, Nottingham.

Barnsley and District Amateur Radio Club.—Almost 100 members and friends attended the Annual Dinner and Social at the King George Hotel, Barnsley, on January 16. The President, G. W. Wigglesworth (G2BH), welcomed the guests, while the toast to the ladies was proposed by H. H. Eyre (G5KM). Mrs. W. Lee (XYL of G6LZ) replied. The dinner was followed by a programme of games (with suitable prizes) organized by J. A. Ward (G4JJ) and W. W. Williams.

Bristol.—At the January meeting D. H. Collins (B.R.S.19638) and G. E. Thompson (B.R.S.20190) concluded their talk on "Atoms and the Amateur" with a discussion on the subjects of batteries and "earthing." The ballot for the "G5FS Memorial Challenge Trophy" was deferred to the next meeting. On February 19 R. E. Griffin, M.I.R.E. (G5UH) will give the first of two lectures on television servicing. Hon. Secretary: D. F. Davies (G3RQ), 51 Theresa Avenue, Bishopstown, Bristol 7.

Cardiff.—Future group meetings will be held in the Sergeants' Mess, T.A. Centre, Park Street, Cardiff, which is situated behind the Empire Pool, close to the General Station and Bus Terminus. The first meeting at the new venue will be on March 14 at 7.30 p.m. Subsequent meetings will be held on the second Monday in each month. Town Representative: T. J. Brooke (GW3GHC), 32 Elgar Crescent, Llanrumney, Cardiff.

Cornwall Radio and Television Club.—More than 30 members attended the January meeting at the Y.M.C.A., Falmouth, when G3BHC gave an excellent introductory talk on s.s.b. Visitors included ZD2WB. Several stations are well on the way to qualifying for the "Worked 25 Cornish Stations" Certificate. The Sunday morning net on 80m is well supported. Hon. Secretary: G. Hubber (G3NVJ), 9 Cardrew Terrace, Redruth.

Crosby Amateur Radio Society.—Meetings are held at the "Colonsay," Crosby Road South, Waterloo, on Tuesdays at 8 p.m. On February 23, G3LIS will give a talk on TVI. The A.G.M. will take place on March 1. The society transmitter is now on the air using the call-sign G3JQA. Theory and constructional classes for beginners are held regularly. Prospective members and visitors are invited to contact the Hon. Secretary: F. R. Rosete, 13 Menai Road, Bootle 20, Lancs.

Grafton Radio Society.—Recent events have included talks by G2MI ("R.S.G.B. QSL Bureau"), K2JTZ/MM ("MM Operation"), Cossor Instruments ("Single and double beam oscilloscopes") and G2AHL ("Mobile Operation"). On January 29, the General Secretary of the R.S.G.B. presented certificates to members who passed the 1959 R.A.E. During the evening Mr. Clarricoats spoke about the Geneva Radio Conference. There was an attendance of about 100 at the first Christmas Party held in December. R.A.E. and Morse classes continue most successfully on Mondays, Tuesdays and Wednesdays. Hon. Secretary: A. W. H. Wennell (G2CJN), 145 Uxendon Hill, Wembley Park, Middlesex.

Grimsby Amateur Radio Society.—Meetings are held on the first and third Thursdays in each month at 8 p.m. at the R.A.F.A., Abbey Drive West, where visitors and newcomers are always welcome. A visitors' night is planned for February 18 and a film show for March 3. G3ELZ will give a talk on his new six-band transmitter, with demonstrations, on March 31. Hon. Secretary: Owen Gilliatt (G3LOP), 24 Station Road, Healing, Lincs.

Halifax and District Amateur Radio Society.—Recent events have included the Annual Dinner and talks on TVI by G3ADG and on standing waves by G3FDC. A film show is arranged for March 1. Further information may be obtained from the Hon. Secretary: Arthur Robinson (G3MDW), Candy Cabin, Ogden, Halifax.

International Ham Hop Club.—As a result of his experiences while on a "ham hop" holiday in England last summer, Peter Catala (F2BO), the club's French representative, has started the Paris Luncheon Club. Radio amateurs visiting Paris are cordially invited to attend but are asked to notify Mr. Catala in advance at 27 av. Charles Lambert, Chatou (S & O), France. Hon. General Secretary: G. A. Partridge (G3CED), 17 Ethel Road, Broadstairs, Kent.

