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THE DALLAS PLAN FOR T.V.I.

IN the June, 1951, issue of *QST* there appeared an account of how the transmitting amateurs in Dallas, Texas, had banded together to tackle one of the great problems which also confronts us in England today; interference to television when an unselective receiver is used. To the "fringe area" dweller in our ranks, we draw attention to the fact that his opposite number in Dallas has *three* television transmitters with which to contend; two in the city and one 35 miles away at Fort Worth. All—by our standards—low powered.

Although nearly every amateur in Dallas had T.V.I.-proofed his equipment, it was still not possible to go on the air; hence the setting-up of the Dallas Amateur Radio Club T.V.I. Committee. At the outset, some viewers had been eager to buy high-pass filters, but naturally many were not so inclined and it was soon evident that more positive and drastic action was required.

The T.V.I. Committee prepared and circulated a pamphlet to all television dealers and servicemen, introducing them to the problem and suggesting ways and means of applying correction to the offending receivers. A few days later, the Committee circularised all Dallas amateurs, urging them to go on the air and temporarily to install high-pass filters in the worst affected local television receivers. The operators of all amateur transmitters, free of harmonic radiation, were urged to continue operation and to force the issue to a showdown, as it was felt that the responsibility for this type of television interference should be placed squarely on the manufacturers of the offending receivers. A check-up was made on all the initial complaints involving harmonic-free amateur stations, and this revealed the fact that some receivers were a good deal better than others and that one, made by the country's biggest radio firm, was particularly susceptible.

It was decided, therefore, to go right to the top and a letter was addressed to the Chairman of the Corporation, demanding that something should be done.

In the meantime, all harmonic-free amateurs stayed on the air during television hours. Each complaint was checked and verified. Wherever possible the owner of the television set was told what was the basic trouble and advised to complain to his dealer; and to report to the Committee what was his reaction.

The amateurs held their ground and the parade of set-owners to dealers' shops began to attract attention. Many viewers complained direct to the Federal Communications Commission, who, however, adopted a strictly impartial and technical attitude. Where the amateur transmitter was free from harmonics, the viewer was advised accordingly. Where the fault clearly lay with the amateur, he shut down without argument. As a result of the correspondence with the manufacturers, two engineers were sent to Dallas and over a period of four days, the T.V.I. Committee demonstrated to them all the facts previously reported. The outcome was that the firm agreed to modify every set to the satisfaction of the owner and the amateur. Since then a working procedure has been evolved, which deals with complaints in the minimum of time. Measurements have been made over a wide range of television receivers and the results have been communicated to the manufacturers thereof.

Christmas and New Year Greetings to Members Everywhere

In short, the Dallas amateurs have proved that the nut *can* be cracked. They have succeeded because they knew what they were doing, because they stuck together and went right to the top of the tree with their case. They also proved, beyond shadow of doubt, that basically T.V.I. is just as much a result of poor receiver design as it is to faulty transmitters.

How does all this affect us? Well, first let us admit that our T.V.I. problem is small compared

(Continued on Page 259)

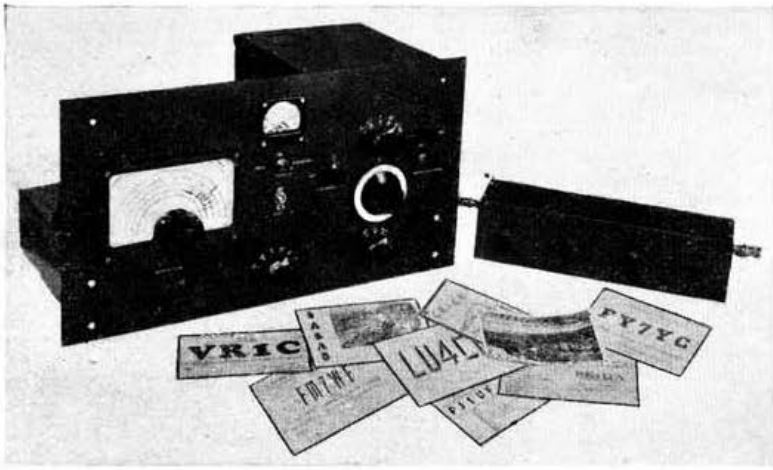
AN IMPROVED 75-WATT T.V.I.-PROOF TRANSMITTER

Part I

By LOUIS VARNEY, A.M.I.E.E. (G5RV)*

The success of the original model of the 50-watt T.V.I.-proof transmitter—described in the July, 1950, issue of the "Bulletin"—was such that G5RV decided to increase its versatility by adding a built-in V.F.O., thus giving the required flexibility of operation so essential these days. In addition, provision was made for "Top Band" operation. How these improvements have been achieved is explained in the following article.

ALTHOUGH this article really follows on from the one referred to in the sub-heading above, nevertheless, complete constructional data is provided so that the improved T.V.I.-proof transmitter can be built from scratch, if desired. In the process of modifying the original circuit, it was decided to dispense with the VR150/30 stabiliser for the screen-grid supply line to the frequency multiplier valves. A simple voltage divider network was found to be adequate. The VR150/30 previously used for this purpose now provides 150 volts stabilised for the 6SJ7 E.C.O., the 6SJ7 class "A" buffer screen-grid, and the screen-grid of the 6AG7 1.7 Mc/s. buffer (or 3.5 Mc/s. doubler) stage.



Front view of 75-W. T.V.I.-proof transmitter with low-pass filter and some QSL cards from DX stations confirming contacts made by G5RV during television hours.

On switching to the 1.7 Mc/s. range, provision is made for automatically reducing the input to the 807 P.A. to 10 watts, while the modulating impedance remains substantially constant. For those who wish to construct their own wideband couplers, a set of coils has been designed which dispenses with the necessity of fitting plug-in type bases. Tuning is accomplished by slight variation of the iron-dust cores. Small fixed (ceramicon) trimmer condensers may be added to those windings where necessary to compensate for differences in valve input or output capacities, and circuit stray capacities.

The circuit diagram of the complete V.F.O.-controlled transmitter is shown in Fig. 1. It will be noted that all non-R.F. wiring is carried out in single conductor screened wire. An improved method of preparing this type of wiring is described in the text. The general design details and mechanical layout of the new version of the T.V.I.-proof transmitter may be seen in the photographs.

Choice of V.F.O.

Any type of variable frequency oscillator circuit may be used, but a word of warning is necessary. Originally, the writer wired the "control" or "alternative keying" jack in series with the cathode-earth return lead of the oscillator, but this arrangement caused occasional and random minute changes of oscillator frequency to take place. It took a long time to trace the cause to small changes of contact resistance in the *Bulgin* toggle switch used to close the cathode circuit when transmitting (or, alternatively, in the contacts of the *Vibroplex* key when used in this position for break-in working). The moral is: *never* key the cathode of a V.F.O.! If it is not sufficiently screened to permit break-in operation on the sending frequency by keying the cathode of V3, the V.F.O. valve may be keyed in its screen grid circuit, or switched (by the send-receive switch contacts for normal operation) with excellent results. Ideally, a keying relay should be used in the E.C.O. screen-grid line.

Excitation Amplitude Control

As mentioned in the original article, some means of setting the amplitude of the R.F. drive to the 807 is necessary, for the following reasons: (a) to maintain correct drive amplitude on the P.A. when switching from band to band; (b) in the

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interests of T.V.I. suppression, because driving harder than necessary in order to achieve maximum output from a power amplifier results in greater undesirable harmonic output, and (c) to compensate for inevitable small variations in output from the wideband couplers, especially over the 3.5 and 28 Mc/s. bands.

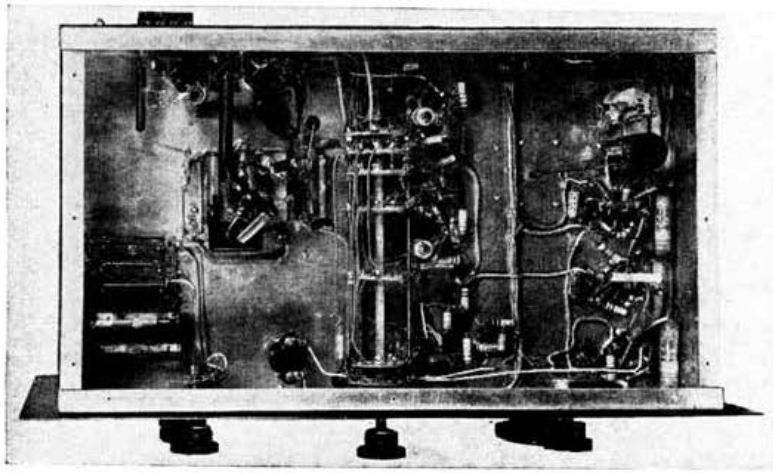
There are many possible ways of obtaining drive control. The method used in this case employs a 20,000-ohm wire-wound potentiometer connected across the 150-volt supply to V3, to vary its screen-grid voltage. It provides smooth and adequate control on all bands.

Modification of Original Layout

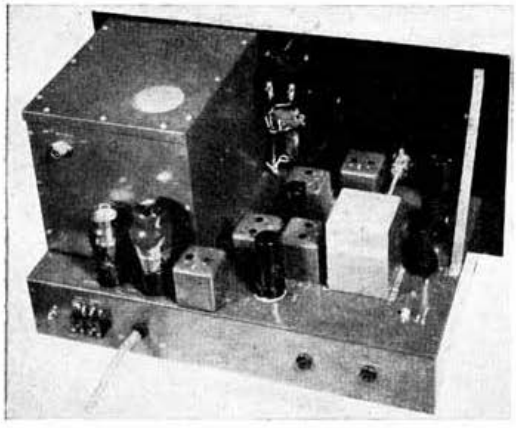
The few modifications required to incorporate the built-in V.F.O. are very simple. If the V.F.O. is to be added to an existing model, it should be built into the chassis space available after removing the original crystal oscillator assembly which is attached to the main chassis by four P.K. screws. If desired, it may be built on a sub-chassis, in a similar fashion to the crystal oscillator unit. There is only sufficient panel space to permit the use of a small scale for the V.F.O. band-spread tuning condenser, but since most operators set their frequency by reference to their receiver, an approximate calibration of the actual V.F.O. dial is all that is necessary.

It will be seen from Fig. 1 that the 3.5 Mc/s. output from V3 *via* its wideband (WB) output transformer primary and associated link coil (which may be Lw of the original crystal oscillator circuit with a four-turn link coil added) can be fed into the link coil of the existing WBC1 in the original circuit (*vide* Fig. 1, p. 8, July, 1950, BULLETIN). The switch SW4 may be dispensed with, the "hot" terminal of WBC1 secondary being connected direct to the rotor contact of SW1A on the original diagram. If preferred, a standard *Labgear* 3.5 Mc/s. wideband coupler may be used between V3 and SW1A.

It is not recommended that the 1.7 Mc/s. facility be added to the original model because of the extensive additions required to the existing range switch SW1A-E, and to the P.A. coil turret.



Underchassis view of the transmitter with base plate removed.



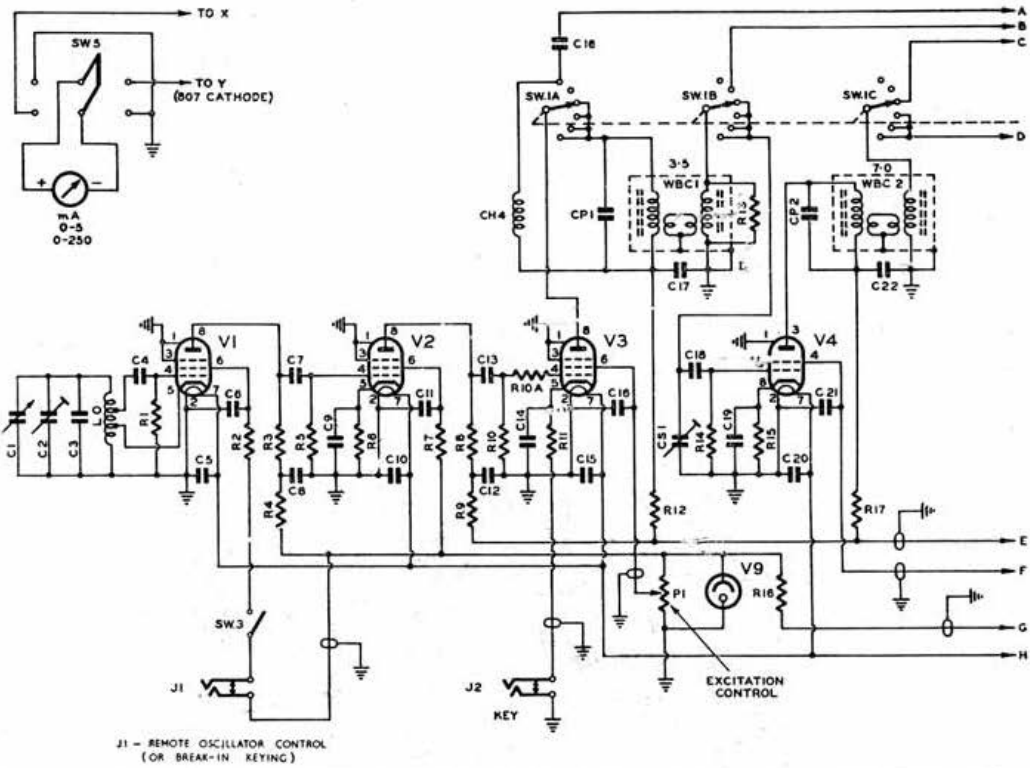
Rear view showing disposition of valves and major components. Note wire mesh ventilator grille in P.A. box lid over 807 valve.

Constructional Details of New Model

In order to achieve a well-balanced front panel layout consistent with good electrical efficiency, and to enable a large full-vision type of slow-motion drive to be used for the V.F.O., the power amplifier screening box should measure 8 x 7 x 7 in. The chassis is made of No. 16 S.W.G. aluminium with a No. 20 S.W.G. bottom plate of the same material, while the 807 stage screening box is constructed of No. 24 S.W.G. copper (though, if desired, No. 20 S.W.G. aluminium may also be used for this unit). It is possible that *copper-plated* mild steel sheet could be used throughout, and the writer intends to try such a form of construction and report on its efficiency from a T.V.I. point of view at a later date.

In passing, it should be stated that single screening technique, as employed in this transmitter, is *unquestionably* an asset from the T.V.I. aspect, in spite of statements to the contrary made elsewhere. It permits the low-pass filter to be used with maximum efficacy. No doubt double or even triple screening would be even more effective, but such complexity is impracticable for the amateur, and—in the writer's experience—unnecessary for T.V.I. suppression.

Fig. 2 is a mechanical layout drawing which will be found to provide good electrical efficiency with maximum convenience in construction and subsequent servicing. Screening covers for the wideband couplers are made by cutting down standard 3½-inch long aluminium I.F. cans to 2 in.,



Note: In the above circuit diagram contacts 2 and 3 on SW1A should be shown joined, and the meter ranges should be shown as 0-5, 0-125 mA, or 0-5, 0-250 mA.

COMPONENT LIST

CONDENSERS

C1. 150 $\mu\mu$F. variable (*Cyldon "Bébé" or similar*).
C2. 5–100 $\mu\mu$F. midget air trimmer (*Polar*).
C3. 330 $\mu\mu$F. silver mica, 5%.
C4. 100 $\mu\mu$F. ceramicon or silver mica.
C5, 6, 8, 9, 10, 11, 12, 14, 15, 16, 19, 20, 21, 24, 25, 30, 31. 0.01 μF. tubular paper, 350 V. wkg. (*T.C.C. CP32N*).
C7. 15 $\mu\mu$F. ceramicon.
C13. 100 $\mu\mu$F. ceramicon.
C17, 22. 0.01 μF. tubular paper, 500 V. wkg. (*T.C.C. CP33S*).
C18, 23, 29, 34. 100 $\mu\mu$F. ceramicon or silver mica.
C26, 27, 28, 32, 33, 37, 38, 39. 0.001 μF. mica (*T.C.C. CM20*).
C35. 0.002 μF. mica, 350 V. wkg.
C36. 0.01 μF. mica, 350 V. wkg.
C40, 41, 46. 0.001 μF. mica, 1,500 V. wkg., 2,250 V. test (*T.C.C. M3U or M4HO*, 2,000 V. wkg.)
C42. 150 $\mu\mu$F. variable (*Cyldon "Bébé," J.B. type C604*, or similar).
C43, 47. 10–100 $\mu\mu$F. midget air trimmer (with corner of one moving vane bent so as to short circuit when condenser is fully meshed).
C44. 5 $\mu\mu$F. ceramicon.
C45. 0.001 μF. mica (*T.C.C. CM20*).
CP1, 2, 3. 10–22 $\mu\mu$F. ceramicon, as required.
CS1, 2, 3. 3–30 $\mu\mu$F. concentric air trimmers (*Mullard*).

RESISTORS

R1, 5. 100,000 ohms, ½-W.
R2, 7, 10. 47,000 ohms ½-W.
R3. 22,000 ohms, ½-W.
R4, 9, 12, 17, 20, 23, 25, 29. 100 ohms ½-W.
R6, 15, 19, 22. 680 ohms ½-W.
R8. 47,000 ohms 1-W.
R10a, 27. 330 ohms ½-W.
R11. 470 ohms ½-W.
R13. 10,000 ohms ½-W.
R14, 18, 21. 33,000 ohms ½-W.
R16. 5,000 ohms 10-W. wire-wound.
R24. 22,000 ohms 1-W.
R26. Meter shunt (see text).
R28. 22 ohms 6-W. wire-wound (*Welwyn*).
R30. 25,000 ohms 10-W. wire-wound.
R31. 50,000 ohms 10-W. wire-wound.
R32. 10,000 ohms 3-W.
R33. 22,000 ohms 3-W.
R34, 35. 4,700 ohms ½-W.
P1. 20,000 ohms potentiometer (wire-wound).

INDUCTANCES

LO. 32 turns No. 22 S.W.G. enam. copper wire close-wound on 1" O.D. former; tapped at turns 8 and 22. Winding length 1$\frac{1}{16}$".
APC. 10 turns No. 22 S.W.G. enam. wire wound on R27.
CH1, 2. V.H.F filter choke (*Eddystone Cat. No. 1011*).
CH3. V.H.F. filter choke No. 18 S.W.G. wire; winding length 2" on $\frac{3}{8}$" dia. tufnol rod.
CH4. H.F. choke (*Eddystone Cat. No. 1066*).
CH5. H.F. choke (*Eddystone Cat. No. 1010*).
CH6. H.F. choke (*Eddystone Cat. No. 1022*).
WBC1. 3.5 Mc/s. wideband coupler (*Labgear* or as text).
WBC2. 7 Mc/s. wideband coupler (*Labgear* or as text).
WBC3. 14 Mc/s. wideband coupler (*Labgear* or as text).
WBC4. 21 Mc/s. wideband coupler (*Labgear* or as text).
WBC5. 28 Mc/s. wideband coupler (*Labgear* or as text).
L1 to L10. P.A. coil-turret coils. (*Labgear**, or as data in Part II next month.)
LT. Harmonic trap coil, 6 turns of No. 16 S.W.G. enam. copper wire, I.D. ½", winding length $\frac{3}{8}$".
** Does not include 1.7 Mc/s.*

SWITCHES

SW1A–C. Exciter Range Switch, "Oak" 7 wafers—1-pole 6-way each. Assembled length about 9" (behind panel).
SW2A–B. 2-wafer 6-position ceramic switch (*Wearite*). Front wafer 2-pole 6-way; rear wafer 1-pole 6-way.
SW3. On-off toggle switch (*Bulgin*).
SW4. "Oak" 1-wafer 1-pole 3-way switch.
SW5. D.P.D.T toggle switch (*Bulgin*).

VALVES

V1, 2. 6SJ7.
V3. 6AG7.
V4, 5, 6. 6V6.
V7. 807.
V8. 6V6G or KT63.
V9. VR150/30.

MISCELLANEOUS

CS1, 2. Co-axial sockets (*Belling Lee*).
J1, 2. Self-shorting jack sockets (*Igranic*).
M.A. 0–5 mA. D.C. moving-coil meter.
V.F.O. Dial. *Eddystone* Full Vision S.M. (*Cat. No. 598*).

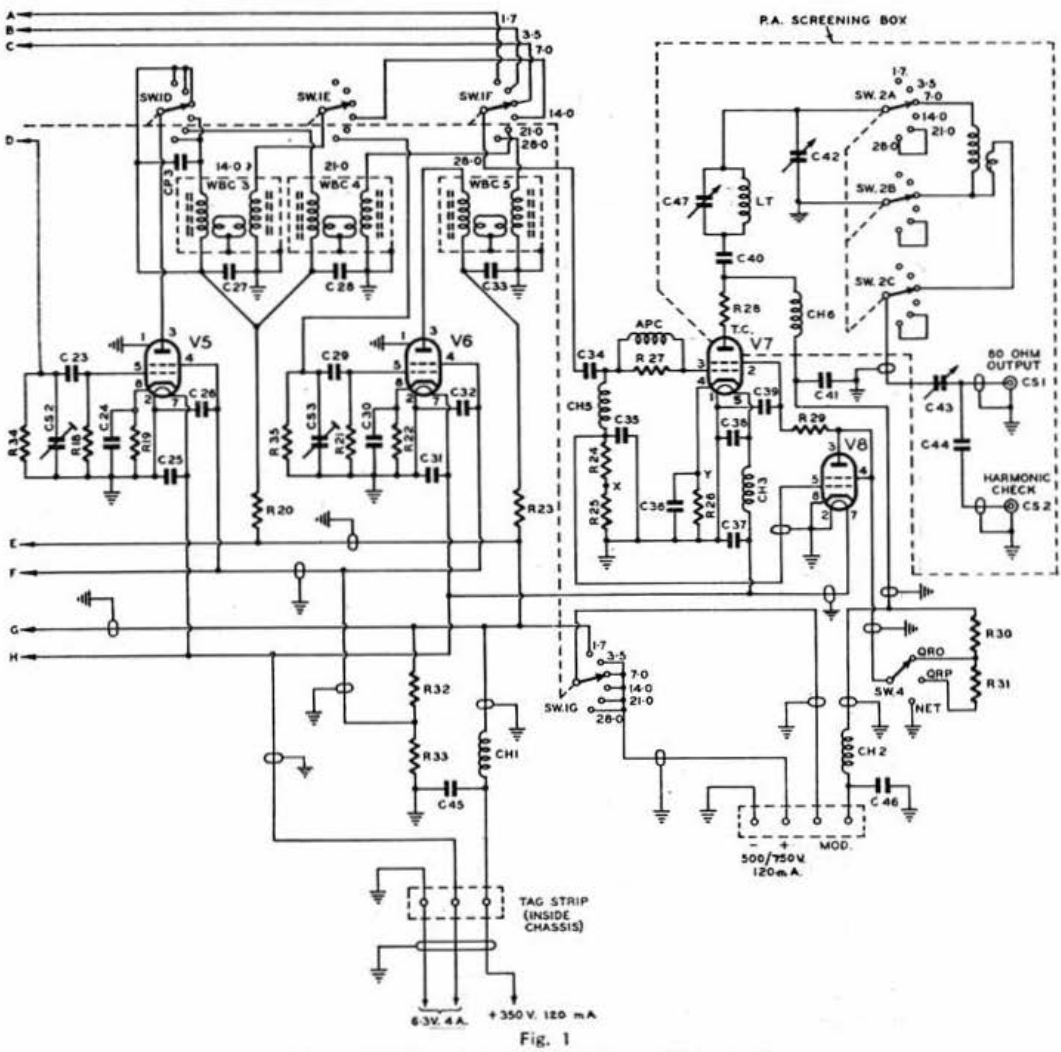


Fig. 1

Circuit diagram of the 75-W. T.V.I.-proof transmitter.

leaving a small flap on two opposite sides which may be bent outwards to form a pair of flanges by means of which the modified can may be screwed to the chassis with No. 4 P.K. screws. A suitable screening box should also be constructed to enclose C1, the V.F.O. band-spread tuning condenser, mounted on top of the chassis. All other V.F.O. components are mounted below the chassis. The 807 valveholder should be mounted 1½ in. below the chassis by means of a bracket.

When preparing the screened wiring, it is essential to avoid leaving frayed ends of the screening braid which could cause trouble. A neat way of finishing the braid is to bind each end for about ⅛ in. with a close winding of No. 22 S.W.G. tinned copper wire, a "tail" of this wire being left with which to earth the braid to the nearest earth point. Any attempt to solder the braid directly to an earth tag or to the braid covering of an adjacent wire will often result in melting the P.V.C. covering, with a consequent short-circuit. Where several such wires are run together, they should be bunched and bound with a few turns of No. 22 S.W.G. wire at convenient points. For general wiring, No. 22 S.W.G. P.V.C.-covered wire should be used, the screening braid being cut from screened wire (which is usually multi-stranded flexible, and thus unsuitable for general wiring). The braid cover is "concertina'd" to enable it to slide easily off the original wire and on to the prepared length of P.V.C.-covered wire, which should protrude for about one inch at each end. Heater wiring should, of course, be made in heavier gauge wire, such as No. 16 or 18 S.W.G.

The P.A. cathode-current meter shunt consists of a length of *Eureka* resistance wire adjusted so that the 0-5 mA-meter reads 0-125 mA. with the shunt connected. Approximately 1½ in. of No. 24 S.W.G. *Eureka* wire (1.65 ohms per yard) will be required, either coiled or bent into a "W" form for connection directly across C36. A 0-125 mA. calibration may be added to the meter scale in Indian ink, or the meter switch position on the front panel may be marked with the multiplier "X25" in white drawing ink—which is also a suitable medium for marking band-switch positions, etc., on the panel, and valve and wide-band coupler designations on the grey cellulosed chassis.

Band-Selector Switch

The writer made up the exciter band-selector switch from switch components salvaged from surplus equipment. Old switches may be dis-

mantled, the existing contacts, which are fixed to the stator wafers by hollow rivets, being removed by carefully drilling the flange off one end of the rivet, using a drill slightly larger than the diameter of the rivet. When re-assembling, 8 B.A. bolts and nuts should be used in place of rivets.

this way, the wafers may be located in the most suitable positions along the switch assembly in relation to associated components. In order to accommodate the 4 B.A. side rods, the holes in the wafers should be cleared with a No. 26 drill.

If the available switch centre shaft is not long

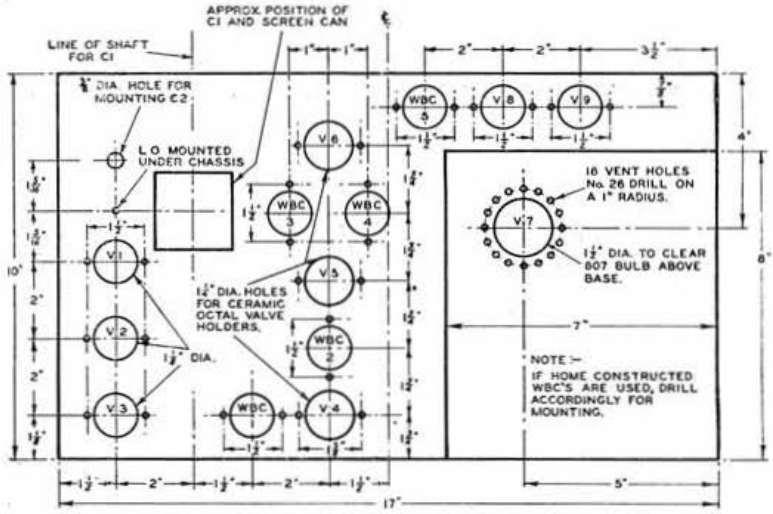


Fig. 2

Mechanical layout drawing for transmitter construction. Base plate has ventilating holes similar to chassis, below 807 valveholder.

The rotors may be removed by carefully untwisting the rotor blade "claws" which fit into the radial slots in the bakelised linen rotor discs and gently prizing the rotor component pieces apart. This operation will only be necessary if the assorted rotor assemblies are "odd," in order to make them line up when fitted to the switch shaft so that the rotor blades all engage the correct stator contacts at each of the six switch positions required. It is convenient to dispense with the standard side rods, which hold the wafers and spacer pieces in position, by substituting 4 B.A. studding with nuts each side of each wafer. In

enough to accommodate the seven wafers with adequate spacing, a piece of ¼-in. diameter brass rod, having flats filed on opposite sides to match the original shaft, may be added by means of a shaft-coupler. The switch assembly should be approximately 9 in. long from click plate to rear wafer. The well-known "Oak" type wafer switch lends itself admirably to the modification described.

* * *

Next month, in the second part of this article, details of the coil turret and wideband couplers will be published, together with the final calibration and operating instructions.

SOME PITFALLS IN SPEECH CLIPPING

By R. H. HAMMANS (G2IG)*

Norman Keith Adams Prize Winner, 1951.

The virtues of speech clipping have been acclaimed far and wide in the last two or three years, but the attendant complications and difficulties have not generally received as much publicity. So that a false sense of security may be avoided, the author draws attention in this short article to some of the snags that may be encountered after speech clipping has been adopted. Although, essentially, a theoretical treatment, it indicates the reasons for the practical failures that frequently occur.

THE first complication to be encountered in designing a system of speech clipping is the need for adequate filtering above 2.5 or 3 kc/s, so as to eliminate any harmonics of these frequencies which will have been generated by the process of "squaring off" the speech waveform. Unless such filtering is properly carried out, the effect on the local listener (whether amateur or B.C.) will be very similar to that of over-modulation, which is in itself a method of speech clipping without precautionary filtering. Basically the problem is one of ensuring that (a) the amplitude of the speech waveform does not exceed the value required for 100 per cent. modulation, and (b) no energy resulting from the modulation process is radiated outside the band of plus or minus 2.5 kc/s.

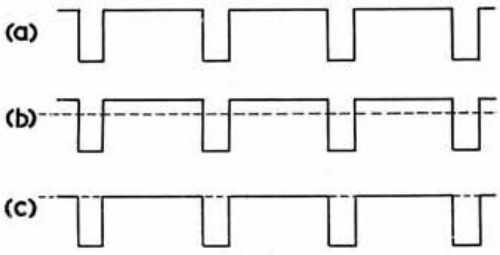


Fig. 1

(a) Television synchronising waveform; (b) waveform in (a) after A.C. coupling; (c) waveform in (b) after D.C. restoration.

Speech Waveforms

Before examining in detail the various factors which enter into (a) and (b), it is desirable to investigate the nature of a speech waveform, and the changes that take place when such a waveform is passed through an amplifier. Although the intelligibility of such a wave could be preserved within a pass-band of 500 c/s to 2,500 c/s, it should not be imagined that the waveform of speech in any way approximates to a sine wave. Indeed, it is chiefly due to the "peaky" nature of speech that speech clipping offers such an advantage in telephony communication. This "peakiness" results not only in isolated peaks of amplitude considerably greater than the mean value, but also in an asymmetrical waveform exhibiting peaks of larger amplitude on one side of the base line than those on the other. An analogy to this asymmetrical condition may be found in television, where the synchronising waveform comprises negative-going pulses of 10 micro-seconds duration at the end of every line, the period of which is approximately 100 microseconds. (Fig. 1a).

When this signal is passed through an amplifying stage (other than a D.C. amplifier), it will shift about the base line (shown dotted in Fig. 1b), taking up a position such that the area enclosed by the curve above the base line is equal to the area enclosed by the curve below it. This condition of equal areas above and below the base line is always true of A.C. coupling. Fig. 1c shows the base line drawn in a position corresponding to television black level, with the whole of the curve appearing below the line. In order to preserve this condition throughout an amplifier, D.C. coupling must be used at all times, or the D.C. component must be restored by some means.

It is a fact that the D.C. component cannot be truly restored, though in the case of a repetitive waveform, such as a television synchronising signal, use may be made of the characteristic that all the pulses are of the same amplitude in order to align their tips, thus maintaining the base line both straight and fixed, relative to a known D.C. value. In a speech waveform, however, there is no equivalent to the constantly repetitive synchronising pulse, since speech is essentially almost infinitely variable in its timing. Consequently, the D.C. restoration methods so familiar to the television engineer cannot be used.

Fig. 2a illustrates how the base line of the television signal remains straight when the D.C. level is preserved, even though the signal content on the positive side may vary. Fig. 2b shows what happens when a signal (as in Fig. 2a) is passed through an A.C. coupling, resulting in the loss of the D.C. component.

Over-modulation Mystery

It will be observed that when the D.C. component is removed, the tips of the negative-going pulses project below the preceding ones immediately any signal appears on the positive side of the datum line. Now imagine that the signal shown in Fig. 2a has been clipped along its negative pulse tips in order to restrict any change in amplitude. Directly the signal is passed through a valve-amplifying stage or a transformer (*e.g.*—a modulation transformer), the D.C. component is lost, the result being the waveform illustrated in Fig. 2b. Clearly, despite the clipping action introduced before the A.C. coupling, the negative-going peaks are nevertheless permitted to go considerably more negative than is the case at

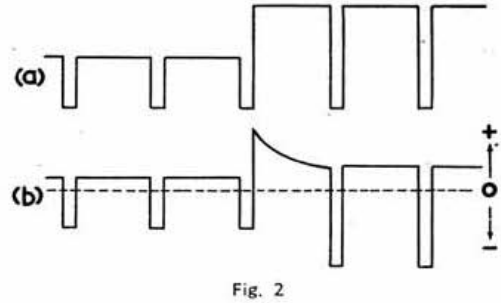


Fig. 2

(a) D.C. coupled waveform with varying asymmetry; (b) waveform in (a) after A.C. coupling. Note the increased peak-to-peak swing as compared with (a).

* *28 Tudor Way, Petts Wood, Orpington, Kent.*

the point where clipping is applied. Similarly, it is possible to imagine a waveform of such a shape that the same argument would apply to the positive peaks. From this it will be realised that although the waveform is clipped to a rigidly determined peak-to-peak amplitude, immediately it passes through a transformer or amplifier the amplitude swing may exceed the clipping level to a considerable extent.

This explanation may help to clear up a mystery which must have been apparent to all who have been conscientious enough to set up a speech clipper using a sinusoidal tone signal, monitoring the results on an oscilloscope. After carefully adjusting the positive and negative clipping levels to obtain symmetrical clipping, applying the signal as modulation to a carrier, and setting the post-clipping adjustments to give precisely 100 per cent. modulation as judged by the trapezium pattern on the oscilloscope, very large changes of tone amplitude will be found to make no difference to the 100 per cent. modulation pattern; but bitter disappointment sets in when, having replaced the tone by speech, it is found that 10 to 20 per cent. over-modulation "spikes" are observed every few seconds on the oscilloscope trace.

Low-level v. High-level Clipping

Tests and observations have shown that as much as 20 db. of speech clipping may be introduced in the presence of fairly large amounts of atmospheric and other noise before intelligibility suffers. Another way of expressing this is to say that the gain of a speech amplifier may be increased ten times (with an input signal of a given acoustic level) from the setting which first gives full modulation, without exceeding 100 per cent. modulation, and without loss of intelligibility. Obviously the modulator *(e.g.*—a Class "B" stage) must, in the interests of economy, be designed so that it will just accept a grid swing corresponding to 100 per cent. modulation. If clipping is to be introduced only after the last A.C. coupling *(i.e.* after the modulation transformer), the grid swing in the modulator stage will have to be about ten times greater than that necessary for 100 per cent. modulation. Consequently, it would appear that clipping should be introduced at an early stage in the speech amplifier, in addition to the high-level clipper following the modulation transformer.

One of the virtues of low-level clipping is that the filter network which must of necessity follow the clipper is much more easily designed and constructed. For example, the inductance in the case of a high-level clipper should for convenience carry the D.C. feed of the P.A. stage, while the filter condensers should be capable of withstanding not only the P.A. anode voltage, but also the peak modulating voltage. This calls for condensers with a minimum rating of twice the P.A. anode voltage.

Nevertheless, it has been shown that both low-level and high-level clippers are essential if 100 per cent. modulation is to be maintained but not exceeded, and if, at the same time, equipment is to be reasonably economical.

Low Frequency Phase Distortion

Fig. 3a illustrates a sine wave to which symmetrical clipping has been applied. If the clipping is as great as 20 db., the remaining portion of the sine wave approaches a square wave in shape (Fig. 3b). The sharp edges formed by the intersection of the flat tops with the almost vertical sides are equivalent to the introduction of a long series of harmonics. If a succeeding amplifying stage with its associated couplings introduces a time-delay which varies with frequency, then the fundamental of the square wave will become displaced relative to the higher frequency components. The result of such phase distortion is illustrated in Fig. 3c, where the flat top has suffered a noticeable "droop." There is also an increase in amplitude at the beginning of the waveform top as compared with the level at which clipping was set. This effect is introduced mainly by iron-cored transformers and is more pronounced at lower frequencies. The remedy is to use good quality transformers and deliberately reduce the low frequency components in the speech waveform before clipping is applied.

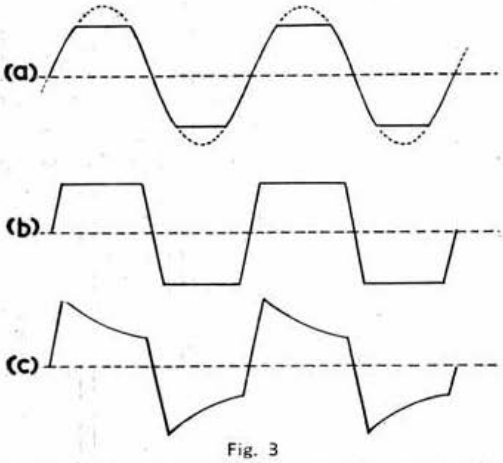


Fig. 3

(a) Sine wave, slightly clipped on positive and negative half-cycles; (b) sine wave of much greater amplitude clipped to same level as (a); (c) waveform as in (b) with phase distortion. Note increased peak-to-peak swing as compared with (b).

Bevan Swift Premium

SHORTLY after the death of Mr. Henry Bevan Swift, A.M.I.E.E., G2TI, in November, 1948, members of the R.S.G.B. donated a sum of money, amounting in all to £137 6s., for the purpose of establishing a Bevan Swift Memorial Fund.

The Council has decided to use this money to establish a Bevan Swift Premium which will be governed by the following rules:

(1). The Premium will be awarded annually in December, until the principal has been exhausted, to the Corporate Member who shall have contributed the most meritorious article to the last complete volume of the *R.S.G.B. Bulletin.*

(2). The Award will be made on the recommendation of the Technical Committee of the Society or in such other way as the Council may direct.

(3). The Premium will be to a value of £5 5s. and may take the form of a medal, a prize or cash.

(4). The Premium may only be awarded once to any member.

Mr. Bevan Swift was President of the Society from 1931-33, having previously served as Chairman of the old T. & R. Section, and later as Honorary Secretary of the Society. Mr. Swift helped to found the *T. & R. Bulletin* in 1925 and was Honorary Editor for several years.

B.A.T.T.S., Watchfield, R.A.F.

Mr. C. B. Raithby (G8GI), School House, Martin, Lincoln, would be glad to hear from the wartime staff of the above school, including F/Lt. Brown.

AN AERIAL SAFETY DEVICE

By F. C. ROBERTSON (GM3GIV)*

Snow, ice and gales are the natural enemies of aerials, feeders, and masts, and some form of protection is often desirable. Here is an ingenious accessory of simple construction which can be pre-set to safeguard an aerial against excessive strain that might otherwise cause damage to the installation, particularly in exposed localities where there is little or no protection from the elements.

THE safety device described herein is designed to maintain an aerial at normal height until the extra strain imposed by a storm reaches a pre-determined level. It then automatically releases the halyard and lowers the aerial to the ground. For simple recovery of the unit and repositioning of the aerial, the halyard should be of the continuous loop type. Aerial "load-shedding" in this way removes the risk of a broken wire, and provides the mast with a better chance of safe survival.

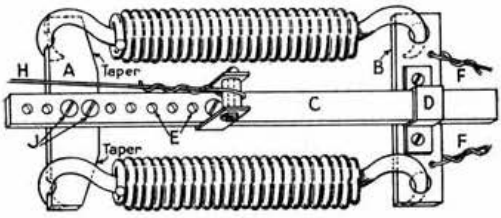


Fig. 1

Diagram of aerial safety device showing mode of construction and assembly.

Construction

It is necessary to measure the pull of the aerial by attaching the halyard to a baby spring balance, and reading the result from the scale. Having ascertained this, the balance should be taken to an ironmonger or tool shop, where the two tension springs with hooked ends (shown in Fig. 1) will be purchased. The most suitable type of spring has an easy action and may be extended to about twice its closed length.

The springs should be attached in parallel to the balance, and should be capable of sustaining the same pull as recorded for the aerial with not more than 50 per cent. extension.

Crossbar A should fit quite easily inside the hooks of the springs, and the taper on the inner edge must not be less than 10 degrees. The length of trigger C, should be made approximately equal to the full extension of the springs. If a series of holes, E, are bored with a spacing equal to J along about one third of the trigger, C, the device can be adjusted to operate over the full range of which the springs are capable.

Bolted to the centre of the trigger is a small U-piece to which the halyard, H, is attached by means of a bolt and spacing tube. The halyard is thus allowed freedom of movement when the trigger turns over at the time of release.

The remaining crossbar, B, is attached by wires, F, to the original anchorage of the halyard. In order to ensure that the trigger will not jam when in action, saddle, D, should be made a little larger than the cross section of C.

Operation

As the pull on the halyard increases (from whatever cause), the springs extend until finally the end of the trigger is withdrawn from the saddle. Since the halyard is attached to the centre of the trigger, and crossbar, A, is still held by the hooks, the trigger is automatically turned-over lengthwise through 180 degrees, bringing the hooks on to the tapered edges of crossbar A. This position is untenable, and the hooks slide off A outwards, splitting the device into two parts. The aerial, braked by pulley and halyard, falls gently to the ground.

Resetting

Having raised the aerial by the halyard in the usual way, resetting can be achieved by slipping the appropriate end of the trigger through the saddle, by replacing the spring-hooks in the grooves of the crossbar A, and then carefully allowing the device to take the load again.

The device may also be fitted between the aerial insulator and the upper end of the halyard, with the trigger linked to the insulator. To prevent damage to the insulator when falling to the ground, thick rubber rings of sufficient diameter should be positioned at each end of it.

* "Mount Carron," Falkirk, Stirlingshire.

The Eddystone Two-Metre Beam Aerial

DESIGNS for V.H.F. aerials are many and various, but in general fall into two main categories—stacked dipoles and the Yagi. An excellent example of the latter is the four-element all metal array made by Stratton and Co., Ltd., of Birmingham, and appearing in the *Eddystone* catalogue under No. 717.

Constructed in brass and copper, this aerial consists of a folded dipole with provision for feeder connection, two directors and a reflector. Whereas the spacing of the tubular elements is fixed, their length may be adjusted by sliding them in or out of sockets welded to the main boom; electrical connection and mechanical security is ensured by tightening the clips provided. The aerial is designed to fit a tubular mast up which the co-axial feeder is run, the latter connecting to the folded dipole by means of a well-designed and waterproof insulated fitting.

The complete aerial weighs only 2¼ lb. which, together with its low wind-resistance, enables it to be used with safety on unstayed masts up to 25 ft. in height.

The idea of employing a dipole with unbalanced feeder would seem to invite trouble from standing waves on the cable, but in practice no harmful effects were apparent in either transmission or reception. The makers' figures of 9 db. gain over a dipole and a 20 db. front-to-back ratio appear to be borne out in practice, and the aerial compares favourably with a six-element stack so far as gain is concerned.