Lothians Radio Society.—"Sound Studio Equipment and Techniques" was the title of a talk by GM2AIK, Engineer-in-Charge at the B.B.C.'s Queen Street Studios, Edinburgh. The Mullard film *The Junction Transistor in Radio Receivers* was another recent feature. Meetings are held fortnightly on Thursdays at the Y.M.C.A., South St., Andrew Street, Edinburgh 2. A surplus sale will be held on February 25 and a talk on "Radio Control of Models" is due to be given on March 10. Hon. Secretary: L. Lumsden (B.R.S.22359), 33 Hillview Drive, Edinburgh 12.

Macclesfield and District Radio Society.—The society will be operating GB3MAC at the Macclesfield Mayor's Hobbies Exhibition at the Town Hall from February 27 to March 5 inclusive. The station will be active on all bands from 1.8 to 28 Mc/s on c.w., a.m. and s.s.b. from 10 a.m. to 10 p.m. on both Saturdays, from 2 p.m. to 10 p.m. on March 2 and from 5 to 10 p.m. on other weekday evenings. Contacts will be welcome and it would be appreciated if QSL cards could be sent direct to the Hon. Secretary: B. Haywood (G3MKR), "Penarth Cottage," 15 Tunnicliffe Street, Macclesfield, Cheshire, for display at the exhibition. All contacts will be confirmed with special QSLs.

Midland Amateur Radio Society.—G3DO is to give a talk on "DX Working" on March 3 while G3HAZ's subject on March 15 will be "Frequency Measurements" with a v.h.f. demonstration. "The New Trunk Dialling System" will be described by Brig. F. Jones, C.B.E., Birmingham Telephone Manager, on April 7. Visitors are most welcome at meetings which are held at the Midland Institute, Paradise Street, Birmingham, commencing at 7 p.m.

Mitcham and District Radio Society.—The Annual General Meeting will be held at "The Canons," Madeira Road, Mitcham, on February 26 at 8 p.m. Preparations for N.F.D. are well under way. Hon. Secretary: D. Johnston (G3NFA), 59 Acre Lane, Carshalton, Surrey.

North West V.H.F. Group.—This new group has been formed to promote interest in, and to assist in the exchange and dissemination of information on v.h.f./u.h.f. technique and operation. The following officers have been elected for 1960: Chairman: G. S. Bracewell (G3EGK); Hon. Treasurer: R. G. Lascelles (G3AKX); Hon. Secretary: J. G. Barnes (G3AOS), 5 Prospect Drive, Hale Barns, Cheshire; Committee Members:

F. Nicholls (G3MAX); B. N. Green (G3KCB). The group's headquarters are at 164 London Road, Manchester, where a station will shortly be in operation on 144 Mc/s every Monday evening. The Hon. Secretary will be pleased to hear from any v.h.f./u.h.f. enthusiast who wishes to join the group.

Reading Amateur Radio Club.—On February 27 a film on the manufacture and application of transistors will be followed by a discussion. The meeting will be held at Palmer Hall, West Street, Reading, commencing at 7 p.m. Further information regarding the club's activities may be obtained from the Hon. Secretary: R. J. Nash (G3EJA), "Peacehaven," 9 Holybrook Road, Reading.

Rotherham Radio Society.—At the recent A.G.M. the following were elected: President: E. Davies (G2LG); Chairman: R. R. Palmer (G4BD); Hon. Treasurer: A. Tinsley; Hon. Secretary: K. Webster (G3LLE), 28 Athelstan Road, Handsworth, Sheffield 13. Meetings are held at the Headquarters of the Rotherham Photographic Society, The Crofts, Moorgate, on the first three Wednesdays in each month. Visitors and prospective members are always welcome.