The array is supplied in "knock-down" form, complete with blue-print and full instructions for assembly, and takes only a few minutes to put together, a fact which makes it very attractive for portable work.

W.H.A.

A SIMPLE 420 Mc/s. TRIPLER

By J. HUNTER (GM6ZV)*

In the October, 1951, issue of the "Bulletin" GM6ZV described "A Simple 144 Mc/s. Exciter." The author of that article now explains how the exciter may be adapted for 420 Mc/s. operation, again using components that are readily available, and employing circuit techniques which will appeal to those who are about to venture into the 70 cm. band for the first time.

IN order to convert the 144 Mc/s. exciter for operation on 420 Mc/s., it was decided to add a tripler output stage, using an 832 twin-tetrode. The circuit employed, illustrated in Fig. 1, is quite straightforward, offering no difficulties so far as practical layout is concerned. The exact mode of construction will depend to a large extent on materials and facilities available, but the following practical points should be borne in mind.

Construction

The 832 valve is mounted horizontally, this being the most convenient arrangement, because it simplifies the connection of the grid and anode lines. The grid circuit comprises the tripler-stage anode lines from a SCR522 transmitter, with a *Philips* 1-8 $\mu\mu$F. trimmer connected across them. The anode inductance is formed from a strip of thin copper $\frac{3}{4}$-in. wide bent into a "U" shape about $1\frac{1}{8}$ in. long, and 13/16ths in. across. Connections to the anode pins of the 832 are provided by soldering anode clips from a SCR522 on to the inner surfaces of the "U." The R.F. choke is made from about 7 in. of insulated connecting wire wound on a $\frac{1}{4}$-in. former. Other details of the unit are apparent from the circuit diagram.

No by-pass condenser is connected externally between screen-grid and cathode (there is, of course, an internal condenser), as it was found, when testing the original unit, that the inclusion of a condenser produced a state of unbalance. One make of valve showed colour on one anode, while another make showed colour on the opposite anode, whereas both valves ran without colour when the by-pass condenser was removed.

Tuning

Before starting to test the unit, the 832 valve pins should be carefully cleaned with a fine file (several valves which had been condemned performed normally after cleaning). This is important because the anode loop is tuned to resonance by sliding it along the anode pins of the valve—an easy enough adjustment if the lines are carefully set to the spacing of the anode pins.

To safeguard the 832 in the absence of drive, a modest value of fixed grid-bias is used, and this may be applied *via* a low-range milliammeter (*e.g.* 0-5 mA.) to indicate grid current during tuning-up. The tripler grid circuit is coupled to the output of the 144 Mc/s. exciter by means of an insulated loop formed into a "U," the size of the loop being varied until maximum drive is obtained.

Tuning-up procedure is as follows. With the 144 Mc/s. exciter operative, and the tripler heater on but no H.T. applied, adjust the tuning of the grid trimmer C1, and the anode output condenser of the 144 Mc/s. unit until grid current appears in the milliammeter. With 27 volts negative bias applied *via* a 80,000 ohms grid resistor, the grid current should be about 2 or 3 mA.; the input to the 144 Mc/s. tripler under these conditions being approximately $22\frac{1}{2}$ watts. 832 valves vary considerably in performance, but the writer's stock of seven all performed well, one or two being definitely superior to the others.

When maximum grid current has been achieved, H.T. can be applied to the 420 Mc/s. tripler; a voltage of 200 is recommended for a start. Because no well-defined dip is noticeable in the anode current at resonance it is necessary to couple a flash-lamp bulb to a "U" loop, using this device to indicate maximum output. A useful accessory consists of a small piece of copper sheet, about 1 in. square, attached to the end of a length of insulated rod. If, on bringing this close to the anode lines, the lamp brightens, then the inductance of the loop is too great. Another piece of insulated rod may be used to push the anode loop in or out until the optimum setting is found.

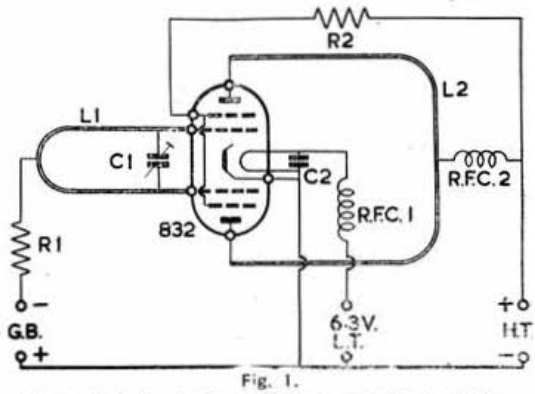


Fig. 1.
Theoretical circuit diagram of the 420 Mc/s. Tripler.

L1	See text.
L2	See text.
C1	1–8 $\mu\mu$F. *Philips* trimmer.
C2	500 $\mu\mu$F.
R1	80,000 ohms.
R2	70,000 ohms.
R.F.C. 1, 2	7" insulated wire, wound on $\frac{1}{4}$" former.

With 300 volts on the anodes, anode current will be between 50 and 70 mA., depending on individual valve characteristics. At this input a 3-watt lamp can be lit to full brilliance.

The writer wishes to express his appreciation to Mr. John Kyle, GM6WL, for his assistance and ideas.

Design of a Cutter Head

AMATEURS who are interested in direct disc recording will find much practical information in a new specialised booklet published by the *British Sound Recording Association* entitled *The Design of a Cutter Head for the Amateur.* The head described is of the moving-iron type, fairly easy to make with ordinary hand tools, and has been found to give extremely good results with adequate sensitivity and freedom from non-linearity distortion. The booklet contains 20 pages, and sells for 5s. 6d.

* *20 Mansefield Crescent, Clarkston, Glasgow.*

THE THIRD 420 Mc/s. TESTS

The introduction of the R.S.G.B. 420 Mc/s. Tests in 1949 marked an important phase not only of U.H.F. deve'opment in this country but also in the conception of a "contest" that places particular emphasis on technical innovations. As a result, reports on this annual event have come to be regarded in the nature of a symposium on the very latest U.H.F. techniques coupled with an opportunity to judge their relative merits by direct comparison of performances.

THE eighteen entries for the third R.S.G.B. 420 Mc/s. Tests, held during the weekend of June 16-17, 1951, clearly reflected the genuine enthusiasm and progressive outlook of British amateur U.H.F. workers. Favoured this year by weather that permitted portable operation without excessive discomfort—though turbulent winds gave little promise of temperature inversions—the Tests may truly be said to have set the stage for the ensuing highly successful 1951 420 Mc/s. summer season. The results are shown in Table I.

Table I—Results

Call	Location	Stns. Worked	Stns. Heard Only	Max.QSO Distance (miles)
G2DD	Stanmore, Middx. 170 ft. a.s.l.	12	1	27
G2HDJ/A	Ashford, Middx.	7	—	40
G2JT	Oldham, Lancs.	6	2	70
G2QY/P	Princes Risborough, Bucks. 800 ft. a.s.l.	6	2	110
G2RD	Wallington, Surrey	6	1	19
G2WS	Shortland, Kent	2	—	2
G2WS/A	London, W.1.	3	—	16
G3APY/P	(i) Crich, Derbyshire (ii) Meryton Low, Staffs.	2 13	1 3	70 110
G3BUR/P	Fish Hill, Worcs. 1048 ft. a.s.l.	5	1	70
G3DA	Speke, Liverpool 40 ft. a.s.l.	5	—	40
G3ENS/P	Broombriggs Hill, Leics.	6	—	75
G4CG	Wimbledon, S.W.19	8	4	14
G4LU	Nr. Oswestry, Salop	5	—	85
G5CD	London, N.W.11	3	1	—
G6HD	Beckenham, Kent	4	2	20
G6VX	Hayes, Kent	14	1	45
G8QY/P	Ilmington Downs, Worcs. 854 ft. a.s.l.	8	—	85
GW2ADZ	Llanymynech, Mont.	3	1	70
GW5MQ	Nr. Mold, Flint	5	—	—
Check logs				
G2FKZ/P, G3FZL/P	Caterham, Surrey	12	3	—
G3EIW	London, S.E.18	2	—	—

Also Active: G3ELT, G3FP, G3FUL, G3HGY/P, G3IS, G5PP/P G5PY, G5RW, G5TP, G6DP, G6YP, G6PG, G8DM/A, G8KZ.

Over thirty stations, roughly stretching from just south of London, across the Midlands and as far north as Lancashire, are known to have established two-way contacts during the period of the Tests, though it is much to be regretted that a number of parts of the country are still unrepresented. Despite the absence of good tropospheric propagational conditions, at least one contact—G2QY/P (Princes Risborough, Bucks.) to G3APY/P (Meryton Low, Staffs.)—exceeded 100 miles and all three classes of contacts—portable/portable, fixed/portable and fixed/fixed—are to be found in the accompanying table of notable contacts (Table II). This table, incidentally, illustrates one feature of more than passing interest: over half of these longer distance contacts were made between 1600 and 1745 B.S.T.

Several of the shorter distance contacts were made over intervening hills; for example the 28-mile path between G3APY/P and G2JT (Oldham, Lancs.) crosses the foothills of the Pennines,

Table II—Notable Contacts

Date G.M.T.	Station A	Station B	Strength of A at B	Strength of B at A	Approx. Distance
June 16 2320	G4LU	G3APY/P	5/7-8/9	579	70
June 17 1450	GW2ADZ	G2JT	569	559	70
1603	G4LU	G2JT	589	5/5-7/9	70
1603	G3APY/P	G8QY/P	59;	59	75
1625	G3APY/P	G3BUR/P	579	46–	70
1742	G4LU	G8QY/P	57–	589	85
1745	G3EBS/P	G2QY/P	569	569	75
2008	G3APY/P	G2QY/P	559	569	110

Heard only: G4LU by G2QY/P, G3ENS/P by G2FKZ/P, G8QY/P by G2FKZ/P

including Goyt Moss and Cats Tor, and represents an estimated "bend" of some 500 ft. Here again contact was made (at 1730) in the vital period mentioned above. Yet at the same time it is worth recording that an investigation into the "heard only" reports of longer distance transmissions shows much less restricted time limits; for example G4LU (nr. Oswestry, Salop.) was heard over 120 miles away by G2QY/P at 1417 B.S.T.

The inclusion of an after-dark period was widely welcomed although, for various reasons, comparatively little activity was recorded. The good signal strength reports of G4LU to G3APY/P (who was then located at Crich, Derbyshire) suggests that useful propagational conditions existed during this period although at the time a depression situated off North Ireland was moving North-east and the barometer was slowly falling over the Midlands and south-east England.

A propagational effect observed by G3ENS on 144 Mc/s. during the Tests raises the question of the possible presence of a floating area of ionised material. During the evening of June 16 he noticed that, whenever his aerial was pointed towards the setting sun, the hiss level increased by up to five "S" points. Next morning a peculiar "rumbling" noise covering the entire 144 Mc/s. band was noticed. Its source at first appeared to be located at roughly 90 degrees from North but by twenty minutes later had shifted to about 10 degrees from North. No corresponding effects were reported on 420 Mc/s.

Equipment

Most satisfactory feature of the Tests is the general improvement in results over both the 1949 and 1950 events: this year nearly half the entrants made contacts over distances exceeding 60 miles—no mean feat bearing in mind the "average" conditions. The reason for this overall improvement is not difficult to find if a comparison is made between the equipment in use during the three Tests. Receivers, especially, have been radically improved and the gap between the few stations who previously dominated the field and the remainder has been sensibly narrowed. The need for a stable, narrow-band superheterodyne receiver with a low noise factor and smooth tuning arrangements is no longer questioned. The super-regenerative receiver has retired from the lists and

the battle now lies between those who favour crystal-controlled injection and those who prefer a self-excited local oscillator. This year the current has flowed strongly towards crystal control —at least six such receivers were in operation— though the practical results of this trend lie more with added convenience in operation than any fundamental improvement in sensitivity. By the use of overtone crystal circuits and multipliers up to and including quintuplers, two 6J6s usually suffice to produce 400-Mc/s. components from conventional crystals. Table III presents the salient features of a number of the home-constructed receivers in use.

Table III—Receivers

Call	R.F. Stage	Mixer Stage	Fundamental Osc. Freq. Mc/s	First I.F. Mc/s
G3FZL	CV88	CV102	Xtal.22	35
G2DD	—	Xtal. diode	Xtal.5.6.	27
G2HDJ	—	Xtal. diode	S.E.O.68	14
G2JT	—	p.p.6J6	Xtal. 8	16
G2QY	—	p.p.CV103s	S.E.O.103	17
G2WS	—	Xtal. diode	S.E.O.70	12
G3APY	446A	CV102	Xtal.7.5.	25
G3DA	446A	1N34	Xtal.(?)	13
G3ENS	446A	1N22	S.E.O.(?)	30
G4LU	—	CV102	S.E.O.105	8
G5CD	p.p.12AT7	p.p.12AT7	S.E.O.200	10.7
G6HD	—	CV102	Xtal.16	22
G6VX	—	p.p.Xtal. diodes	S.E.O.144	25
G8QY	446A	Xtal. diode	S.E.O. (?)	45
GW2ADZ	—	CV102	S.E.O.140	12

While many novel ideas are to be found in the finer points of the receiving equipment, pride of place in this connection must surely go to G6VX. To eliminate feeder losses, a push-pull crystal mixer stage was placed in the centre of the 16-element aerial array together with one stage of 25 Mc/s. I.F. amplification possessing a bandwidth of 1 Mc/s., and the output from this amplifier was coupled *via* a 100-foot length of 80-ohm coaxial cable to an *Eddystone* 640 at the operating position. This same cable also carried 6.3 volts on the outer conductor and H.T. on the inner conductor. A second 100-foot cable provided a common earth return for the two supply leads (outer conductor), the crystal current (inner conductor) as well as permitting the local oscillator voltage to be fed to the output side of the two crystal diodes (Fig. 1). The local oscillator was set in 1 Mc/s. steps, and the intervals explored on the *Eddystone* receiver. '6VX reports that the most difficult problem he encountered in the design of this unorthodox equipment was the tunable oscillator (135-145 Mc/s.) since it had to produce enough stable 400 Mc/s. component to overcome the high losses at this frequency in the low grade cable. A CV408 oscillator proved satisfactory with overall stability as good or better than incoming crystal-controlled signals. It is worth

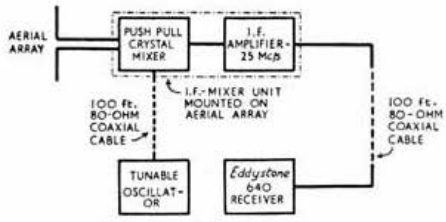


Fig. 1.

Block schematic diagram of the unorthodox receiver used by G6VX incorporating a mixer-amplifier in the aerial array.

noting that transmitter drift, even with crystal control, is often considerable on these frequencies : any crystal drift on its fundamental frequency being multiplied many times.

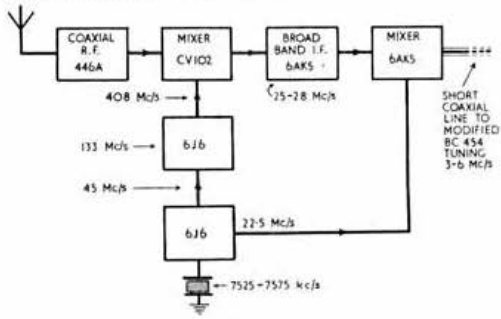
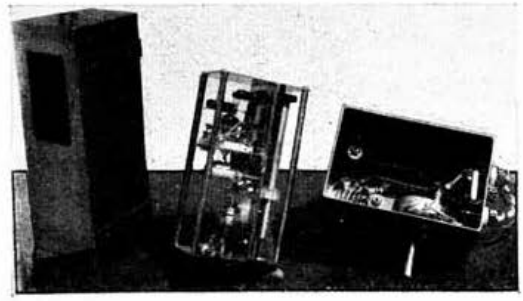


Fig. 2.

Block schematic diagram of the crystal converter used by G3APY/P.

The quadruple superheterodyne receiver (I.F.s 25/28 Mc/s., 3/6 Mc/s., 1415 kc/s. and 85 kc/s.) at G3APY consists of the converter outlined in Fig. 2 in front of a modified BC454. An interesting feature of this arrangement is the Squier oscillator circuit designed to allow the 22.5 Mc/s. component of a 7.5 Mc/s. crystal to be used as second injection voltage while the 408 Mc/s. component from the same crystal chain is used as first injection voltage. Low power consumption, permitting the field use of the receiver was a basic requirement in this design. In his report, '3APY mentions that break through and " birdies " are of an extremely low order.



This view of the unorthodox receiving equipment used at G6VX during the 420 Mc/s. Tests, shows from left to right: The outer weatherproof case for the mixer-I.F. unit; the unit itself with input lines in the right-hand section; and the tunable oscillator normally located at the operating position.

Transmitters

Here again there is a perennial search for greater power efficiency, with at least six stations now using straight amplifiers in the final stage compared with two in 1950. No self-excited transmitters were in use by entrants, though a few such rigs were in operation. It is, of course, important that the value of the S.E.O. for simple mobile operation be not overlooked—G3BUR has done extensive tests in this connection—but it is generally agreed that for serious communication work their value has departed, or at least moved on to higher frequencies.

G2JT is one of several stations who show that it is quite feasible to get to 432 Mc/s. from an 8 Mc/s. crystal without a long string of multipliers ; he uses a 6J6 harmonic oscillator operating on the third overtone, multiplying in the second

triode section to 48 Mc/s.; then come two 6AG5s in push-pull tripling to 144 Mc/s., followed by a neutralised push-pull 6C4s amplifier. He then uses an 832A power tripler to obtain 2-3 watts output on 432 Mc/s. But though the 832, and its more modern counterpart the QQV06/40, remain at the top of the "hit parade," disc-seal triodes retain considerable support, as may be seen from the following analysis.

Transmitter Design.

Power Amplifier: G2DD (CV53), G2FKZ (ME1003), G3APY (CV53), G4CG (CV53), G5CD (QQV06/40). *Power Doubler:* GW2ADZ (CV127), G2RD (CV82), G4LU (CV127). *Power Tripler:* G2HDJ (QQV06/40), G2JT (832A), G2QY (832), G2WS (QQV06/40), G3BUR (CV82), G3DA (832), GW5MQ (832), G6HD (832), G6VX (15E), G8QY (CV82).

Particular emphasis has been given by G2DD to the elimination of spurious transmissions—including the stray 145 Mc/s. component which all too often denotes the presence of a 420 Mc/s. transmitter—and parasitic oscillations. He uses modified R.F.105 units for the final and penultimate stages and states that with the substitution of CV53s these units become "as docile as a lamb"—though perhaps a countryman might object to this analogy! But more seriously, the improvements generally effected in transmitter stability and general design do represent an extremely strong argument in favour of an early reconsideration by the authorities of the present 25-watt limit which is hampering the work of several enthusiasts.

Aerials

Aerial design has not, it would appear, undergone radical change to the same extent as receivers and transmitters. Sixteen-element stacked arrays were again popular, with a fair sprinkling of 24-element arrays, corner reflectors and 6-element Yagis. G3APY carried out experiments with a "cheese" radiator some 20-ft. across at the mouth with a dipole and reflector mounted at the focal point, but field strength indications and its unwieldly size convinced him that the more conventional 5-element Yagi was the better aerial for the Tests. For fixed locations, where a little more output power is usually available, the less highly directional stacked arrays continue to prove effective. G4LU, for example, was undoubtedly radiating an extremely useful signal over a broad horizontal arc with an indoor 6-element stack of half-wave radiators with reflectors spaced one-quarter wave behind them. G2JT also used an indoor aerial, his arrangement being an H2/4 (Koomans) array.

Mr. C. I. Orr-Ewing

THE news that Mr. Charles Ian Orr-Ewing, O.B.E., M.P. (North Hendon), has been appointed Parliamentary Private Secretary to the Minister of Labour and National Service (Sir Walter Monckton, K.C., M.P.), will give pleasure to his many friends in the Society. Mr. Orr-Ewing served in the R.A.F. throughout the 1939-45 war and is now a Director of *Cossor, Ltd.* Prior to the war he operated an amateur station under the call G5OG.

with the one which faces our U.S. friends where as many as eight stations may be active in one city from 6 a.m. until midnight. With this in mind it behoves us all, if we want to operate during television programme hours, to see that our transmitters are harmonic-free, but it is also up to the set manufacturer to do his part. In this connection, we have a mixed picture, like the Americans. For example, we know that receivers made by the *Philips* and *McMichael* concerns embody design features specifically intended to cope with our problem. The *E.M.I.* and *Murphy* organisations have also been most helpful and co-operative and have undertaken the modification, at their own expense, of some of their earlier models, with which trouble was being experienced. We have no doubt that other firms have also been willing to tackle the problem although, as yet, the facts may not have been brought to our notice. To all these we tender our grateful thanks. To the others we most earnestly address our plea that they overhaul their designs to see whether their television receivers are specially liable to amateur T.V.I. We pledge the technical co-operation of the R.S.G.B. in this matter to the utmost.

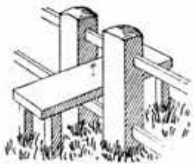
It may be thought that, because there are so many radio services now on the air, the choice of an intermediate frequency which just cannot be interfered with is a physical impossibility. This is perfectly true, but whereas only a microscopic percentage of viewers is likely to live within interference range of a commercial transmitter, a hundred or more may live near an amateur station. It would seem reasonable, therefore, carefully to avoid the amateur allocations when choosing the I.F. for a television receiver.

In the early days, when broadcast receiver interference was our number one headache, it was the manufacturers who eliminated the problem because receivers had to be made more selective due to the increase in the number of broadcasting stations. This, however, is not likely to occur with television stations. The unselective, flatly-tuned, receiver which gave us so much trouble twenty years ago is the direct counterpart of the "modern" television receiver with its front end wide open to a variety of signals far off the television frequencies. We believe that the remedy is still largely in the hands of the industry although it is no less important for us to ensure that our own house is in order. We do believe, nevertheless, that the British manufacturer is fair-minded and will admit that the present state of affairs is an injustice to the amateur. If we see to it that our transmitters do not radiate signals in the television band, it is only fair to expect him to design his receivers so that they do not pick up signals which are being carefully confined within the limits of the amateur bands.

G6DH Wins Clerk-Maxwell Premium

THE senior award of the Brit.I.R.E.—the Clerk-Maxwell Premium—has been made to Denis W. Heightman, G6DH (now with the *English Electric Co., Ltd.*), for his paper on "The Propagation of Metric Waves beyond Optical Range." This Premium—offered for the most outstanding paper published in the Institution's Journal during the year 1950—was presented at the recent Annual General Meeting of the Institution. Mr. Heightman won the R.S.G.B. Norman Keith Adams prize in 1947.

THE HELPING HAND TO AMATEUR RADIO



Part VI.—Superheterodyne Receivers

THE selectivity of the I.F. stages in a superheterodyne receiver depends greatly on the efficient design of the coupling transformers. The ratio of inductive reactance to H.F. resistance (known as "*Q*" factor) must be kept high, and for this reason the coils are usually wound with Litz stranded wire. Trimming condensers should be of the air-dielectric type. The modern trend, however, is to employ inductance-trimming by means of variable screw-threaded iron-dust cores capable of screwdriver adjustment, resulting in improved "*Q*" and more compact dimensions, without the need for parallel capacity trimmers, though fixed condensers may be used.

By
B. W. F. MAINPRISE
B.Sc.(Eng.), A.M.I.E.E.(G5MP)

Use of I.F. Regeneration

When regeneration (*i.e.* positive feed-back) is applied to an I.F. amplifying stage, the response curves of the tuned circuits are sharpened so that increased selectivity accompanies the increased gain. Adequate feedback can often be achieved by running an insulated wire from the grid of one of the I.F. valves towards the anode lead, or into the I.F. transformer connected in the anode circuit of that valve. The position of the wire should be adjusted until the stage is on the threshold of oscillation. Telegraphy signals will then develop a characteristic "ringing" note, and telephony will become low-pitched due to attenuation of the higher modulation frequencies. Control of regeneration (or reaction) may be affected by varying the voltage applied to the screen or cathode of the valve *via* a panel-mounted potentiometer.

A more satisfactory method is to add a reaction winding to the I.F. transformer—*i.e.*, a few turns adjacent to the grid coil. The cathode of the valve may then be connected through this winding to chassis, or to the bias resistor (the latter being made variable to control regeneration). If no oscillations (indicated by the sudden production of heterodyne whistles and spurious signals) are obtained on initial test, then the coil connections should be reversed to obtain correct polarity.

The Crystal Filter

Instead of using regeneration to improve selectivity, a crystal filter may be employed. The crystal itself consists of a small slab of quartz—the resonant frequency of which is determined by the thickness and axis of the cut—held between two parallel-ground metal plates, the whole assembly often being enclosed in an evacuated container. The crystal is connected in a bridge circuit as shown in Fig. 1. L1 and L2 form the I.F. transformer in the anode circuit of the last I.F. stage, while the tap on L3 matches the impedance of the filter circuit to that of the detector. C1—a panel-mounted variable condenser of maximum capacitance around 15 $\mu\mu$F. (which is about twice the capacitance of the crystal and holder)—is termed the *phasing condenser*. C2 serves to tune L2 to either side of resonance, and is known as the *selectivity condenser*.

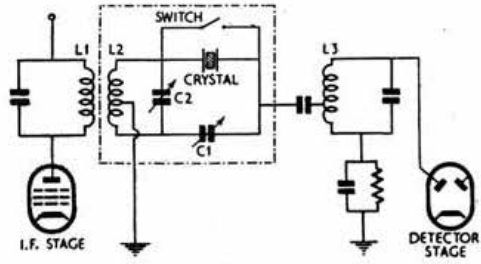


Fig. 1.
Circuit of a crystal filter (shown inside dotted line). C1 adjusts the position of the rejection "notch" in the resonance curve, while C2 controls the overall selectivity. The low impedance filter output is tapped on to L3 for impedance matching.

The bridge is balanced when C1 is made equal to the capacitance of the crystal and holder, and the filter then acts as an acceptor circuit of very high "*Q*," with a symmetrical response curve of the type illustrated in Fig. 2a. When C1 is purposely made unequal to the crystal capacity, then the filter, while still providing a high "*Q*" response, acts as a rejector circuit at a frequency slightly removed from acceptor resonance, resulting in the formation of a "notch" in the response curve, so that the latter is no longer symmetrical (Fig. 2b). By varying the capacity of the phasing condenser, the position of the "notch" can be shifted a few kc/s. to either side of the resonance point, and can be set to attenuate interference on a frequency adjacent to that of the desired signal.

The selectivity of the filter may be varied by adjustment of C2, which alters the impedance of the circuit feeding the crystal bridge. Best selectivity is obtained when the impedance of L2.C2 is low—*i.e.*, when tuned off I.F. resonance—although this involves some sacrifice of signal strength. C1 and C2 are normally both panel

controls, enabling the operator to set the rejector "notch" *(phasing control)* and vary the overall selectivity *(selectivity control)* in order to obtain optimum reception of wanted signals.

The crystal filter may be switched out of circuit by means of a short-circuiting switch across the crystal. Although the use of the filter always results in a drop in signal strength, the reduction in background noise caused by the narrower bandwidth is much greater, and reception is greatly improved. In the case of telephony, however, the loss of signal strength (coupled with deterioration of intelligibility) will be more apparent owing to removal of the sidebands, and where telephony reception is mainly required, it is preferable to use another crystal in place of C1. The two crystals differ in frequency by a predetermined amount to provide a flat-topped response curve with a pass-band of about 2500 c/s. High selectivity 'phone reception is then possible, but filters employing two crystals are not in common use because of difficulties in design.

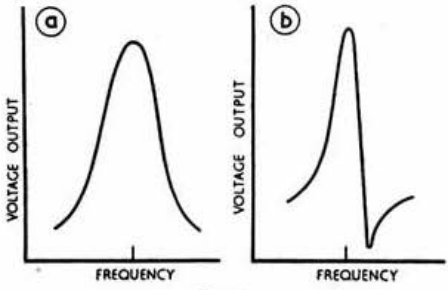


Fig. 2.

Typical I.F. response curves (a) with I.F. regeneration or a balanced crystal filter, and (b) with an unbalanced crystal filter, showing the appearance of the rejection "notch," and impaired selectivity at frequencies well removed from resonance.

Detector and Output Stage

Modern practice favours diode detection, the circuit usually comprising a double-diode triode valve, with one diode for detection, resistance-capacity coupled to the triode (for A.F. amplification), the second diode being used to provide A.V.C. The triode is invariably coupled to a pentode output valve.

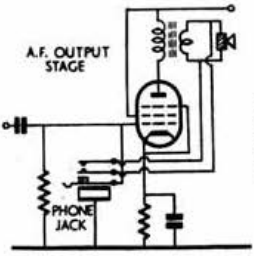


Fig. 3.

Circuit of A.F. output stage, showing method of wiring jack for headphone reception so that inserting the 'phone plug mutes the speaker.

The A.F. and output stages of communications receivers are normally orthodox and follow commercial design, with the exception that provision is made for headphones as an optional alternative to loudspeaker operation. A typical arrangement is shown in Fig. 3. It is important to note that a pentode valve should never be operated with too high an impedance load, as occurs when the loudspeaker is disconnected from the output transformer. The resulting high voltage swings would cause flash-over inside the valve, or damage the insulation of the transformer primary winding. When using headphones, it is essential to leave the loudspeaker connected, though it may be short-circuited for muting purposes. The 'phones are best connected across the grid resistor of the output stage rather than in the anode circuit, where the higher noise level generally proves irritating. Insertion of the headphone plug into the jack connects the 'phone in the grid circuit, at the same time short-circuiting the loudspeaker, one side of the phones being taken straight to chassis to prevent trouble through hum pick-up or possible R.F. instability.

Alignment of Tuned Circuits

A beginner should be in no hurry to interfere with the alignment of a receiver giving reasonable performance. From time to time, however, slight adjustment of the tuned circuits will become necessary, due to such causes as the creeping of the wax protecting coil turns, ageing of trimming condensers, changes in operating temperature and humidity, and the replacement of valves. A systematic procedure is essential, and the successive steps are outlined below.

Alignment of receivers is carried out by starting at the circuit feeding the detector valve and working, in orderly sequence, towards the aerial stage. Thus, the I.F. amplifier is the first section to receive attention.

I.F. Alignment

Set the receiver controls as follows: R.F. and I.F. gain at maximum; crystal switched in; phasing control at mid-capacitance to provide a symmetrical resonance curve; selectivity control at the sharpest position (detuned from centre); and the primary and secondary windings of the I.F. transformers (if movable) at maximum separation.

Adjust the trimmers (or iron-dust cores, if applicable) of the I.F. winding feeding the detector valve for maximum background noise, then adjust the remaining I.F. trimmers in sequence, working towards the anode circuit of the frequency changer. Great care should be exercised in carrying-out these adjustments, as the selectivity of the receiver will depend on the accuracy of the operation.

If the receiver is not fitted with a crystal filter, alignment may still be performed by peaking the background noise, but a serious disadvantage of this method is that the resulting resonant frequency of the I.F. circuits is unpredictable, and may become slightly displaced, with a corresponding change in receiver calibration. In this case it is better to use a simple oscillator to provide a signal, the frequency being determined by noting on a broadcast receiver which stations are heterodyning the second or third harmonic. The same frequency should be used each time re-alignment is necessary. The oscillator unit may consist of a battery valve with an I.F. transformer providing grid and anode circuits (note that reversal of the connections to one winding may be necessary to ensure oscillation).

Local Oscillator Alignment

A signal source, such as a BC.221 frequency meter or a Class "D" wavemeter, is desirable, in order to provide a signal near to the H.F. end of the given wave-band. Set the receiver dial to the appropriate reading, then adjust the local oscillator trimmer condenser until the signal is heard, peaking for maximum output.

Next, shift the wavemeter frequency to a point

near the L.F. end of the band, and locate the signal on the receiver. It will probably be found that the dial reading is in error, and this should be corrected by adjustment of the oscillator padder condenser (where fitted), or alternatively of the coil core. It is advisable to rock the tuning gang while "padding" in order to ensure that a true maximum is obtained at the correct dial calibration.

The whole process—trimming and padding—should be repeated until calibration at both ends of the band is correct. Remember that the H.F.-end adjustment is achieved by means of the trimming condenser, while the tuning range (*i.e.*, the L.F. end of the band) is determined by the L/C ratio of the circuit, which is adjusted by means of the padder condenser or the iron-dust core of the oscillator coil. Accurate trimming and padding will ensure satisfactory tracking over the band.

R.F. Alignment

With the wavemeter again providing a signal at the H.F. end of the band being aligned, the trimmer in the mixer grid circuit is adjusted for maximum output, followed by that in the R.F. grid circuit. The receiver is then tuned to the L.F. end of the band, and the trimmer setting is checked to determine whether the R.F. circuits are still peaked on calibration. If no alteration is required, all is well; otherwise the end turns of the coils should be adjusted in their spacing until the same trimmer capacity holds for both ends of the band.

When aligning the oscillator and R.F. stages, the "S"-meter should be used to indicate maximum output. The overall resonance characteristic may be judged to a fair extent by watching this meter while slowly tuning through a steady carrier. With the phasing control at mid-setting, the reading should rise and fall symmetrically and sharply. At other settings of this control, one side of the characteristic will become appreciably steeper as the rejection "notch" appears. Any flattening or double-humping of the curve indicates faulty alignment, or possibly over-coupling in the I.F. transformers.

The selectivity may be further examined by tuning to a steady broadcast station. At resonance and maximum selectivity, speech should be almost unintelligible due to attenuation of the sideband modulation frequencies.

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and a long wire for 1.7 Mc/s. All were suitably disposed for break-in working, and the simultaneous operation of both stations was easily achieved. The distance between the two operating positions was less than five feet. It goes without saying that a mutual QSO ensued as a matter of course! G3CWZ would now like to know whether he and '3EYN can claim the further distinction of being the only two amateurs on record having two individual stations in the same shack.

New R.S.G.B. members include A. M Smith who, at the age of 16 years, has just taken out the call G3IAS, and Capt. A. H. Hix of the U.S. Army stationed at Orleans, who is W8PQQ/F7AR/3A2AC/PX1AR. . . . Italian amateurs set up a 7 Mc/s. emergency network to replace broken communications during the recent severe floods in that country. . . . G. C. Bagley, G3FHL, 34 Wharfage, Ironbridge, Shropshire, would like to hear from any member who, like himself, is a **bell-ringer.** . . . . The **millionth** television receiving licence was issued at Sheffield during October.

It's Topical

ADDRESSING Boy Entrants of No. 2 and No. 3 Radio Schools of the **Royal Air Force** after taking the salute at the passing-out parade, **Sir James H. Barnes,** K.C.B., K.B.E., Permanent Under-Secretary of State for Air, emphasised the increasing importance of radio and radar in the modern Air Force. "We are now spending on radio and radar as much money as we spent on all the aircraft we were buying shortly before the war," he stated. "In one of the new aircraft there are no less than twenty-five separate radio and radar sets, and some of the new operational aircraft use hundreds of valves. Electronic equipment is, in fact, the eyes and ears and the whole nervous system of the Royal Air Force." Sir James added that when he was dealing with questions of electronics, he realised more and more how essential it was that the Air Force should have tradesmen of the very highest quality to handle this equipment. There was a heavy burden of responsibility on those whose task it was to maintain it. Without tradesmen of the very highest quality, all the sacrifices which the country is now making to maintain an efficient Air Force would be in vain.

A recording of part of a QSO between G2VZ and G2AYM introduced the subject of Amateur Radio in a short interview between John Cadell of the B.B.C. and **Peter Bond, G3BEG,** in *London, West Central*—a magazine programme broadcast in the B.B.C.'s **European Service** on Saturday, December 1. After referring to the R.S.G.B. Amateur Radio Exhibition (then in its final day), '3BEG outlined the main features of Amateur Radio as a hobby, and explained how a transmitting licence may be obtained. The programme was heard throughout Europe on 224 metres and on short waves. It was also heard over land line on the R.S.G.B. Stand—no medium wave broadcast receiver being available!

Some applications of **closed-circuit industrial television** were suggested in a speech made recently by Dr. V. K. Zworykin, Vice-President of *R.C.A.*, who listed the following: *banks*—the transmission of signatures from teller to record files for quick identification; *stores*—selling goods by means of strategically located screens to customers who had not intended to visit that particular department; *berthing ships*—side of vessel and dock may be seen on the bridge and in the engine-room; *prisons*—the whole cell tiers may be watched on a monitor screen; *offices*—busy executives can "tour" their offices and factories *via* video links; *telemetering*—reading meters and other dials from remote positions; *edcuation*—whole classes may "look" into a microscope together, or observe experiments involving small areas such as the inside of a test-tube or a small machine; *medicine*—doctors and students may view close-ups of surgical technique while actual operations are in progress.

In the October issue, G3GYT and B2BTJ claimed the record for the **shortest-distance-ever QSO,** having the same QRA with rigs in adjoining bedrooms. This month **G3CWZ** of Shaftesbury, Dorset, goes one better. Until the end of June this year, both he and **G3EYN** resided at the same address in Knockholt, Kent, where they operated two entirely separate stations *in the same room!* Both had access to a comprehensive aerial system consisting of two dipoles for 7 Mc/s., three for 14 Mc/s., and two for 28 Mc/s., together with an open-wire centre-fed dipole for all-band operation,

(Continued in previous column)

R.S.G.B. Fifth Annual

AMATEUR RADIO EXHIBITION, 1951

The accent this year was more than ever on amateur-built equipment. This article highlights the main features of the Exhibition for those who were unable to attend, and revives pleasant memories for those who "signed in" at Headquarters' stand and QSL'd in the traditional manner. The Exhibition was televised by the B.B.C. and screened in "Television Newsreel."

THE Fifth Annual Amateur Radio Exhibition organised by the R.S.G.B. was held at the Royal Hotel, Woburn Place, London, W.C.1, from November 28 to December 1, 1951. New features aroused favourable comment—in particular the comprehensive displays of amateur-constructed equipment which became a focus of interest for transmitting amateurs, short-wave listeners, and the general public alike. Amateur Television was represented by the 420 Mc/s. transmitting equipment which was the subject of a recent London Lecture Meeting. Other attractions included a demonstration of beam aerial radiation patterns on 9 cm., and a display of historical equipment.

The Exhibition received magnificent support from the Admiralty and Air Ministry, the R.A.F. display featuring a fascinating collection of technical exhibits. The trade stands demonstrated the continuing interest of the radio industry in the requirements of Amateur Radio enthusiasts.

The Exhibition was declared open by Mr. C. Ian Orr-Ewing, M.P. (Parliamentary Private Secretary to the Minister of Labour and National Service) in the presence of a large and distinguished gathering which included representatives of the Royal Navy, the Royal Air Force, the General Post Office, and the Radio Industry. In this photograph taken during the opening ceremony can be seen, from left to right: Mr. Horace Freeman (Exhibition Manager), Mr. Leslie Cooper (Hon. Secretary), Mr. Orr-Ewing, Mr. W. A. Scarr (President), and Mr. John Clarricoats (General Secretary).

The Opening Ceremony

The Exhibition was officially opened at 12 noon on Wednesday, November 28, by Mr Charles Ian Orr-Ewing, O.B.E., M.P., M.I.E.E. (Private Parliamentary Secretary to the Ministry of Labour and National Service), in the presence of a large assembly which included many distinguished guests and representatives of the radio industry.

After being welcomed by the President (Mr. W. A. Scarr, M.A., G2WS), Mr. Orr-Ewing, in the course of a significant speech, listed the four main features of the Amateur Radio movement. He said that in addition to being an enthralling hobby, Amateur Radio provided a pool of trained enthusiasts for defence, promoted international friendship and understanding, and—in the experimental field—opened up new methods and new frequencies hitherto thought useless. He paid tribute to the help given to the movement by the G.P.O. and the Services, emphasising that it was no mean thing for a country the size of Great Britain to have more than 12,000 radio enthusiasts "on tap" in the event of an emergency. Mr. Orr-Ewing mentioned that within a week of the commencement of the last war, many amateurs were on active service in France and on the high seas. The speaker expressed his pleasure at the progress made in Amateur Television, and appealed to the radio industry to assist amateurs in this new and complex field by offering camera tubes with slight imperfections at reduced prices.

The Honorary Secretary (Mr. Leslie Cooper, G5LC), on behalf of the Council, thanked Mr. Orr-Ewing for opening the Exhibition, and referred to the valuable assistance which he had so willingly given to the Society on many occasions in negotiations with the G.P.O. and other Government Departments.

The Luncheon

Immediately after the opening ceremony, the President and Council entertained distinguished guests and representatives of the radio industry at lunch. Among those present were: Vice-Admiral W. R. Slayter (Admiral Commanding Reserves); Captain R. G. Swallow, R.N. (Director, Signals Division, Admiralty); Air Vice-Marshal E. B. Addison, C.B., C.B.E. (Assistant Chief of Air Staff, Signals); Air Vice-Marshal R. G. Hart, C.B., C.B.E., M.C., A.M.I.E.E. (Director General of Engineering, Air Ministry); Air Commodore T. U. C. Shirley, C.B.E., A.D.C., A.M.I.E.E. (Director of Radio Engineering, Air Ministry); Lt. Cdr. J. E. Pope, R.N.; Lt. Cdr. J. R. Deane Sainsbury, R.N.V.W.R.; Wing Cdr. S. Conway (Radio Engineering Branch, Air Ministry); Wing Cdr. W. E. Dunn (President, R.A.F. Amateur Radio Society); Dr. R. L. Smith-Rose (Director of Radio, D.S.I.R.); Mr. H. Faulkner (Deputy Engineer-in-Chief, G.P.O.); Mr. A. H. Mumford, O.B.E. (Assistant Engineer-in-Chief, G.P.O.); Col. J. Reading (Assistant Engineer-in-Chief, G.P.O.); Mr. S. Horrox and Mr. J. Parry (Overseas Telecommunications Department, G.P.O.); Mr. Hugh Pocock; Capt. H. de A. Donisthorpe; Mr. Douglas Johnson; Mr. G. Parr (Hon. Secretary, Television Society); Mr. Gerald Marcuse, Mr. E. D. Ostermeyer, Mr. A. D. Gay, Mr. E. L. Gardner, Mr. S. K. Lewer and Mr. V. M. Desmond (Past-Presidents); and Mr. H. A. M. Clark, Mr. D. N. Corfield and Mr. J. W. Mathews (Vice-Presidents).

The Toasts

A toast to the Society was proposed by Dr. Smith-Rose, who referred to the rapid growth of

membership from 2,200 in 1934 (when the 21st birthday of the Society was celebrated), to 12,000 at the present day, and to the special difficulties which the radio amateur has to contend with compared to those who follow other hobbies. Because of these special difficulties—of which congested

The President (Mr. W. A. Scarr) with Mr. Geoffrey Parr (Hon. Secretary, Television Society), Mr. Ian Orr-Ewing and Dr. R. L. Smith-Rose at the pre-luncheon reception. Wing-Cdr. W. E. Dunn is behind Mr. Scarr.

ether space and interference are the most serious—the transmitting amateur must be subjected to a certain degree of regimentation. For this reason, said Dr. Smith-Rose, it is essential that, in negotiations with the Post Office on matters affecting licences, the Amateur Radio movement should be represented by one officially recognised organisation—namely, the R.S.G.B. As pointers to the effective work achieved by the Society, he

Dr. R. L. Smith-Rose (Director of Radio, D.S.I.R.) proposing a toast to the Society at the Luncheon held after the opening of the Exhibition.

instanced the recent concessions granted by the G.P.O. for amateurs to use Frequency Modulation on 144 Mc/s., Pulse Modulation on the V.H.F.'s, and Amateur Television on 420 Mc/s.