South Yorkshire Amateur Radio Society.—Meetings are now held on the second Tuesday and fourth Thursday in each month at the Stag Inn, Dockin Hill Road, Doncaster, at 7.30 for 8 p.m. Prospective members are invited to obtain further information regarding this new society from the Hon. Secretary: W. Farrar (G3ESP), 2-A, Highbury Avenue, Bessacarr, Doncaster, (Doncaster 56082).

Thames Valley Amateur Radio Transmitting Society.—At the A.G.M. last month the following officers and committee members were elected: President: Leslie Cooper (G5LC); Vice-President: Alan Mears (G8SM); Hon. Secretary: Ken Rogers (G3AIU); Hon. Treasurer: Graham Leicester (G3IKC); Committee Members: Gerry Billison (G6GB), Joe Hill (G3JIP) and John Kingston (G3VK). A junior section has been formed to help the younger generation of amateurs and short-wave listeners who are offered a reduced subscription rate. Details of meetings will be found in *Forthcoming Events* for Region 7.

Torbay Amateur Radio Society.—There was an excellent attendance at the January meeting when Don Cousins (G3NCC) gave the first of his talks on "Power Supplies and their Regulation." Entries for the Construction Cup were due to be judged by the society's president, W. B. Sydenham (G5SY), and Arthur Hook (G3CMT) at the meeting held on February 13. The Annual Dinner and Social will be held at the Abbey Lawn Hotel, Scarborough Road, Torquay, on March 5 at 7.30 p.m. Tickets, price 11s. 6d. each, are obtainable from R. Luscombe (G3MEP), 51 Tamar Avenue, Torquay, or from the Hon. Secretary: George Western (G3LFL), 118 Salisbury Avenue, Barton, Torquay.

West Kent Amateur Radio Society.—Meetings are held on alternate Fridays commencing at 7.30 p.m. at Culverden House, Culverden Park Road, Tunbridge Wells. On March 4 there will be a film strip lecture and on March 18 a demonstration of wiring, layout and testing. The A.G.M. will be held on April 29 when the judging of entries for the societies' trophies will take place. Hon. Secretary: H. F. Richards, 17 Reynolds Lane, Tunbridge Wells.

Wirral Amateur Radio Society.—Meetings have been arranged for February 19 (lecture on the Army 62 Set by J. Jones, G3IGG), March 4 (quiz with the Liverpool and District Amateur Radio Society) and March 18 (lecture on transistors by C. Hubbard, G3CSZ). The Annual Dinner is being held on February 26 and will be attended by the General Secretary of the R.S.G.B., John Claricoats, O.B.E. (G6CL), and Philip Wade (G2BPJ), Zone A Representative. Members were due to meet the Flintshire Radio Society on February 10 for a hot-pot supper and rag chew. Hon. Secretary: A. Seed (G3FOO), 31 Withert Avenue, Bebington, Wirral, Cheshire.

Affiliated Society Representatives

The following are additions to the list of Affiliated Societies Representatives published in the December 1959 issue:

Amateur Radio Club of Nottingham (G3EKW): A. Gwynne (G3LNR) 31 Caroline Street, Nottingham.

York Amateur Radio Society (G3HWW): G. F. Nottingham (G3DTA), 23 Abbotsway, Muncaster Gate, York.

LONDON U.H.F. GROUP
will meet at the Bedford Corner Hotel, Bayley Street,
Tottenham Court Road,
at 7.30 p.m. on Thursday, March 3, 1960
All v.h.f. and u.h.f. enthusiasts welcome.

AMERICAN PUBLICATIONS

Radio Amateur's Handbook, 1959 (A.R.R.L.)	-	34/-
CQ Sideband Handbook (Cowan)	-	25/-
Mobile Manual for Radio Amateurs (A.R.R.L.)	24/6	
CQ Mobile Handbook (Cowan)	-	24/-
Antenna Book, 8th Edition (A.R.R.L.)	-	19/-
Television Interference—Its Causes and Cures (Nelson Publishing Co.)	-	16/-
CQ Anthology (Cowan)	-	16/-
Single Sideband for the Amateur (A.R.R.L.)	-	14/-
Hints and Kinks, Volume V (A.R.R.L.)	-	10/-
Course in Radio Fundamentals	-	10/-
How to Become a Radio Amateur (A.R.R.L.)	-	4/6
Learning the Radiotelegraph Code (A.R.R.L.)	-	4/6
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Representation

THE following is an addition to the list of County Representatives published in the December 1958 issue:

Region 3.—Birmingham: G. A. Swinnerton (G6AS), 120 Grange Road, Olton, Birmingham 27.