Dr. Smith-Rose emphasised the important part played by the R.S.G.B. in international relations —particularly in connection with the I.A.R.U. He had noticed with special interest that the Society had been invited by all the other European Societies to act as a co-ordinating centre for Region I. He was gratified to see that the Royal Navy and the Royal Air Force were both supporting the Exhibition, and recalled how great was the part played by the R.S.G.B. in the early days of the R.N.V.W.R. and the R.A.F.C.W.R. He thought it regrettable that the Army had not yet considered the formation of a Wireless Reserve manned by amateurs. Parliament would do well to bear in mind the value of the Amateur Radio movement in plans for Home Guard and Civil Defence work.

Dr. Smith-Rose spoke of the Society's technical publications, produced by members in their spare time, and in particular of the value and importance of the *Amateur Radio Handbook* to the fighting services during the second World War. He concluded his speech by paying a warm tribute to the President, whom he described as a true amateur in every sense.

Mr. Scarr, in his reply, expressed appreciation to Dr. Smith-Rose for his kindly and generous remarks. The prestige of the Society was, he suggested, higher than ever before. So far as national defence was concerned, the Society contained a wealth of accumulated technical knowledge which would be available whenever needed. Mr. Scarr also referred to the valuable assistance given by the G.P.O. and the radio industry in the past, and expressed the hope that as the supply of war-surplus equipment diminishes, the industry will concentrate more and more on the demands of the large amateur market.

Radio Trade Thanked

A toast to the radio trade was proposed by the Executive Vice-President (Mr. F. Charman, B.E.M., G6CJ), who traced the history of the long and continuous association between the amateur and the radio trade. He outlined in some detail the topical problem of T.V.I., and made an appeal for the support and co-operation of the industry in striving to overcome this difficulty.

An entertaining response was made by Mr.

From left to right: Mr. C. I. Orr-Ewing, the President (Mr. W. A. Scarr), Vice-Admiral Slayter, Dr. R. L. Smith-Rose, Capt. R. G. Swallow and Mr. F. Charman (President-Elect) at the luncheon.

Cobden Turner, J.P. (Managing Director, *Salford Electrical Instruments, Ltd.*), who referred to radio and electronics as the largest growing industry in the world, in terms of capital investment and personnel.

The General Secretary (Mr. John Clarricoats, G6CL), in proposing a toast to the guests, spoke of their respective associations with the Society and its work. Air Vice-Marshal E. B. Addison, responding for the guests, referred to the debt which the Services owe to the Society for having provided, through its membership, a great pool of trained technicians when the emergency arose. The Admiralty and Air Ministry had been glad to give practical support to the Exhibition and to show many recent technical developments.

After the luncheon, guests accompanied the President on a tour of inspection of the Exhibition.

Air Vice-Marshal E. B. Addison (Assistant Chief-of-Air Staff, Signals), speaking at the luncheon.

Around the Stands

Amateur-constructed equipment occupied pride of place at the Exhibition, seven stands being devoted to the display of every conceivable type of apparatus from test-sets to television. Each stand represented a specific phase of activity, such as, for example, L.F., V.H.F., Single-Sideband, Television, etc. On Stand No. 1 (L.F. Equipment), more than thirty pieces of apparatus were on show, including a 50-watt band-switched gang-tuned transmitter (C. M. Gillman, G3BPN); a miniature QRP transmitter (S. Phillips, G8DL), described in the November BULLETIN; a portable direction-finder for "Top Band" (W. F. Holdaway, B.R.S. 15028); a composite transmitter-rack, with 1.7 and 144 Mc/s. P.A., modulator, power supplies and V.F.O. (S. F. Sharpe, G3CKX); a six-band transmitter—"Top Band" to 2 m. (P. W. Winsford, G4DC); and a communications receiver (R. Godfrey, B.R.S. 18540). An item of unusual interest displayed on this stand was a receiver constructed by Capt. Ernest Shackleton, G6SN, when a P.O.W. in Germany.

The exhibits on the V.H.F. stand (No. 3) demonstrated the competence with which amateurs

Past President, Gerald Marcuse (G2NM), with Col. Reading (Assistant Engineer-in-Chief, G.P.O.).

are tackling the problems of efficient operation in the metre and centimetre bands. Equipment included an 80-watt 2-metre transmitter (C. E. Newton, G2FKZ); a 25-watt 70 cm. coaxial-line power doubler (S. F. Brown, G4LU); an electronic keyer (N. Priest, G3BYB); a 70 cm. double-superhet. receiver with I.F.s of 32 and 1.4 Mc/s. (H. F. Knott, G3CU); the first 420 Mc/s. C.C. coupler to be built by amateurs (G2FKZ and G3CU); a V.H.F. grid-dip oscillator (G. Fox, G3AEX), and a 2-metre portable 10-watt transmitter and modulator (J. A. Plowman, G3AST).

S.S.B. Demonstrated

Stand No. 16 was devoted to a display of single-sideband transmitting and receiving apparatus. An exciter unit, modulated by recorded speech, was used to supply a signal to a receiver, so that visitors could "hear what S.S.B. sounded like"—when received as a normal signal without reinserting the carrier, and with the carrier reinserted in the usual S.S.B. manner. Equipment on show included a single-sideband suppressed-carrier exciter (H. F. Knott, G3CU); a Class "B" R.F. amplifier for use with a S.S.B. exciter (R. Morris, G3FDG); a phase-shift network of 40 db. attenuation (G. Bagley, G3FHL); a crystal calibrator for checking S.S.B. filters (H. Woodhead, G2NX); a phase-shift network ratio test-set (G. Bagley, G3FHL), and the high-selectivity receiver, incorporating a crystal-gate filter and a system of sideband selector switching (R. Hammans, G2IG), which was the subject of a London Lecture Meeting last season.

Test equipment for the amateur station was featured on Stand 4, including a heterodyne frequency meter and grid-dip oscillator (C. H. L. Edwards, G8TL), described in past issues of the BULLETIN; a C.R.T. modulation monitor (E. Yeomanson, G3IIR); a multi-checking unit combining heterodyne wave-meter, beat-frequency audio oscillator, cathode-ray tube with X and Y plate amplifiers, and a 100 kc/s. oscillator with a 10 kc/s. multivibrator step (K. Perry, G3GKP); a valve-tester and a capacity and resistance bridge (C. E. Largen), and a general purpose oscilloscope (L. Hickingbotham, B.R.S. 18104).

Museum Pieces

Of great interest was the display of historical radio equipment and literature organised by members of the East London Group and Ilford Radio Society. A copy of the *Daily Mirror* for October, 19, 1907, featured the inauguration of the new *Marconi* wireless service between Great Britain and Canada, and headlined a "sensational" photograph of the "electric rays" actually leaving the transmitting aerial at Clifden on their way across the Atlantic! There were specimens of early experimenters' licences dating back to 1920. Objects of, possibly, nostalgic memory included a coherer (1904); a miniature crystal receiver (1923); a 10-inch spark-coil transmitter (1910); a 3-valve wireless set (1925); a Woodruffe pick-up used by the B.B.C. in 1925; a selection of early publications dealing naively with the new science of wireless, and a range of thermionic valves produced between 1908 and 1928.

Headquarters' Rendezvous

Headquarters' stand was, as usual, "home base" for members visiting the Exhibition, the visitors' book and the display of QSL cards pinned to the wall-board testifying to the large number of

(Continued on Page 274)

DX TOPICS
THE MONTH ON THE AIR

by A. O. Milne* G2MI

A Word of Warning

WE have received a kindly tip from a certain important quarter that exception is being taken to what goes on in some of the telephony nets, especially between 3.7-3.8 Mc/s. The point has been made to us that the amateur bands are not intended to provide a "chatter channel" for family parties or the exchange of dubious anecdotes and funny-man stuff, sometimes in rather poor taste. Something must be done about it—and soon! Business radio users pay a heavy fee to use equipment for business purposes, and would be the first to complain if amateurs were using their allocations for purposes other than those for which they are intended. It is usually the few silly idiots who spoil things for everyone, so watch your step. The next notice of this matter may not be so benevolently bestowed. One or two culprits are really asking for trouble, as anyone with a receiver can hear for themselves. So it's up to you chaps.

Andorra

Warren Snyder, F7AT, has sent along some notes on recent activites in Andorra. The original expedition was a combined effort on the part of ON4QF, SM5KP, W6SAI and F7AR, the station equipment comprising a HT-9 transmitter and an SX28 receiver. ON4QF also provided a small rig, and SM5KP had a battery-operated transmitter and receiver. Among other difficulties they had to contend with was the curiosity of the local inhabitants, to say nothing of the mountain-locked terrain. Even so, about 400 contacts were made, mostly with Europeans. The second trip, using the call PX1AR, was made by F7AR and F7AT and a mountain-top site was chosen. No commercial power being available, they took along a 2.5 kW. petrol-generator set. Operations started at 0100 on August 26, and ended at 0930 on the 28th. by which time no less than 532 QSOs had been made with stations in 53 countries, this time some 300 of them with the U.S.A. The station was erected in an abandoned road-house located on the summit of a pass just within the Andorra border at an altitude of 7,000 ft. All contacts were later confirmed. Future hope of activity in Andorra lies in the person of Yves Ramond who gave so much assistance to both expeditions. He is now applying for a licence, having mastered the code; further, he is the proprietor of a radio shop, and is familiar with radio theory. The F7 gang are helping him with some gear and it is hoped he will be on the air next year.

The operating position at G3GZO — station of the Amateur Radio Club of H.M.S. Aerial at Warrington, Lancs, a training establishment for naval cadets. The Club is under the direction of Lt.-Cmdr. Ironmonger (G8PO/VK3WU), to whom acknowledgment is due for this picture.

Tristan da Cunha

Several letters and a number of cards have been received from "Red" Fenton who is on the air again from Tristan da Cunha with only 4 watts input. He is still with the Government Meteorological Department, and his old transmitter is now operated by the *Fisling Company*. We have written to enquire whether R.S.G.B. members can help in this matter of gear, and await his reply. "Red" regrets that he cannot QSL contacts made by Bert Mobey, but he will re-QSL anyone who has not had a card for a QSO with him. Incidentally, Tristan will issue its own postage stamps as from January 1, 1952.

Notes and News

G6XS comes up, as usual, with more useful dope on frequencies: CR5AD, 569 (14067) at 1845; EQ3FM, 579 (14045) at 1545; XZ2EM, 578 (14052) at 1600; FQ8AK, 569 (14042) at 1815; ZD6DU (G2HDU), 559 (14033) at 1625; XZ1AR (14060) at 1815 (who says QSL *via* R.E.F. !); ZS4AK, 579 (14065) at 1845; PX1AA (who said he was DL4VI), 579 (14072) at 1500; and FB8BB still going strong. CR5AD (who QSLs) is also sometimes at the low-frequency end of the band. VS2DC (B.R.S. 18394) has some strong comments on humidity which plays havoc with insulation in Malaya. He says DX is not too good—only a few locals like JA, KG6, KC6, etc.! He is using a three-element beam built on bamboo—a masterpiece of lashing and Heath Robinson ingenuity.

G5JL collected some useful ones during the *CQ Magazine* contest on 7 Mc/s., including VQ4KK, VK2CD, ZC4DT, ZC4XP, IS1ANK, ZB2F, EA8BF, 4X4RE and YI3ECU. G2MI worked three 4X4s on 3.5 Mc/s. Incidentally, what a marvellous rhythm in 4X4RE's call—we found ourselves bobbing about in time with the music! G5JL has worked VE8SW 0630 on 7065, VE5CI on 7028, and ZS7D on 7028.

We learn from the West Gulf DX Club's weekly broadsheet, edited by W5KUC, that W0ELA is trying to get started as VS5ELA. From the same source, it is reported that KM6AX (QSL *via*

* *29 Kechill Gardens, Hayes, Bromley, Kent.*

Navy 3080, c/o P.M. San Francisco), and VP5BF (QSL *via* W4LVV) are on 14 Mc/s. every night, local time. VR1H is active on British Canton Island; FD8AA is on 14030; ZS8F is on 'phone. VP2AF (14150), also on 'phone, is worth looking for.

Further news from W5KUC gives ZD1SD (14139); VP5BF (14150); ZP4BB (28450); W6EJ who was ET9X (now ET3R), active only on 14 Mc/s. The Ethiopian Air Force operates ET3Q with 50 watts. QSL *via* R.S.G.B. We are sorry to hear of the death of FP8BX who gave a new country to so many of us. W5JC gives FH8AB (14021) as a new one in the early mornings. His QTH is M. Ferrau, Box 8, Wallis Island, c/o New Caledonia.

G2BJY, who had been concentrating on 3.5 Mc/s., says the band so far has not come up to expectations. Between 0500 and 0730 G.M.T., however, he has worked ZL4JJ, but had no luck with ZS or VK. Two interesting QSOs were with HP1PS/MM near Gibraltar, and HK2DA/MM on board a ship in the North Sea.

G5VT (Bishops Stortford) draws attention to F9JD who is operating from Corsica; with F9QV active, this doubles our chances of a contact with this very elusive country. We understand that the VQ1s will be active between December 5-15, and that they will work mostly on 'phone.

B.R.S. 250 (Thornton Heath) copied JA2HA at 0210 on 7030. Blame the election for this one, he says! Other outstanding 7 Mc/s. DX includes OQ5RA at 0415, CX1AL at 0100, VE8SW at 0700, and Z2SA at 2345. On 14050, KB6AQ (Canton Is.) was the best. He has heard OH3NY five times on 1860 between 2325 and 2350 G.M.T. CQ-ing to no purpose!

G3FNN corrects our statement that FQ8AE doesn't QSL. Apparently his cards were mis-routed through a commercial bureau. Steps have been taken to put this right, and apologies to Georges of FQ8AE.

Bob Pybus says FR7ZA is often an S9 'phone signal on the H.F. end of 14 Mc/s. from 1700-1800 G.M.T. Bob has just received his QSL from CE2AY after a lapse of three years and four months—so never give up hope!

GW3DOF celebrated his return to the air after six months inactivity by working FB8ZZ and FB8BB! G4JT states that VS2DG is Mr. K. E. Jones, Assistant C.T. (P.C.) Telecommunications Dept., Ipoh, Malaya. G6XS and many others have worked PX1AA, some on 3.5 Mc/s. Late news from G6XS includes KG4AF 1750 (14008); ZS4DH 1800 (14094); TA1CC—who says his name is Abdullah and QTH Ankara—1740 (14026); HZ1QU 1824 (14046); CR5AA 1800 (14068), EA0AD 1810 (14085) and FR7ZA 1740 (14024). G3CKM was told by ZB1BJ that he recently copied G3BDZ and G2CL on "Top Band."

G6QX, who "snagged" FB8ZZ during TV hours recently, says VP7NW and PJ5CW have been active on 7 Mc/s. around 2300 G.M.T.

Mobile Marine

Our recent reference to G6UT qualifying for the M.M. certificate has, for some extraordinary reason, caused so many people to think that M.M. licences are being issued, that the G.P.O. have asked us to help stem the flood! G6UT's certificate is issued by the Mobile Marine Club of U.S.A. and is an *operating award* to anyone producing QSLs from 35 American Mobile Marine stations. We hope this has made things plain enough for everyone! The British Post Office is not yet issuing M.M. licences, although the question of a special licence to operate an amateur station aboard ship is under discussion.

DX C.C. Claims

Owing to the fact that the Federal Communications Commission has banned U.S.A. amateurs from working certain countries, contacts with stations in the following countries are not acceptable for the DX C.C. certificate, unless worked before February 23, 1951: AR, EP, EQ, FI, HS, J, OE, PJ, PK (except JA and OE Allied Occupation Forces stations).

Who's Who

VQ3CF, who left Tilbury on November 2, is going back to VQ4, where he will specialise on 7 Mc/s. From G3BID we hear that G3DCU is now VK2AWU. A welcome letter comes from our old friend Norman Burton, ex-B.R.S. 11494, now in Australia, who is busy combing the bands. He is taking an active part in the affairs of W.I.A. and has no desire to return to this country.

3A2AN was operated by Carlos Cordovez, HC1FG. Cards are held at the R.S.G.B. Bureau for the following calls: VS9AN, YI3HPG, YI2AG and YI3PDR. Can anyone supply forwarding addresses please?

VU2DA is operated by His Highness Maharaja Dhiraj Patiala; his QSL is one of the prettiest we have ever seen. YI3ECU returns to the U.K. this month.

Bill Barker, VK6DX, is leaving Australia next month on R.M.S. Strathnaver for a visit to the U.K. He is due to arrive at Tilbury Docks on February 10. During his stay, Bill and his wife hope to meet as many British amateurs as possible. They will carry a distinctive pennant on their car. Their mailing address in this country will be c/o Dennis Chester, G3BUU.

Pirates

G3GUP, at present in the Middle East, is a victim of pirates.

Cyprus

Sgt. "Tikky" Tyler, ZC4TF, is home from Cyprus, and has his logs and cards with him. All outstanding QSLs will be attended to. ZC4HV is now MI3HV. ZC4ND's call has been changed to ZC4MH, and he has one of the new licences issued to civilians at £6 a time! John Goddard, B.R.S. 18017, now in Cyprus, is hoping to get a ZC4 call.

Late Flashes

The "Top Band" was open to W and VE between 0530 and 0630 on November 25. G3PU, the only G on the band at the time, worked VE1EA and W1LYZ. Thanks for the information, B.R.S. 250.

From G5GQ we learn that KV4AA will be looking for "Top Band" European contacts during January. Operating frequencies 1902 and 1998 kc/s. KV4AA is already working W9CVQ on that band.

W7EJD is looking for G contacts on 7 Mc/s. G5GQ has urged him to persuade some of the W6s to come up on 3.5 Mc/s. as well.

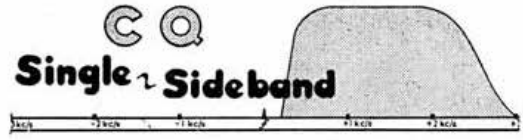
The bogus call inventor of two years ago is active once again on 3.5 Mc/s. Such calls as VS7NG, VP8AK, VR2CJ and VQ1RF are being pirated—so beware! VQ1RF, whose call was being heard during November, did not leave for Zanzibar until December. It would be much safer for a time to ignore all "exotic" DX call signs on this band.

Slow Morse Transmissions

THE following slow Morse transmissions, sponsored by the Society, are intended to assist those who aspire to obtain an amateur transmitting licence.

G.M.T.	Call	kc/s.	Town
Sundays			
10.00	G6MH	1990	Southend-on-Sea
10.00	G5XB	1950	Reading
10.30	G3GIO	1915	Guildford
10.30 *	G3ESP	1990	Pontefract
	G3US		
	G3HCX		
	G3IDT		
11.00	G2FXA	1900	Stockton-on-Tees
21.00	G2FIX	1812	Nr. Salisbury
22.15	G3AEZ	1847	Dorking
Mondays			
19.00	G3NC	1825	Swindon
19.30	G3AIX	1760	Birmingham
20.00	G3DSR	1750	Derby
21.00	G3BLN	1900	Bournemouth
21.00	G3BHS	1820	Eastleigh, Hants
22.00	G3AEZ	1847	Dorking
22.00	G3GIO	1915	Guildford
22.00 *	G3EJF	1810	Bury, Lancs
	G3GCZ		
	G3DZU		
	G2AYG		
22.15	G8TL	1896	Ilford
Tuesdays			
18.00	G2FXA	1900	Stockton-on-Tees
19.00	G5XB	1905	Reading
19.30 *	G3HGY	1830	Coventry
	G5PP		
	G5SK		
21.00	G3EFA	1855	Southport
22.00	G3ELG	1772	Rotherham
22.00	G3GIO	1915	Guildford
22.00	G2BND	1890	Dalston, E.
23.00	G2XG	1735	Chingford
Wednesdays			
14.00	G3ADZ	1910	Southsea
19.00	G3ADZ	1900	Southsea
19.30 *	G3HBX	1870	Warwick
	G6XA		
21.30	G3HKC	1770	Birmingham
22.00	G3DLC	1800	Grays, Essex
22.00	G3GIO	1915	Guildford
Thursdays			
18.00	G2FXA	1900	Stockton-on-Tees
19.00	G3NC	1825	Swindon
19.30	G3BUJ	1990	Southend-on-Sea
19.30 *	G2DOF	1830	S. Birmingham
	G3DTG		
	G3ENH		
	G6KI		
	G8JI		
20.00	G3FVH	1920	Hull, Yorks
21.30	G6DL	1760	Birmingham
22.00	G2NK	1730	St. Mary Cray
22.00	G3AEZ	1847	Dorking
22.00	G3GIO	1915	Guildford
22.30	G3OB	1803	Manchester
Fridays			
14.00	G3ADZ	1900	Southsea
19.00	G3BLN	1900	Bournemouth
20.00	G5AM	1900	Witnesham, Ipswich
20.00	G2AMV	1870	Wirral
21.00	G3BHS	1820	Eastleigh, Hants
22.00	G3GIO	1915	Guildford
22.00 *	G3AUT	1785	Rugby
	G3AUF		
	G3CBV		
	G3GTX		
Saturdays			
14.00	G3ADZ	1910	Southsea
22.00	G3GIO	1915	Guildford
23.00	G2FXA	1900	Stockton-on-Tees

* *Each station will operate in turn.*



By H. F. KNOTT (G3CU)*

THE proof of any pudding is in the eating, and this is certainly true of single-sideband. While it may be some time before all its advantages become apparent, it is obvious that the band occupancy of a transmitter using this system is less than half that of a properly adjusted A.M. or F.M. transmitter. For instance, a few weeks ago G3FHL, SM5QV, OZ7T and DL6WL were working as usual on 3,720 kc/s. (carrier frequency) using upper-sideband, when it was decided to split into pairs, with DL6WL and OZ7T shifting to the lower-sideband. The result was—two independent QSO's running simultaneously, using the same carrier frequency! There were no heterodynes, because the carriers were suppressed, and no interference between the sidebands, because the stations in question each have an audio cut-off of 200 c/s. at the low end, with an upper limit of about 3,000 c/s.

The receivers in question were adjusted for a 3 kc/s. pass-band, with crystal-gate filters notched down, resulting in improved signal-to-noise ratio—since noise is proportional to bandwidth.

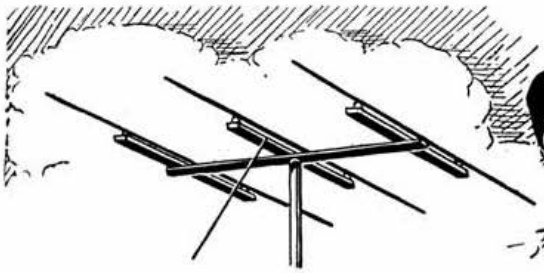
It is interesting to note that had these two pairs of stations separated their carrier frequencies by 2 kc/s., thereby extending the upper frequencies to plus and minus 4 kc/s. from the original carrier frequency, they would then have been occupying just about as much spectrum as most A.M. stations use. With carriers still suppressed, there would be no heterodynes, but in between the two sidebands there would be 2.4 kc/s. of empty ether space—room enough for another channel! (A glance at the heading will undoubtedly help in a clearer understanding of the above statement.) *Three* QSO's could now be accommodated in the same number of kilocycles as would normally be occupied by an A.M. transmitter. The close proximity of another sideband or envelope of speech frequencies has little or no effect on the intelligibility of the wanted signal, anything that might be heard manifesting itself as "monkey chatter."

DL6WL is now on with QRO having worked most of the G S.S.B group on 3.5 Mc/s., HB9SU being the latest addition. No details have come to hand as to the equipment that '9SU is using, but judging by his signals, things appear to be working out all right. OZ7NU, who uses an OZ7T phase-shift exciter, is on the air, and G3BY (who became active last March) uses a crystal rig and confines his activities to "Top Band." He finds that an EF50 in Class "A" drives a 6AG7 nicely to 10 watts. He is on most evenings around 1.880 kc/s. or 1.920 kc/s. between 2130 and 2215 G.M.T. G2IG is now active on 14 Mc/s. and G3FQQ on 1.8 Mc/s.

On November 18 the writer made contact with ON4CC. the first Belgian station to use S.S.B. It was ON4CC's first contact on S.S.B. outside his own country.

It is hoped that many new calls will soon be logged in this column as a result of the comprehensive display of S.S.B. equipment shown at the R.S.G.B. Amateur Radio Exhibition, where various types of exciters were on view.

* *31 Batchwood Green, St. Paul's Cray, Orpington, Kent.*



AROUND THE V.H.F.'s

By W. H. ALLEN, M.B.E. (G2UJ)*

AFTER the spate of reports concerning operation during September and early October, November was an unusually quiet month on both 2 m. and 70 cm. It is to be hoped that of the many stations now possessing V.H.F. gear some at least will continue to operate during the winter. It will be a bad day for Amateur Radio generally, when the only reason for working on a band is the possibility of DX. The gentle art of rag-chewing may be carried on very effectively—and with far less interruption than on the narrower L.F. bands—up to distances of 50 miles or more on the V.H.F.'s under any conditions unless the station is either very badly screened indeed or the efficiency of the apparatus is well below normal standards.

Amateurs around Cambridge, we are assured by G3WW, do not intend to abandon 2 m. during the winter, but already they are finding very few stations to work outside their own area. From the observations of those who have been around, it seems clear that, generally speaking, lack of activity and not poor conditions produced a "dead" band. G3EHY (Somerset) comments on similar lines. After the excellent openings of late October, when GI3GQB (Belfast) was worked for the second time by 'EHY, and many other distant stations were contacted, the strong winds and torrential rain of early November had a depressing effect upon the band both from the point of view of conditions and of activity. However, despite this, DX openings appeared at unexpected times, and it was possible to work into Lancs., Cheshire and Yorks. from Somerset. Around 1900 G.M.T. seemed to be the best time for long distance contacts, as those stations active after 2200 G.M.T. seemed more interested in local rag-chews. G8AO (Ashtead, Surrey), is always workable from 3EHY, even when conditions are really poor.

G5FF (Edith Weston, Rutland), who had his first QSO on 2 m. with G3WW on or around October 16, is situated 550 ft. a.s.l. and employs a *vertical* dipole at a height of 90 ft. ! His frequency is 145.63 Mc/s. G3VM (Nr. Norwich) has been running midday skeds. with PE1PL (The Hague). G3EDD (Abington. Cambs.), now has his beam 60 ft. above ground. A new c.c. *cascode* converter in use at G2XV (Cambridge), gives excellent results.

Two Metre F.M.

G8DM (Shrivenham) has now had an opportunity further to test his N.B.F.M. on 144.78 Mc/s., and has been in touch with G3DJQ, near Birmingham, the first station to be worked beyond local range. It was found that the F.M. signal came through fading surprisingly well. Local interference is very much reduced, and the spread of the signal at a distance of only half a mile is much less than with A.M. with only slight over-modulation. Cross-modulation and splatter are completely non-existent. Details of the apparatus in use by G8DM are being given to a number of stations interested in trying F.M. for themselves ; incidentally, G8DM would be interested to hear from those who are so equipped. G6NB (Aylesbury) has been heard by G2UJ using F.M., but as he obviously had his beam pointing away from the latter station, a proper comparison with his normally excellent A.M. signal was not possible.

The Aurora and V.H.F. Transmission

In recent issues reference has been made, from time to time, of the effects of auroral reflection on 2 m. signals. For some reason, reports of this type of propagation have been practically non-existent in this country until the present year, although the effect had been commented upon frequently in the U.S.A. for some time past, where much of the 2 m. DX has been attributed to this cause. Increased and more widespread activity is no doubt responsible for the reports which have been received, and it is felt that amateurs could provide valuable assistance to those groups of scientific workers who are engaged upon research into the general question of aurora and atmospheric electricity. Mr. J. F. Shepherd, GM3EGW, 12 Park Place, Dunfermline, Fife, is in touch with Mr. James Paton, B.Sc., Senior Lecturer in the Physics Department of Edinburgh University, who is a recognised authority on the aurora, and would be pleased to hear from anyone prepared to co-operate in this project.

New High-Gain V.H.F. Aerial

The October issue of *Electronics* carries an article on the design of an aerial for the high frequency TV channels in the U.S.A. which, in the view of G5CD (a member of the R.S.G.B. Technical Committee), may have a useful application to the 70 cm. band. Basically the aerial is a 60 deg.-angle horn, with (since it is applied to one plane of polarisation only) two sides omitted. It may best be described as a dipole consisting of two equilateral triangles fed at their apexes and then folded together to make a 60 deg. angle between them. This results in the opening of the mouth of the horn being equal to the length of one side of the triangle. Ideally the length of a side should be several times cut-off for the horn ; cut-off being a half-wave at the frequency concerned. Taking 3½ times cut-off makes a side equal to about 4 ft. in the 70 cm. band which, according to the author of the article, should give a forward gain of 14 db., a power gain of 25 times, a centre impedance of 400 ohms and a directivity of plus or minus 20 degs. for half-power points. An equivalent gain could be expected from a stack of ten dipoles and reflectors !

The model constructed by G5CD had 4 ft. 6 in. sides and on test at 435 Mc/s. showed a measured directivity of plus or minus 21 degs. for 6 db. down, which is the same as his 6-element Yagi described on page 98 of the September, 1951, BULLETIN, and a front-to-back ratio of 30 db., which is better. It matched reasonably well to

* *32 Earls Road, Tunbridge Wells, Kent*

300-ohm feeder. In this model the triangles were constructed of copper mesh, but there seems no reason to suppose that small mesh "chicken netting" would not perform equally well. A point of interest to those operating on 70 cm. and above is that this type of aerial, like for instance the rhombic, has the ability of functioning on several bands higher than the one for which it is designed.

Noise Measurement

The factor which decides whether one receiver is better than another, at least on the V.H.F. bands, is its signal-to-noise ratio, and with a normal noise diode this may readily be obtained up to frequencies of the order of 250 Mc/s. At much higher frequencies than this, conventional methods become unreliable for several reasons, one of which is transit time in the diode. Miniature noise diodes, such as the *Sylvania* 5722, have gone some way to alleviate this difficulty, but the position at 400 Mc/s. and above is still far from satisfactory.

In an article in the November, 1951, issue of the *Wireless Engineer*, some interesting data is given on the subject of noise figures for receivers operating on 465 Mc/s., obtained with the aid of a noise diode recently developed by the *General Electric Company* in this country, and even if this valve is not obtainable commercially at the present time, those working on this important subject will find the article mentioned of considerable interest.

The practical measurement of noise factor for 2 m. receivers will be dealt with in a forthcoming issue of the BULLETIN when constructional details will be given of a simple but effective noise generator, together with full instructions for its application in receiver measurement.

Getting on Two Metres

Those who operated in the old days on 5 metres will no doubt remember the call of G5AM (Witnesham, nr. Ipswich) as the sole representative on that band of the county of Suffolk. It is good news to learn that G5AM is now active on 2 m., but the point is not so much the appearance of a new call on the band but the facts of how he got there with a lot of hard work and the minimum of expense, a consideration with so many of us these days when the ever-rising cost of living makes an extension of our activities often a matter of finance rather than enthusiasm.

Tackling the transmitter problem, G5AM decided to see what could be done with the erstwhile 5 m. job. The 7375 kc/s. crystal was rubbed down to 8038 kc/s.—using *Vim* as an abrasive—and this was used to control a 6V6 CO/tripler feeding an 807 doubler and another 807 tripler on 144 Mc/s. He admits that the 807 is far from being an ideal valve for 2 m. operation, but nevertheless it enabled a signal to be radiated. Work is now in progress on an RK34 P.A. stage. The aerial in use is a 6-element stack constructed according to data in the September, 1949, BULLETIN. This has been found to give excellent results from the point of view of gain and ease of lining-up, with the great advantage that its horizontal pattern is broad enough to make searching an easy matter.

On the receiver side the first piece of apparatus produced was a simple modulated signal generator, calibrated from Lecher wires and battery operated so that it could be put some distance away from the station and serve as a test signal for lining up the receiver. Finding that a simple conversion of an available R. 1132A was useless on 2 m., the VR65A stages were removed and an EF54, EF54, EC52 valve line up adopted. After much work, in which the signal generator proved invaluable, this receiver produced results not the least of which was ON4BZ on 'phone at R5 S7.

Call	Situation	Mc/s.
G2DD	Stanmore, Middx.	436.16
G2FKZ	London, S.E.22	436.0
G2HDJ/A	Ashford, Middx.	436.1
G2JT	Oldham, Lancs.	432.0
G2QY	Pinner, Middx.	435.16
G2RD	Wallington, Sy.	435.53
G2WJ	Nr. Dunmow, Essex	435.78
G2WS	Beckenham, Kent	433.35
		434.7
		436.0
G2XV	Cambridge	432.78
G3APY	Kirby-in-Ashfield,	433.3
	Notts	436.15
G3EHY	Banwell, Som.	435.75
G3EIW	London, S.E.18	437.4
G3FP	Thornton Heath, Sy.	436.49
G3FZL	London, S.E.22	435.3
G3HBW	Wembley, Middx.	434.1
		437.7
G4AP	Swindon, Wilts.	435.27
G4CG	Wimbledon, Sy.	435.2
G4LU	Oswestry, Salop	431.55
G5CD	London, N.W.11	435.6
G5PY	London, S.W.12	435.4
G6DF	Frodsham, Lancs	432.0
		432.4
		433.4
G6HD	Beckenham, Kent	435.12
G6PG	Dartford, Kent	435.3
G6VX	Hayes, Kent	435.0
G8KZ	London, W.10	436.05
G8QY	Birmingham	433.0
G8SM	East Molesey, Sy.	435.7
GW2ADZ	Llanymynech, Mont.	432.84
GW5MW	Rhosesmor, Mold,	432.6
	Flint	434.7
F8GH	Beauvais	434.79
F9AE	Neuilly, n. Paris	435.0

Frequencies of Stations operating in the 420 to 460 Mc/s. Band.

A Word of Thanks—from Us to You

These notes bring us to the end of another year, and the writer takes this opportunity of thanking all those who, by their contributions, their criticisms, and in some cases their praise, have made the preparation of this feature possible. A happy Christmas to you all and may 1952 be a better year in all ways than its predecessor.

January Issue

Owing to the Christmas holidays the closing date for the January issue will be earlier than usual, and reports are requested as soon as possible after the appearance of this issue.

LONDON LECTURE MEETING

Friday, January 25, 1952.

"OVERTONE MODE CRYSTALS"

(Standard Telephones & Cables, Ltd.)

Institution of Electrical Engineers, Savoy Place, Victoria Embankment.

Tea 5.30 p.m. - - Lecture 6.30 p.m.

The Story of Amateur Radio

Told at Glasgow Exhibition

GLASGOW'S first Amateur Radio Exhibition, styled as "The Story of Amateur Radio," was opened by the Lord Provost, Sir Victor Warren, in the Engineering Centre, Glasgow, on October 29, 1951. The Exhibition was organised by local amateurs to stimulate activity in the district, and to give the public practical information on what is for them a little-known hobby. In a series of twenty-one stands, each of the main aspects of the subject was explained and illustrated, the visitor being taken on a "conducted tour" through Amateur Radio.

[Photo by courtesy of Outram, Glasgow.
The Rt. Hon. The Lord Provost of Glasgow (Sir Victor Warren, M.B.E., C.St J., T.D., LL.D.), after opening the Glasgow Amateur Radio Exhibition, has a word with GM3EDZ from the Exhibition station.

How the Story Was Told

The "story" began with a typical amateur station in which the various items of equipment were labelled and described. The actual station used belonged to the late "Bill" Gentleman, GM6UK, who had taken an active part in the early preparations for the show. A further group of stands dealt with the Morse code, the "Q" Code, QSL cards, etc., all of which were explained in detail, many examples being given.

Some sixty pieces of amateur-constructed gear, ranging from absorption wave-meters to television receivers, were on view, each representative of a type of instrument or method of construction. The "aerial farm" featured a selection of popular types of aerial with brief descriptions. A working model of a rotary beam, driven by selsyn motors, attracted many junior ops.

Special Displays

Mr. Leslie Fraser, GM3GNX, demonstrated how a blind amateur constructs and operates his station. This stand aroused great interest, and was given much publicity in the local press.

V.H.F. equipment on show included examples of modern design by GM6WL and GM3BDA. A historical section exhibited valves dating from 1914, receivers of 1920 vintage, and some of Baird's early televison equipment.

On the R.S.G.B. stand, details were given of the important part played by the Society in Amateur Radio affairs, and of the activities of local groups. The Society's technical publications were displayed and were available for sale. National Field Day was described, with the Falkirk stations—winners of this year's event—on view. In a separate room, films were shown of Glasgow's 1951 N.F.D., a London Region N.F.D., and a D/F Contest.

The centre of the hall was devoted to demonstrations of chassis construction, the assembly and testing of transmitters and amplifiers, and receiver alignment.

Highlight of the Exhibition was a complete operational amateur station installed in a separate room. Two rigs were available, loaned by GM3PB and GM3AXX. The accommodation here was never sufficient to deal with the crowds.

Accent on Action

Throughout the show, particular stress was laid on working models, including Morse keys to pound with and inkers to show the result; wire and tape recorders on which one could record and hear one's voice; a gramophone recording of nineteen different types of interference; a television set showing the types of interference to which it can fall foul, and methods of curing the trouble.

Among the visitors was a bus-load of thirty amateurs from Edinburgh, who were given a warm welcome by the Glasgow Group. The Exhibition was open for a week, and received wide publicity. The descriptive talk on the B.B.C. Home Service by GM3DNQ is acknowledged as the finest boost our hobby has yet received in Scotland.

GM4JO

Kingston Radio Society Aid United Appeal for the Blind

TO provide funds for that most worthy object, the United Appeal for the Blind, an Amateur Radio Exhibition was organised last month by the Kingston and District Amateur Radio Society.

The Exhibition, held at Penryhn House, Kingston, on Saturday, November 10, was opened by the Mayor of Kingston (Councillor C. L. Sinclair, J.P.), who was accompanied by the Mayoress. Other visitors included the General Secretary of the R.S.G.B. (Mr. John Clarricoats, G6CL), the Honorary Secretary (Mr. Leslie Cooper, G5LC), the Assistant Secretary (Miss May Gadsden) and the South-West London D.R. (Mr. Fred Lambeth, G2AIW).

During the course of his speech the Mayor disclosed that he first became interested in wireless experiments soon after World War I, but gave up after building a unit-type superhet "which never worked!"

The Chairman of the Kingston Society (Mr. Victor Mayhead, G2ACA), moved a vote of thanks to the Mayor and this was supported by Mr. Clarricoats, who reminded the large gathering that the occasion was unique, in that no previous Amateur Radio Exhibition, had, as far as he knew, been organised solely for the purpose of raising funds for the blind. He also mentioned that, at the present time, the R.S.G.B. has knowledge of some 20 sightless amateurs, all of whom derive great joy from their contacts with other radio amateurs. Truly, they had "the world at their finger tips."

The County Organiser of the United Appeal for the Blind (Mr. G. L. Sturmey) expressed the grateful thanks of his organisation to those responsible for the Exhibition.

After the opening the Mayor and Mayoress with the other guests made a detailed tour of the stands.

With the exception of one stand, which was devoted to the work of the blind, the whole Exhibition was given over to Amateur Radio and Electronics. A transmitting station operated under the calls G3DHZ/A and G3GXG/A, and in the course of eight hours established contacts with many stations. Radio controlled models were on show including Miss Eedee, the boat which crossed the English Channel recently. Old timer A. W. Knight (G2LP) exhibited many historical items to show the progress of Amateur Radio over the past 50 years. A display of Avometers, including one with Braille calibrations, aroused great interest as did the items of home-constructed equipment loaned by members of the Kingston Society.

Altogether nearly 400 persons visited the Exhibition and as a result the funds of the United Appeal for the Blind have benefited by the sum of £22.

Norman Turner's Hamfest

THE President-Elect (Mr. F. Charman, B.E.M.), and the General Secretary were among the 140 guests present at the Fifth Annual Hamfest arranged by Norman Turner, G4NT, Chairman and Managing Director of *Ernest Turner Electrical Instruments, Ltd.*, and held in the Chiltern Works of that Company at High Wycombe, Bucks, on Sunday, December 2, 1951.

The high standard of technical lectures which has made these gatherings famous throughout the South of England and the Midlands was fully maintained. During the afternoon, Mr. E. A. Dedman *(Quartz Crystal Co., Ltd.)*, lectured on "Modern Quartz Crystal Production" and Mr. T. D. Humphries (*Electronic Tubes, Ltd.*), on "Valves and Cathode Ray Tubes in the Making."

After a high tea, Mr. G. T. Peck, a member of the staff of *Ernest Turner Electrical Instruments, Ltd.*, but equally well-known as a leading D/F exponent, lectured on "High Speed Cinematography."

After a break for refreshments, two short films were displayed, following which Mrs. Clarricoats presented prizes to the winners of the Lucky Number draw.

Mr. Kenneth Alford, G2DX, and the General Secretary voiced the thanks of the guests to Mr. Norman Turner, Mr. Peck and those associated with them in the organisation of yet another highly successful Hamfest.

London Lecture Meeting

A DISAPPOINTINGLY small attendance, of less than 40 members, was recorded at the London Lecture Meeting held at the Institution of Electrical Engineers on Friday, November 23, 1951, when Mr. D. N. Corfield, D.L.C.(Hons.), A.M.I.E.E. (Vice President), discussed the Technical Aspects of the Sound and Vision Amateur Transmitting Licences.

Messrs. Newton, G2FKC, Haydon, G3BLP, and Dedman, G2NH, were among those who contributed to the discussion.

The Chair was taken by Mr. H. A. M. Clark, G6OT (Vice President and Chairman of the Technical Committee).

Whose Pen ?

A fountain pen was left at Headquarters stand on Wednesday, November 28—the opening day of the R.S.G.B. Amateur Radio Exhibition. If the owner will write to Headquarters, giving details of its appearance, make, etc., it will be returned to him.

FORTHCOMING EVENTS *(Continued from Page 245)*

St. Albans.—December 19, January 2, 16, "Ottershaw," Upton Avenue.
Southgate.—January 10, 7.30 p.m., Geography Room, Arnos Secondary Modern School, Wilmer Way, N.11.
Slough.—January 17, 7.45 p.m., "The Golden Eagle," High Street.
Sutton & Cheam.—December 18, January 1, 7.30 p.m., Sutton Adult School, Benhill Avenue.
Watford (W.R. & T.S.).—December 18, January 1, 15, 7.30 p.m., "Cookery Nook," The Parade.
Welwyn Area.—January 1, 8 p.m., Council Offices, Welwyn Garden City.

REGION 8

Brighton (B.D.R.C.).—Tuesdays, 7.30 p.m., Eagle Inn, Gloucester Road. **(E.B.S.W.C.).**—Thursdays, 7.30 p.m., 27 Warren Avenue, Woodingdean.
Chatham (M.T.A.R.S.).—Mondays, 7.30 p.m., Co-operative Hall, Luton Road.
Gillingham (G.T.S.).—Alternate Tuesdays, 7.30 p.m., Medway Technical Institute.
Petersfield.—January 10, 7.30 p.m., Heroes Hotel, Waterlooville.
Portsmouth (P.D.R.C.).—Tuesdays, 7.30 p.m., Royal Marines' Signals Club, Eastney Barracks.
Southampton.—January 5, 7.30 p.m., 22 Anglesea Road, Shirley.