The following are additions to the list of Town Representatives published in the December 1959 issue:

Region 1.—Cheshire, Wirral Area: F. N. Kendrick (G3CSG), 25 Cook Road, Leasowe, Wirral.

Region 3.—Warwickshire, Coventry: J. L. Boyce (B.R.S. 19512), 73 Maida Vale Crescent.

Region 14.—City of Glasgow, Glasgow Area & Postal Districts: Alex Reid (GM3NFR), 213 Nithsdale Road, Glasgow, S.1.

Vacancy

Mr. D. C. Bradford (G3LCK) has resigned as District Representative for London North. Nominations for his successor should be made in the prescribed form and sent to reach the General Secretary by not later than March 31, 1960.

R.S.G.B. Amateur Radio Call Book

THE following are corrections to the 1960 edition of the *R.S.G.B. Amateur Radio Call Book*.

G3MC R. A. M. Crust, "Cwmcarn," Grove Green Lane, Weaverling, Nr. Maidstone, Kent.

G6FM F. D. Milner, 64 Bury Street, London, N.9.

G3GJW T. I. (Smudge) Lundegard, 11 Avondale Road, London, S.E.9.

G3IES B. S. Sutherland, 40 South Road, Edgware, Middlesex.

G3ILL A. G. Mabbott, 20a Gratton Terrace, London, N.W.2.

G3KNJ R. J. Wyatt, 43 Bransgrove Road, Edgware, Middlesex.

G3LUU Leeds University Amateur Radio Society, Leeds University Union, University Road, Leeds, 12.

G3MHB Bradford Grammar School Amateur Radio Club, The Grammar School, Bradford, 9.

G3MWV/T D. Blake, The Flat, 9 Mount Street, Cromer, Norfolk.

G3NEE R. J. R. Pedder, 27 Hillside Grove, London, N.14.

G3NGF Rev. A. W. Shepherd, 75 Park Road, Mansfield Woodhouse, Notts.

G3NJB World Association of Methodist Radio Amateurs and Clubs (W.A.M.R.A.C.), Headquarters, 75 Park Road, Mansfield Woodhouse, Notts.

G3NMI R. Purdon, Croft Cottage, Berrow, Burnham-on-Sea, Somerset.

G3NNM B. R. Smith, 1 Belle Vue Road, Herne Bay, Kent.

G8NQ (not GW8NQ) N. L. Stephens, "Hollybank," Hereford Road, Monmouth.

GI3CJD L. M. Lyske, 63 Church Street, Portadown.

GM2CHN D. Niven, 190 Nithsdale Road, Pollokshields, Glasgow S.1.