REGION 9

Bath.—December 17, 7 p.m., 12 Pierrepont Street.
Bristol.—January 18, Carwardine's Restaurant, Baldwin St., Bristol 1.
Exeter.—January 4, 7 p.m., Y.M.C.A., 41 St. David's Hill.
Gloucester.—Alternate Thursdays, 7.30 p.m., Spread Eagle Hotel, Market Parade.
North Devon.—January 3, 7.30 p.m., Rose of Torridge Cafe, The Quay, Bideford.
Penzance.—January 3, Railway Hotel.
Plymouth.—December 15, 7 p.m., Tothill Community Centre, Tothill Park, Knighton Road, St. Jude's.
Stroud.—Wednesdays, 7.30 p.m., Subscription Rooms, Railway Hotel.
Torquay.—December 15, 7.30 p.m., Y.M.C.A., Castle Road.
Weston-super-Mare.—January 1, 7.30 p.m., Y.M.C.A.
West Cornwall (W.C.R.C.).—December 20, January 3, Fifteen Balls, Penryn.
Yeovil.—Wednesdays, 7.30 p.m., Grove House, Preston Rd.

REGION 10

Cardiff.—January 14, 7.30 p.m., "The British Volunteer," The Hayes.

REGION 13

Edinburgh (L.R.S.).—December 27, January 10, 7.30 p.m., Edinburgh Chamber of Commerce, 25 Charlotte Square. Newcomers welcomed.

REGION 14

Falkirk.—December 28, January 4, 7.30 p.m., The Temperance Cafe.
Glasgow.—December 26, 7.30 p.m., 39 Elmbank Street.

ROTAB Winner

HERBERT BARTLETT, G5QA, of Heavitree, Exeter, the 1951 ROTAB Trophy Winner, has made more than 2,000 contacts with Jack Parminter, ZL2OU. They made their first contact on October 26, 1936, their 1,000th on December 4, 1946, and their 2,000th on December 24, 1950. G5QA has never met ZL2OU, but Mr. Parminter's son, Graham, visited Exeter in 1947 during the World Scout Jamboree and is again in England under the Government Exchange of Teachers scheme.

An unusual picture—Herb. Bartlett trying to look dead serious !

G5QA and ZL2OU are on sked daily at 0830 clock time on 14 Mc/s., and in spite of extremely poor conditions at the present time, contact is still maintained. The word ROTAB was coined by the donor, Mr. Gerald Marcuse, G2NM, in 1925, and signifies "Royal Order of Transatlantic Brass-pounders." Since then, the Trophy has been held by some of the best known names in Amateur Radio. Ironically on the very morning Mr. Bartlett received notification that he had won the Trophy for 1951 the exciter unit of his transmitter blew up and the sked. broke down for the first time since 1936. Sheer exciter-ment ! !

Slade Radio Society

AMONG the guests present at the annual dinner of the Slade Radio Society, held in Birmingham on November 9, were Mr. John Clarricoats, G6CL, General Secretary of the Radio Society of Great Britain, and Mr. H. F. Smith, Editor of "Wireless World."

Slade Radio Society Dinner

From left to right: Mr. N. B. Simmonds, 1951 winner of the Harcourt Trophy; Mr. H. F. Smith, Editor of "Wireless World"; Mr. W. E. Chilvers, Chairman of the Slade Radio Society.

In a short after dinner speech Mr. Clarricoats congratulated the Society on its past efforts in the field of radio and direction-finding, and expressed the hope that during its 25th year (now beginning) it might be possible for the Society to arrange an exhibition in Birmingham when some of the apparatus and records of Slade Radio—one of the oldest in the country—would be displayed.

The 5 Ack R Cup

PRESENTED some years ago by Past President E. Dawson Ostermeyer, G5AR, to the East London District of the R.S.G.B., this cup is awarded annually to the District Member constructing the best piece of apparatus. As points are awarded for originality, design, neatness, etc., it does not necessarily follow that the best *looking* piece of apparatus will win the Cup.

The closing date for entries is March 1, 1952, and the Cup will be presented at the East London Meeting to be held in Ilford Town Hall next April.

Further details can be obtained from the East London D.R.—Mr. J. E. Hunter, G6HU, or from Mr. F. F. Ruth, G2BRH, 579 High Road, Seven Kings, Ilford, Essex.

Leslie McMichael

WITH great sorrow we record the death, on November 17, 1951—his 67th Birthday—of Leslie McMichael, G2FG.

It is to Leslie McMichael and his lifelong friend and business partner, Rene Klein (G8NK), that the R.S.G.B. owes its existence. He was one of the five founder members of the London Wireless Club (forerunner of the Wireless Society of London) which came into being at a meeting held at the home of Mr. Klein on July 5, 1913. His initial wireless experiments, however, took place as far back as 1902 when he succeeded in transmitting signals over a distance of 200 yards, using an 8-inch spark coil and a coherer receiver. He held the call sign MXA before the first World War ; became 2MI in 1919 and later G2FG. For some years he was Honorary Secretary of the Society. In recognition of his pioneer work as a Founder and Past Officer of the R.S.G.B., Mr. McMichael was, in 1945, elected an Honorary Member. It was largely due to his wisdom and foresight that the foundations upon which the R.S.G.B. has risen, were so well and truly laid.

One of the most kindly and generous-hearted of men, Leslie McMichael's reputation of integrity was recognised with deep respect all over the world, not only among the Amateur Radio fraternity but as the hallmark of the famous firm which bears his name.

It was typical of the man that even with his many other interests and despite failing health, his interest in Amateur Radio in general, and the welfare of the Society in particular, was maintained to the last. To meet him was an experience not easily forgotten, for he had a happy knock of making even the most casual acquaintance feel like a close personal friend.

So one more of the great men of Amateur Radio passes to his rest. To those who were closely associated with him and to his family we offer our sincere sympathy on behalf of the membership of the Society which will always remain to us as a monument to his memory.

The Society was represented at the funeral service, held at the Golders Green Crematorium, by the General Secretary (Mr. John Clarricoats), the Assistant Secretary (Miss May Gadsden), and Mr. Harold Wilkins (Vice President). Mr. James Catt, G5PS, one of Mr. McMichael's earliest wireless friends was also present.

A. O. M.

G.P.O. Special Radio Amateurs' Examination

THREE quarters of those who sat for the special Radio Amateurs' Examination organised by the G.P.O. and held in London on October 6, 1951, were successful—an increase of about 14 per cent. on last year. The report issued by the G.P.O. shows that most of the candidates attempted all the questions, but the answers given by those who were unsuccessful indicated, generally speaking, a very superficial knowledge. The average number of marks obtained by the successful candidates was 69 out of 100, those obtained by unsuccessful candidates being only 35 out of 100. The results are shown in the following table:

Year	No. of Candidates examined	No. and percentage of passes	No. and percentage of failures
1951	55	40 (73%)	15 (27%)
1950	69	40 (58%)	29 (42%)

The questions were as follows:

1. What do you understand by the following terms: "Sidebands," "Carrier wave," and "Percentage modulation"? Explain with the aid of a diagram, the "choke" method of modulating a radio frequency carrier wave at audio frequencies. (20 marks.)

Comment.—The first part of the question was generally well answered, but few candidates explained the "choke" method of modulation. (Average marks 11/20.)

2. Explain fully the difference between a "Rejector" and an "Acceptor" circuit, and give examples of their respective uses in receiving equipment. (15 marks.)

Comment.—Very few candidates appeared conversant with the action of the "Rejector" and "Acceptor" circuits and this question was not so well treated as the others. (Average marks 7/15.)

3. State the reasons for the employment of the Pentode in preference to the Triode for H.F. amplification. (10 marks.)

Comment.—Fairly well answered in general, but the majority of the unsuccessful candidates and some of those who were successful failed to mention the ill-effects of inter electrode capacity in the Triode valve at radio frequencies. (Average marks 5/10.)

4. What are the conditions laid down by the Postmaster-General for the frequency control and measurement of amateur transmissions? (15 marks.)

Comments.—Generally fairly well answered. (Average marks 9/15.)

5. State fully what precautions should be taken at an amateur transmitting station to avoid interference with broadcast and television reception. (10 marks.)

Comment.—Generally well answered. (Average marks 7/10.)

6. Explain, with the aid of a diagram, how a crystal may be used to control the frequency of a transmitter. State the advantages of crystal control. (10 marks.)

Comment.—Fairly well answered. (Average marks 6/10.)

7. When two resistances of equal value are connected in parallel across a battery of 24 volts, the total current flowing in the circuit is 2 amps. The internal resistance of the battery is 2 ohms. What is the value of each resistance? (10 marks.)

Comment.—The majority of the candidates appeared to have no difficulty with the simple D.C. calculation. (Average marks 7/10.)

8. Describe, with the aid of a diagram, the construction of a half-wave dipole aerial. Indicate a method by which the aerial is coupled to the transmitter and show the current and voltage distribution in the aerial. (10 marks.)

Comment.—Fairly well answered by most candidates. (Average marks 7/10.)

AMATEUR RADIO EXHIBITION

(Continued from Page 265)

amateurs who had travelled from all parts of the British Isles, and from places abroad. Here, as in previous years, old friends were greeted, and many new friendships established.

A full range of the Society's publications and sales items were on show, and a part of the stand was given over to a display of modern amateur-built equipment loaned by members of the Technical Committee and other well-known amateurs. Among the apparatus on view was the 75-watt T.V.I.-proof V.F.O.-controlled transmitter (R. L. Varney, G5RV), described on page 248 of this issue; a noise generator and harmonic indicator (J. W. Mathews, G6LL); a modern 3-valve straight receiver for all amateur bands (W. H. Allen, G2UJ); a 100-watt 2-metre transmitter and a 70 cm. receiver (D. N. Corfield, G5CD); a frame-aerial for Marine D/F (H. A. M. Clark, G6OT); and a two-valve transmitter with remote oscillator tuning (A. O. Milne, G2MI).

The Amateur Radio Exhibition was televised by the B.B.C. and was screened in "Television Newsreel" for the first time on December 5.

In addition to members of Headquarters staff, the stand was manned throughout the period of the Exhibition by a number of volunteers, among whom were: H. E. Bennett, G8PF; P. C. Bond, G3BEG; J. M. Davie, G2XG; R. A. Evenett, G3AGZ; P. J. Naish, G3EIX; S. F. Sharpe, G3CKX; and C. T. Wakeman, G4FN.

A review of the Trade and Service stands will appear next month.

ZL N.F.D.

FOR the first time the New Zealand Association of Radio Transmitters is to hold a National Field Day. The event will commence at 0400 G.M.T. on January 19 and conclude at 0400 G.M.T. on January 20. There will be a six hours' break for sleep from 1200 G.M.T. to 1800 G.M.T. on the 19th. The 3.5 and 7 Mc/s. bands will be used, power will be limited to 20 watts input, and telephony and telegraphy will be permitted.

N.Z.A.R.T. have paid a compliment to the R.S.G.B. by using the Society's N.F.D. rules as a basis for their own.

Remembering the interest shown by New Zealand amateurs in the U.K. event, British Isles amateurs now have an opportunity of giving the ZLs a hand when the time comes.

Check logs should be sent direct to the Contest Manager, N.Z.A.R.T., 86 Lytton Road, Gisborne, New Zealand.

Good luck Zedders!

HEADQUARTERS CALLING

October Council Meetings

Résumé of the Minutes of the Proceedings at the Meeting of the Council of the Incorporated Radio Society of Great Britain held at New Ruskin House, Little Russell Street, London, W.C.1, on Tuesday, October 16, 1951, at 6 p.m.

Present.—The President (Mr. W. A. Scarr) in the Chair, Messrs. W. H. Allen, A. P. G. Amos, F. Charman, L. Cooper, W. N. Craig, V. M. Desmond, C. H. L. Edwards, T. L. Herdman, A. O. Milne, P. A. Thorogood, P. W. Winsford and John Clarricoats (General Secretary).

* * *

Cash Account.

Resolved to accept and adopt the Cash Acount for the month of September, 1951, as prepared by the Honorary Treasurer.

It was reported that revenue from subscriptions in the first three months of the new financial year was only £30 less than for the corresponding period last year.

Quarterly Statement.

Resolved to receive the financial statement for the quarter ended September 30, 1951, as prepared by the Honorary Treasurer.

Report of the Honorary Treasurer.

The Report which the Honorary Treasurer proposed to present to the Membership at the Annual General Meeting was submitted. The Council expressed its pleasure with the Report and instructed the Secretary to write a suitable letter of appreciation to Mr. Watson.

Membership.

Resolved:—

(a) to elect 59 Corporate Members and 20 Associates.
(b) to grant Corporate Membership to 6 Associates who had applied for transfer.
(c) to grant life Membership to Mr. J. P. Downes, B.R.S.5477.

Applications for Affiliation.

Resolved to grant affiliation to Port of London Staff Club (Radio Section), Amateur Radio Club, R.A.F. Swanton Morley, No. 1 Radio School Amateur Radio Society, R.A.F. Locking.

Representation.

The President and other Members of the Council reported upon the O.R.M.s held recently in Tunbridge Wells and Derby.

The Secretary reported upon the successful Meeting held recently in Plymouth.

Hampshire.

It was reported that Mr H. G. Hunt, G3ECV, of Southampton, had been nominated as Representative for "Region 6 or such other Region in which Hampshire may eventually be included."

The Secretary reminded the Council that at the present time Hampshire is part of Region 8 but that under the new arrangements due to come into force on January 1, 1952, the county will be transferred to Region 6. The Council had already nominated Mr. F. A. Jefferies for the office of Region 6 Representative.

The Secretary further reminded the Council that at the recent Hampshire County meeting, held in Southampton, a motion was put to the meeting and carried that Hampshire should, together with Wiltshire and Dorset, form a new Region. The representatives of the Council present at the meeting had been given to understand that the terms of the resolution and others passed at the meeting would be communicated to the Council. These resolutions had not yet been sent to the Society.

Resolved that Mr. Hunt's nomination be accepted as a nomination for the office of Region 6 Representative.

Region 12 Resolution.

It was reported that a resolution in the following terms was carried unanimously at the Official Regional Meeting held in Aberdeen on September 16, 1951:—

"This meeting wishes to place on record its confidence in the Council of the Society and assure them of its continued support in their governing of the Society's affairs."

The Secretary was instructed to thank the Regional Representative (Mr. John Douglas) on behalf of the Council, for the vote of confidence passed at the Region 12 meeting.

Dorset County Meeting Resolution.

It was reported that a resolution, in the following general terms, was carried at the Dorset County meeting held on September 23, 1951:—

"The Council be asked to use every endeavour to clean up the operation of all bands and in particular to suppress the activities of 'breakfast clubs' on the 80 metre band."

After a lengthy discussion on the resolution it was agreed to draw the attention of members, through the medium of a notice in the BULLETIN, to the problems which may arise if the practices complained of by the Dorset members do not cease.

Television Interference.

The Secretary reported that under date of October 2, 1951, he received from Mr. E. P. Harris, G3GFN, of Ruislip, a letter bearing the call signs of 19 other amateurs. The letter prefaced a Memorandum dealing with the question of interference by Amateur Radio transmitters to television reception.

The Secretary further reported that the object of the Memorandum was:—

To secure, through the offices of the Radio Society of Great Britain a revision of Clause 12 of the licensing conditions affecting radio amateurs licensed by the P.M.G., with particular reference to interference to the reception of the television service of the B.B.C.

The Secretary stated that the Memorandum sets out the present position in so far as the investigation of television interference is concerned and puts forward arguments for the betterment of operating conditions. The gist of the argument is that the R.S.G.B. should seek, by every possible means, to have Clause 12 of the licence modified so that where the interference is due to high field strength from the transmitter ; break through on the I.F. channel of the receiver ; the receiver responding to images ; incorrect operation of the receiver ; or the receiver being operated under unfavourable conditions, the licensee shall be absolved from responsibility for the interference, and not restricted in hours of operation.

The Secretary reported that Mr. Harris had been given prior advice of the statement subsequently published in the October issue of the BULLETIN under the heading "Television Receiver Design." It was further reported that a copy of the Memorandum had been sent to the Chairman and Vice Chairman of the Technical Committee.

After discussion it was

Resolved to advise Mr. Harris that although the points raised by him have already been considered by the Technical Committee and discussed at length with the G.P.O., the Council has decided to forward a copy of the Memorandum to the G.P.O. for their observations.

The Secretary was instructed to inform Mr. Harris that the Council is impressed with the sound and lucid manner in which a case has been stated for a modification of Clause 12 of the licence.

It was agreed that the Technical Committee should be asked to study the Memorandum and report thereon to the Council.

R.S.G.B. Bulletin.

It was reported that when the current volume of the BULLETIN was estimated, the cost of paper was 42/1 per ream (500 sheets) for inside pages and 93/2 per ream for cover pages. In June the price of paper for inside pages rose to 68/1 per ream, and in September to 70/7 per ream. Cover paper had risen to 109/5 per ream.

It was explained that this increase, coupled with the fact that several recent issues had aggregated 48 pages, meant that printing costs were considerably higher than for the corresponding issues last year.

It was reported that the information had been communicated to the Finance and Staff Committee.

Discounts on R.S.G.B. Publications.

After considering a report from the Secretary on the subject of discounts on R.S.G.B. publications it was

Resolved that the Society shall, in future, allow no trade discounts on its publications except to recognised dealers and Affiliated Societies.

Sale and Return Arrangements for R.S.G.B. Publications.

After considering a report from the Secretary on the subject of sale and return arrangements for R.S.G.B. publications it was

Resolved that, in future, cash must accompany all orders for R.S.G.B. publications received from R.S.G.B. Town Groups and Affiliated Societies; that no unsold copies will be accepted except in the case of publications specifically ordered for exhibitions; that in the case of publications ordered for exhibitions, credit will be allowed on undamaged copies returned to the Society within seven days of the closing of the Exhibition.

It was agreed that the Society shall continue to pay, as hitherto, the cost of postage and packing on all bulk quantities of publications supplied to R.S.G.B. Town Groups and Affiliated Societies

Subscription Rates.

It was reported that the Society's legal advisers had advised that "it is not possible to alter the membership subscription without the consent of the Board of Trade, in accordance with Clause 5 of the Memorandum of Association of the Society."

"The Short Wave Magazine."

Copies of letters sent to the Editor of "The Short Wave Magazine" protesting against editorial comments published in the October, 1951, issue of that Journal, were submitted from members.

A member of the Council stated that the Editor of the R.S.G.B. Call Book had expressed the view that certain statements published in the October issue of "The Short Wave Magazine" concerning the Call Book were grossly inaccurate.

After a lengthy discussion it was

Resolved that a rejoinder to the Editorial appearing in the October issue of "The Short Wave Magazine" should be published in the November issue of the R.S.G.B. BULLETIN.

It was agreed that the proposed editorial should be prepared by the Honorary Editor and submitted to the Council for approval.

Amateur Radio Exhibition.

The Council gave consideration to proposals put forward by the Committee set up to organise an Amateur Constructors' Section and authorised the Committee to incur an expenditure up to £50 for transport and out of pocket expenses. A suggestion that an Amateur Radio station should be operated from the Exhibition hall was not approved. The Council authorised the Committee to proceed with its plans for showing items of equipment embodying surplus radio goods.

Arrangements for the opening ceremony were approved.

Council Election 1952.

The Secretary pointed out that no decision had yet been taken on the question of election addresses. He reminded the Council that the Questionnaire showed 1,911 members to be in favour of election addresses and 1,444 against.

Resolved not to invite nominees for the 1952 Council to submit election addresses.

Adjournment.

Due to the lateness of the hour it was resolved:—

(a) that the present Meeting stands adjourned until 10 a.m. Saturday, October 27, 1951.

(b) that the Special Meeting of the Council called for that day shall commence as soon as the business of this Meeting shall have been dealt with.

The Council rose at 10.15 p.m.

* * *

The Council reassembled at 10.20 a.m. on Saturday, October 27, 1951, when the following were present:—

The President (Mr. W. A. Scarr) in the Chair, Messrs. W. H. Allen, F. Charman, L. Cooper, W. N. Craig, C. H. L. Edwards, T. L. Herdman, A. O. Milne, P. A. Thorogood, P. W. Winsford and John Clarricoats (General Secretary).

Apologies were received from Messrs. A. P. G. Amos, V. M. Desmond and A. J. H. Watson.

* * *

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

After receiving reports from the Secretary and the Call Book Editor it was

Resolved to negotiate with South London Press Ltd. terms for the printing of a new edition of the R.S.G.B. Amateur Radio Call Book.

I.A.R.U. Calendar No. 42.

After receiving a report from the Contests Committee it was

Resolved that Aye votes be recorded on Proposals 77 and 78 as set out in I.A.R.U. Calendar No. 42.

(The Proposals put forward by W.I.A. (Australia) relate to the numbering system to be used in Contests. The recommended system has been used by R.S.G.B. for some years.—Ed.)

Annual Report of the Council.

A draft of the Annual Report of the Council prepared by the Secretary was considered in detail. After minor amendments had been agreed it was

Resolved that the Report be approved and signed by the President and circulated to the membership through the medium of the Society's Journal.

The President submitted a tribute to the work of the General Secretary and Miss Gadsden and other members of the staff for inclusion in the Report.

Society Trophies.

Resolved to award Society trophies to those whose names had been listed in Reports submitted by the Secretary and the Contests Committee.

(A full list of winners appeared in the November BULLETIN. —Ed.)

1951 Council Cup.

It having been reported that the Society possesses no suitable trophy for presentation in connection with the 2 Metre Field Day event it was

Resolved that an expenditure of up to £10 be authorised for the purchase of a trophy—to be known as the 1951 Council Cup—and that the Cup be awarded for the current year to the winner of the 1951 2 Metre Field Day.