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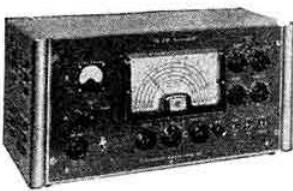
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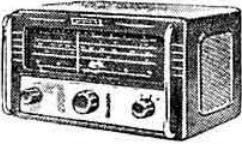
OA2	17/6	6ACT	6/6	6J5GTM	6/0	6X5GT	6/0	12BH7	21/3	30P16	S/0	DAC30	11/0	ECC33	8/8	EM34	10/0	MH4(C)	7/0	QS150/15	UF80	10/6	
OB2	17/6	6AG5	6/6	6J6	5/6	6J30L2	10/0	12E1	30/0	30P1L1	11/6	DAF91	7/6	ECC35	8/6	EM80	9/6	MHL4	7/6	10/6	UF85	10/6	
OZAGT	6/0	6AK5	8/0	6J7G	6/0	7A7	12/6	12J5GT	4/6	33A/158M		DAF90	9/0	ECC40	23/3	EN31	37/0	MHL6	12/6	R12	9/6	UF89	9/0
IA5	6/0	6AG5	5/6	6J7GT	10/6	7B6	21/3	12J7GT	10/6	30/0		DF33	11/0	ECC81	9/0	EY51	9/6	SD6	12/0	UL41	9/0		
IA7GT21/11	6/0	6AM6	5/6	6J7G	5/0	7B7	8/6	12K5	17/11	35A5	21/3	DF66	15/0	ECC82	7/6	EY86	10/0	ML4	12/6	SP47	15/0	UL44	24/6
LC5	12/6	6AQ5	5/6	6J7GT	6/0	7C3	8/0	12K7GT	8/0	35J5GT	9/8	DF70	15/0	ECC88	8/0	EM14	9/0	SP41	3/6	UL46	14/6		
ID5	9/0	6AT6	8/6	6K8G	8/0	7C6	8/0	12K8	14/0	35J5W	4/4	DPF1	6/0	ECC84	9/6	EZ40	7/6	N78	19/11	SP42	12/6	UL84	5/6
ID6	10/6	6AU6	10/6	6K8GT	7/0	7H7	8/0	12K7GT	8/0	35Z3	10/6	DPF6	9/0	ECC85	8/6	EZ41	7/6	OA70	4/0	SP61	3/6	UY41	7/6
ID5GT	11/0	6B8G	1/6	6B8G	1/6	7R7	12/6	12S87	8/0	35Z3	10/6	DF96	10/6	ECC86	7/6	EZ80	7/0	OA71	8/4	SD61	9/6	UY85	7/0
ID4	0/0	6B8G	7/0	6B8G	19/11	7S7	10/6	12S87	8/0	35Z3	10/6	DH36MET	8/0	ECC88	10/6	EZ81	7/0	OC72	17/0	T41	23/3	VP27	12/6
ID6	5/0	6B8G	7/0	6B8G	15/11	7V7	8/6	12S87	8/0	35Z3	10/6	DF98	10/6	ECC89	10/6	EZ82	7/0	TP22	15/0	VP13C	7/0		
ID5GT	11/0	6B8H	9/0	6L6G	9/6	8D2	5/6	12S87	8/0	35Z3	10/6	DF99	10/6	ECC90	10/6	EZ83	7/0	TP23	6/6				
ID5	7/6	6B8J	7/6	6L6GT	12/6	8D8	5/6	12S87	8/0	35Z3	10/6	DF97	12/6	ECC91	9/0	EZ84	7/0	TP24	12/14	VP23	6/6		
ID4	7/6	6B8J	7/6	6L6GT	12/6	8D8	5/6	12S87	8/0	35Z3	10/6	DF98	12/6	ECC92	9/0	EZ85	7/0	TP25	19/6	VP13C	7/0		
ID5GT	11/0	6B8K	1/6	6B8K	1/6	8D8	5/6	12S87	8/0	35Z3	10/6	DF99	12/6	ECC93	9/0	EZ86	7/0	TP26	10/0	VP23	6/6		
ID4	0/0	6B8K	7/0	6B8K	19/11	8D8	5/6	12S87	8/0	35Z3	10/6	DF98	12/6	ECC94	9/0	EZ87	7/0	TP27	19/6	VP13C	7/0		
ID5	12/6	6B8W	10/6	6B8W	28/3	8D8	5/6	12S87	8/0	35Z3	10/6	DF99	12/6	ECC95	9/0	EZ88	7/0	TP28	19/6	VP141	6/6		
ID4	6/0	6B8W	10/6	6B8W	28/3	8D8	5/6	12S87	8/0	35Z3	10/6	DF98	12/6	ECC96	9/0	EZ89	7/0	TP29	19/6	VP141	6/6		
ID5	12/6	6B8W	7/0	6B8W	8/0	10P2	20/2	12S87	8/0	35Z3	10/6	DF99	12/6	ECC97	9/0	EZ90	7/0	TP28	19/6	VP141	6/6		
ID4	12/6	6B8W	7/0	6B8W	8/0	10P2	20/2	12S87	8/0	35Z3	10/6	DF98	12/6	ECC98	9/0	EZ91	7/0	TP29	19/6	VP141	6/6		
ID5GT	11/0	6B8X6	7/0	6B8X6	10/0	10P1	17/6	19AQ5	10/6	83	15/0	DF96	15/0	ECC99	9/0	EZ92	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6B8X6	7/0	6B8X6	10/0	10P1	17/6	19AQ5	10/6	83	15/0	DF97	15/0	ECC100	9/0	EZ93	7/6	TP29	19/6	VP141	6/6		
ID5	12/6	6B8X6	7/0	6B8X6	10/0	10P1	17/6	19AQ5	10/6	83	15/0	DF98	15/0	ECC101	9/0	EZ94	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6B8X6	7/0	6B8X6	10/0	10P1	17/6	19AQ5	10/6	83	15/0	DF99	15/0	ECC102	9/0	EZ95	7/6	TP29	19/6	VP141	6/6		
ID5GT	11/0	6B8Y	6/6	6B8Y	8/0	10D3	8/6	20D1	15/3	85A2	15/0	DF96	7/6	ECC103	9/0	EZ96	7/6	TP28	19/6	VP141	6/6		
ID4	7/6	6B8Y	6/6	6B8Y	8/0	10D3	8/6	20D1	15/3	85A2	15/0	DF97	7/6	ECC104	9/0	EZ97	7/6	TP29	19/6	VP141	6/6		
ID5	10/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC105	9/0	EZ98	7/6	TP28	19/6	VP141	6/6		
ID4	10/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC106	9/0	EZ99	7/6	TP29	19/6	VP141	6/6		
ID5	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC107	9/0	EZ100	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC108	9/0	EZ101	7/6	TP29	19/6	VP141	6/6		
ID5GT	11/0	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC109	9/0	EZ102	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC110	9/0	EZ103	7/6	TP29	19/6	VP141	6/6		
ID5	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC111	9/0	EZ104	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC112	9/0	EZ105	7/6	TP29	19/6	VP141	6/6		
ID5GT	11/0	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC113	9/0	EZ106	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC114	9/0	EZ107	7/6	TP29	19/6	VP141	6/6		
ID5	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC115	9/0	EZ108	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC116	9/0	EZ109	7/6	TP29	19/6	VP141	6/6		
ID5GT	11/0	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC117	9/0	EZ110	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC118	9/0	EZ111	7/6	TP29	19/6	VP141	6/6		
ID5	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC119	9/0	EZ112	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC120	9/0	EZ113	7/6	TP29	19/6	VP141	6/6		
ID5GT	11/0	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC121	9/0	EZ114	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC122	9/0	EZ115	7/6	TP29	19/6	VP141	6/6		
ID5	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC123	9/0	EZ116	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC124	9/0	EZ117	7/6	TP29	19/6	VP141	6/6		
ID5GT	11/0	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC125	9/0	EZ118	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC126	9/0	EZ119	7/6	TP29	19/6	VP141	6/6		
ID5	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC127	9/0	EZ120	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC128	9/0	EZ121	7/6	TP29	19/6	VP141	6/6		
ID5GT	11/0	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC129	9/0	EZ122	7/6	TP28	19/6	VP141	6/6		
ID4	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF99	7/6	ECC130	9/0	EZ123	7/6	TP29	19/6	VP141	6/6		
ID5	12/6	6C3G	6/6	6C3G	10/8	10P1	15/6	20P2	26/6	90AG	9/6	DF98	7/6	ECC131	9/0	EZ124	7/6						

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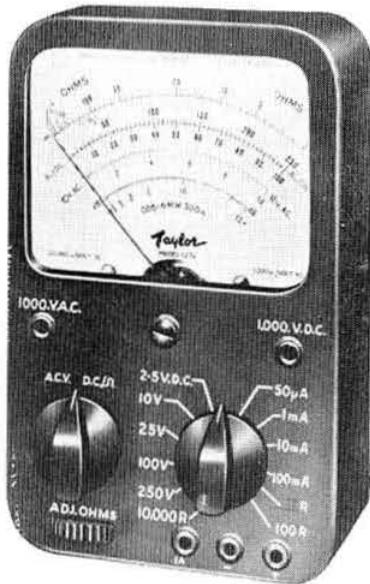
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