Convention Committee.

A final Report prepared by the Chairman and Organising Secretary covering the activities of the 1951 Convention Committee was submitted together with a Statement of Account.

Resolved to receive the Report and the Statement of Account.

(The Council was in recess from 12.30 p.m. until 2.25 p.m.)

"The Short Wave Magazine."

The Honorary Editor submitted the draft of a rejoinder to the Editorial published in the October issue of "The Short Wave Magazine." The Council discussed the draft at great length and after amendments had been agreed it was

Resolved, unanimously, to publish the rejoinder as an Editorial in the November issue of the BULLETIN.

Meeting with G.P.O. Representatives.

The Secretary submitted a Report of a meeting with G.P.O. representatives held on September 27, 1951.

The Secretary reported that the following matters had been discussed at the meeting:—

The amateur vision licence; the revised amateur sound licence; operation of amateur stations aboard ships; frequency modulation on 144 Mc/s.; pulse modulation; television interference in the fringe areas and portable licences.

Articles of Association.

Due to the fact that several Members of the Council were now absent it was

Resolved to defer further consideration of the Articles of Association until a date to be fixed at the next Meeting of the Council.

The Meeting finally terminated at 4.50 p.m.

Can You Help?

● R. Harrington (B.R.S. 17290), 3 Errington Road, London, W.9, with circuit details of the search-head of the American mine detector (1T4 panel).

● R. V. Oliver (G3EIG), 8 Brookdale Avenue, Binley, Coventry, with values of the oscillator and P.A. variable capacitors in the TU8B?

● J. T. Parker (G3BXZ), 9 Cheltenham Road, Broadway, Worcs., who requires a source of supply for powdered-iron toroidal coil forms of the types used in the 20 kc/s. I.F. amplifier described in the November *QST*.

Around the Trade

Clydesdale Supply Co., Ltd., 2 Bridge Street, Glasgow C.5, will be pleased to send a copy of their new List No. 8 to any reader on receipt of a postal order for 1s. 6d. The list runs to 180 pages and is well illustrated.

REGIONAL AND CLUB NEWS

Brighton and District Radio Club

An Amateur Radio station, operating on all bands from 1.7 to 14 Mc/s. under the call G3EVE/A, is to be a feature of the Club's stand at a local Hobbies Exhibition to be held in the near future. A filmstrip lecture "The Cathode-ray Tube" and a talk by *Antiference Ltd.* on "Television Aerials" are planned for January 1 and 15 respectively. The Hon. Secretary is R. T. Parsons, 14 Carlyle Avenue, Brighton 7.

Coventry

At the recent A.G.M. the T.R., Mr. J. R. Tuck, G6TD, reviewed the group's activities and a satisfactory balance sheet was presented by the Group Treasurer. The new Group Secretary is W. Westacott, 43 Abercorn Road, Coventry.

Coventry Amateur Radio Society

Recent meetings featured a talk and demonstration by L. Gardner (G5GR) on "The Mechanics of Music" and the *Mullard* filmstrip "Cathode-ray Tubes" presented by K. Lines (G3FOH). Future plans include the Annual Children's Party on December 17, and the Annual Dinner on February 29. The Hon. Secretary is K. Lines, 142 Shorncliffe Road, Coventry.

Derby and District Amateur Radio Society

Recent activities have included a visit to the local Post Office telephone exchange, and a lecture, illustrated with lantern slides, "Defence in Radiological Warfare." The A.G.M. will be held on January 2 in Room 4, 119 Green Lane, Derby. A C.O.I. film show has been arranged for January 30 in the same room, commencing 7.30 p.m. The Society's club room in the sub-basement of the Derby College of Art, Green Lane, is open each Wednesday evening for general discussion and practical demonstrations. The Assistant Hon. Secretary is F. C. Ward, 5 Uplands Avenue, Littleover.

East Surrey Radio Club

At a recent meeting members of the Club extended a warm welcome to their Patron—Mr. Tommy Price—on his return from a visit to New Zealand. Mr. Price, who was accompanied by his wife, spoke of his experiences "down under," mentioning the happy hours he had spent visiting Amateur Radio stations.

Meetings of the Club are held monthly in the Barn Room, Lesbourne Road, Reigate, commencing 7.45 p.m. The Hon Secretary is L. G. Knight, 6 Madeira Walk, Reigate.

Edinburgh Amateur Radio Club

The Club continues to meet weekly on Wednesdays at 7.30 p.m. in Unity House, 4 Hillside Crescent, Edinburgh. The Club station (call GM3HAM) is on the air alternate weeks. Hon. Secretary: C. L. Patrick, 19 Montgomery Street, Edinburgh.

Medway Amateur Receiving and Transmitting Society

The Society station is now on the air under the call G2FJA. A welcome is extended to new member Bill Evens (G6CH). An excellent winter programme has been planned and big meetings are anticipated.

Plymouth

The Annual Dinner and Social of the Plymouth Group will be held at the Lockyer Hotel on January 26, 1952. Reservations should be made to the T.R. (John Eddy, 55 Greenbank Avenue, Lipson) in good time.

Among the exhibits featured at the Sutton and Cheam Radio Society stand were: A home-constructed tape recorder; a miniature television receiver (4" x 4" x 3") with Home and Light programme sound; a 2-valve receiver having soldered joints constructed without help by a blind member; and a "see your voice" microphone-oscilloscope rig.

Reading Radio Society

The Annual Hamfest (for the first time all male, owing to limited accommodation) was held at the Abbey Gateway. The Nash and Lewis Cups were again competed for, many fine pieces of equipment being entered. The Instructional section meets every second Saturday of the month, and the main meeting is held on the last Saturday. Hon. Secretary: L. A. Hensford, 30 Boston Avenue, Reading.

South Manchester Radio Club

Highlights for the future include a film show on December 21 and a demonstration of Home-Constructed Television on January 4. A new committee was elected at the recent A.G.M. Hon. Secretary is now F. H. Hudson, 21 Ashbourne Road, Stretford.

Stourbridge & District Amateur Radio Society

Lectures have been given recently on "Simple Transmitters," "Tape Recorders" and "Sound and Hearing." The Society continues to meet regularly, and despite a slight falling off in membership enthusiasm remains unaffected. Hon. Secretary: W. A. Higgins, 28 Kingsley Road, Kingswinford.

Sutton & Cheam Radio Society

The story of the Society's contribution to the recent "Hobbies Exhibition" organised by the Rotary Club is told in the captions to the photographs on this page. Meetings in November featured a talk and demonstration on "Long-Playing Records" by Mr. D. Thomson of *The Decca Record Co., Ltd.*, and "Two-Metre Equipment" by C. Newton (G2FKZ). Hon. Secretary: F. J. Harris, 143 Collingwood Road, Sutton.

A corner of the Amateur Radio exhibit recently staged by the Sutton and Cheam Radio Society as part of the Hobbies' Exhibition organised by the local branch of the Rotary Club. Two transmitters were operated under the call G4DH/A, and many contacts made, including one with Malta. Duplex telephony with local stations was demonstrated.

Surrey Radio Contact Club

"The Operation of Valves in Typical Radio Transmitter and Receiver Circuits" was the subject of a recent talk by R. E. T. Dabbs (G2RD). Efforts are being made to arrange a course for the R.A.E. at the Croydon Polytechnic. The Annual Dinner will be held on January 18 at which the Basil Wardman (G5GQ) Cup will be awarded to the winner of this year's contest. Hon. Secretary: S. A. Morley, 22 Old Farleigh Road, Selsdon.

Teeside Amateur Radio Club

The club recently participated in the M.C.C., using the call G3HUG. Excellent facilities (including canteen) are available in the new Headquarters. Several transmitters are on loan to the club pending the completion of a club transmitter, and operation is planned for all bands. New members are welcome on club nights. For details of meetings, see *Forthcoming Events*.

Torbay Amateur Radio Society

At the November meeting G2BMZ spoke on "The Principles of the Transmitter," after which a discussion took place on the possibilities of television reception in the area when the new station at Wenvoe is opened. On December 17 F. D. Cawley (G2GM) will lecture on "A Simple Three-Stage Transmitter." Hon Secretary: W. A. Launder, 15 Cambridge Road, St. Marychurch, Torquay.

Worthing and District Amateur Radio Club

The winter session is now in full swing, and meetings are held on the second Monday of each month at the Adult Education Centre, Union Place, Worthing. At the January meeting the *Mullard* filmstrip "Valves" will be shown. The Secretary is F. H. Betterley, 42 Anweir Avenue, Lancing, Sussex.

Affiliated Societies' Contest

THERE are no major changes in the rules for this contest, which will be held on the 12th and 13th of January, 1952. The only alterations relate to the time of operation which is now 3 p.m. to 8 p.m. each day, and to the serial number which will now increase by one for each contact.

The leading Society will be recommended for the award of the "Edgware Trophy," and a Certificate of Merit will be awarded to the R.S.G.B. member forwarding the best check log.

Rules

1. The contest is open to all Societies in fully paid-up affiliation with the R.S.G.B.

2. The contest will be in two sections: first, C.W. (A1), and second, A.M. Telephony (A3). The C.W. section will be held between 3 p.m. and 8 p.m. G.M.T. on Saturday, January 12, and the Telephony section between 3 p.m. and 8 p.m. G.M.T. on Sunday, January 13, 1952.

3. Operation will be on the 3.5 Mc/s. band, according to the provisions of the R.S.G.B. Band Plan as follows: C.W., 3,500 to 3,600 kc/s.; Telephony, 3,600 to 3,635 kc/s., and 3,685 to 3,800 kc/s.

4. In each section, only one transmitter—which may be either the Society transmitter or that of one of the members—and not more than two receivers may be used (i.e. different stations may be used for the two sections, if desired).

5. The input to the anode circuit of the valve or valves delivering power to the aerial, or to any previous stage, must not exceed 25 watts.

6. Five points will be scored for contact with another Affiliated Society station, and one point for contact with any other British Isles station. The final score will be the sum of the scores for the two sections.

7. Only contacts with stations in the British Isles (Prefixes G, GC, GD, GI, GM and GW) will be permitted to count for points.

8. Competitors will call "CQ RSGB." An exchange of RST (or RS) reports and a self-assigned three-figure number starting between 000 and 100, and increasing by one with each successive contact, will be required before points may be claimed.

9. Only one contact with a specific station will be permitted to count for points in each section of the contest.

10. Transmitter operators may be changed as often as is desired, provided the terms of the licence are observed.

11. Entries (preferably on foolscap or quarto paper) must be set out as shown below.

12. The entry form must be completed and signed by an Officer of the Affiliated Society, who will be held responsible for the conduct of the station(s).

13. The terms of the Transmitting Licence must be rigidly observed.

14. Any station reported operating off-frequency, or causing interference with over-modulation or spurious emissions, may be disqualified.

15. Any station consistently receiving tone reports lower than T9 will be disqualified.

16. Upon the recommendation of the Contests Committee, The Edgware Trophy *will be awarded to the entrant with the highest total score. A Certificate of Merit will be awarded to the member of the R.S.G.B. submitting the best check log.*

17. The decision of the Council of the R.S.G.B. will be final in all cases of dispute.

18. Entries must be postmarked not later than January 21, 1952, and addressed to the Hon. Secretary, R.S.G.B. Contests Committee, New Ruskin House, Little Russell Street, London, W.C.1.

Affiliated Societies' Contest, January 12/13, 1952

Name of Society..... Call Sign(s).....

Address(es) of Station(s) .....

Transmitter .....

Receiver(s) .....

Aerial(s) .....

Date	Time	Call Sign of Stn. worked	Report				Signature of Operator	Points Claimed
			Sent RST/RS	Serial No. sent	Recd. RST/RS	Serial No. rec'd		
							Total ..	

Declaration: I declare that the station(s) for which I was responsible was (were) operated strictly in accordance with the rules and spirit of the contest, and I agree that the ruling of the Council of the R.S.G.B. shall be final in all cases of dispute.

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

Office.....

LONDON LECTURE MEETINGS, 1951/52

All meetings are held at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2. Buffet Tea from 5.30 p.m. Meetings commence at 6.30 p.m.

Tuesday, December 18, 1951: **Annual General Meeting.** Followed by, if time permits, a first showing of the 1950 I.A.R.U. Congress and 1951 R.S.G.B. Convention Films.

Friday, January 25, 1952: **Standard Telephones and Cables, Ltd.**

"OVERTONE MODE CRYSTALS."

Friday, February 29, 1952: **Mullard, Ltd.**

"MODERN VALVES FOR V.H.F. WORK."

Friday, March 28, 1952: **Mr. H. A. M. Clark, G6OT**

Subject to be announced.

Contests Diary

1952

January 12-13	Affiliated Societies
January 26-27	"Top Band" (No. 1)
March 29-30	B.E.R.U. (Telegraphy)
April 5-6	B.E.R.U. (Telephony)
May 10-11	144 Mc/s. Field Day (No. 1)
June 7-8	National Field Day
June 22	420 Mc/s. Tests
July 6	European V.H.F.
July 26-27	144 Mc/s. Open Event
September 7	Low Power Field Day
September 21	144 Mc/s. Field Day (No. 2)
October 4-5	Low Power
November 8-9	"Top Band" (No. 2)

The Radio Amateurs' Examination

DEAR SIR,—I read with great interest the letters from J. H. Woodward and M. Barlow, both of whom raised points of fundamental importance to Amateur Radio, and represent the two opposite facets of the same question, namely, should Amateur Radio be primarily a technical or a social activity? Mr. Barlow seems to consider that the technical standard of our hobby is in danger of serious deterioration, and in this I agree with him.

It must be borne in mind when considering the Radio Amateurs' Examination that, whilst the number of stations is rapidly increasing, the band-width available on the lower frequencies, already overcrowded, will steadily become even smaller due to the demands of essential services. Under these conditions there is no room on the amateur bands (or any other for that matter) for poor transmissions occupying more spectrum space than is absolutely necessary. The worst of the many failings of the R.A.E. is that it demands no knowledge whatsoever of modern narrow-band techniques, and I feel the R.S.G.B. should, in the interests of all amateurs, press for the inclusion of comprehensive questions on this subject. Mr. Barlow's plea for a reasonable standard is timely; surely a person who can only just pass the examination as it stands is not sufficiently qualified to use so potentially devastating a weapon as a 150-watt 20-m. phone transmitter?

With regard to the proposal for a separate U.H.F. licence, I think this would be of doubtful value. Whilst it is quite possible to have a sound knowledge of "L.F." techniques but little of U.H.F. practice, it is hardly likely that a U.H.F. specialist will have no knowledge of the simpler L.F. techniques. The abolition of the Morse test for the U.H.F. licence would certainly be an advantage to those interested only in technical aspects; it is only fair to point out, however, that pure C.W. is the acid test for U.H.F. equipment, and far more has been achieved in long-distance working on C.W. than on 'phone. But I sincerely hope that the mere working of "DX" will not become a primary object on these bands, as it has on the lower frequencies.

"Friendship First" is a very good catch-phrase, but the process of "nattering" which it induces can easily be carried too far. Many amateurs (like myself) prefer the type of contact in which useful ideas and information can be exchanged, to the "rubber stamp" variety which really achieve nothing. The danger with such contacts is that they so easily degenerate into personal discussions which can only be described as nauseating to the listener. Certain nets which pollute the 80 and 40 m. bands with their S9 plus, 200% modulated signals provide good examples of unintelligent "nattering" carried to its logical conclusion.

I think it is necessary to emphasise that the technical and social aspects of our hobby are really complementary, and not opposing; the majority of amateurs achieve a satisfactory balance between them, leaving, as usual, a vocal minority to write "Letters to the Editor."

Yours faithfully,
A. K. BROOKMAN, G3FLP

London, S.W.16.

B.C.I. to Domestic Receivers

DEAR SIR,—With reference to the letter from G3FYY (October issue) regarding B.C.I. and T.V.I., I sympathise with the situation in which he finds himself, and agree that the R.S.G.B. booklet "Transmitter Interference" does not cover adequately problems of this kind.

Doubtless the receivers near G3FYY are superheterodynes where the frame aerial forms the R.F. tuned circuit; hence the selectivity of the R.F. part of the set is less than that of a more conventional type of receiver. The most troublesome symptom, usually, is the ability to tune-in the amateur signal at a number of points throughout the band. This is due to harmonics of the receiver's local oscillator beating with the amateur signal. There are two ways in which this problem may be tackled: the first is to reduce the harmonic content of the local oscillator, and the other to reduce the level of the interference signal at the grid of the first stage by the usual methods—such as R.F. choke, wave-trap, etc. Details of how to accomplish the latter are available. The former should be attempted by damping the local oscillator stage by incorporating a resistor across the coil. The value must be found by trial and error, but a resistance a little greater than that just necessary to sustain oscillation will be very effective. Incidentally, damping the local oscillator will be found of great assistance in dealing with comparatively well-designed receivers of good R.F. selectivity.

Yours faithfully,
NIGEL G. ANSLOW, G4GD.

East Sheen, S.W.14.

Another Technical Controversy

DEAR SIR,—Some while ago I wrote to you regarding the booklet *Receivers*, querying the statement, made several times, that high L/C ratio and low selectivity are practically synonymous. The correspondence was referred to the author (Mr. S. K. Lewer, G6LJ), and a further exchange ensued without convincing result.

It is, I believe, generally accepted that, for an uncomplicated arrangement, the selectivity of a tuned circuit, defined in terms of band-width at so many db. down, is proportional to the inherent "Q" of the circuit. May I, at this point, mention that the argument is concerned with simple couplings of the tuned anode and loosely coupled tuned secondary type, fed by the usual pentode type valve (Fig. 1)?

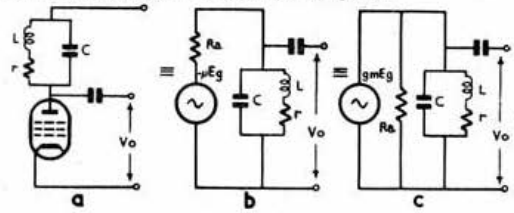


Fig. 1

Simple pentode tuned-anode coupling (a) circuit diagram; (b) equivalent circuit $[Vo=\mu EgZ/Ra+Z]$; and (c) alternative equivalent circuit $[Vo=gmEg/(1/Ra+1/Z)]$, where Eg is the grid input voltage, Vo is the output voltage, and Ra and Z are the valve A.C. resistance and tuned-circuit impedance respectively. Note that if $Ra \gg Z$, $Vo=gmEgZ$ in both cases.

"Q" is fundamentally defined as the ratio $fo/2\delta f$, where fo is the centre frequency of the response curve, and $2\delta f$ is the band-width at -3 db. It can be shown by straightforward circuit theory (Williams' *Thermionic Valve Circuits*) that $fo/2\delta f=1/r\sqrt{L/C}$, where r is the series resistance of the coil. Hence my contention that selectivity is proportional to L/C for an *unloaded* resonant circuit. I am not concerned with P.A. stages coupled to aerials.

It has been suggested that wide-band amplifiers employ high L/C circuits and yet have a wide band-width. The point here, surely, is that the basic resonant circuit is designed to be as efficient as possible, and that the inherently low input impedance of the succeeding valve, aided in many cases by a physical damping resistor, produces the wide band-width and, hence, the low "Q." In fact, the "Q" of a circuit consisting of L, C and R in parallel (where R represents an external load) can be shown to be $Q=R\sqrt{C/L}$, thus further bearing out my contention.

Yours faithfully,
T. G. CLARK, B.R.S.6294.

Woking, Surrey.

Aerials, Not Watts, Count

DEAR SIR,—I must disagree with some of the opinions expressed by Mr. Farrar, G3ESP, in the October issue. To state that "many" amateurs use power in excess of their licence is, I think, unwarranted. Some, no doubt, do, and their conduct is much to be deprecated, but they are probably very few. Surely the way to deal with them is by collective action amongst the victims of their activities rather than by a general restriction on final amplifiers. If we were to follow Mr. Farrar's suggestion there would be very little choice left for a 150-watt stage. Push-pull 807s and a few of the smaller triodes would be all that remained.

This would have a bad effect on design generally; amateur construction is stereotyped enough already without imposing any further restrictions. The mere possession of a final amplifier capable of 300 watts or more is no evidence of use. Numerous National Field Day stations use transmitters capable of at least 15 watts input, but no one believes that many—or in fact any—use it. Stories of high power lose little in the telling and in the final analysis it is aerials, not watts, that count.

Yours faithfully,
COLIN T. DOLLERY, G3GAF.

Birmingham 13.

A Question of Power

DEAR SIR,—Whilst I do not agree with the suggestion made by G3ESP in the October BULLETIN regarding more controls over our power input, it is most refreshing to see that he has brought to light a controversial issue which has been kept "under cover" for far too long.

Dealing first with his suggestion to forbid the use of equipment capable of producing more than our licensed power: I strongly suspect that he did this with his tongue in his cheek to provoke correspondence. Obviously, it

would be similar to putting speed governors on all motor vehicles, a practice which would firstly be impracticable, and secondly a control which no reasonable nation would tolerate.

Coming back to our input question, I would suggest that the whole thing is now anachronistic. Why?

When we were first licensed shortly after the 1914 war, we were limited to 10 watts input. There was a very real fear that we would interfere with other services if we had more power. At one time we were not supposed to contact stations outside Britain, unless we had applied for permission. We were limited to an aerial of 100 feet maximum. " Spark " was still in use, receivers unselective, and wavelengths uncertain. Even the B.B.C. had to close down at frequent intervals because, under their licence conditions, they had to listen in case there was an S O S or a Government station was suffering interference from them. In those distant days we were—Services as well as amateurs—feeling our way and those precautions and regulations were reasonable.

Now things are different. We are allowed 150 watts input and may use any length of aerial. With modern beams, the effective power of many stations is in excess of a kilowatt, even though they be working within their licensed input power. Therefore, as far as interference with other services is concerned (where the effective received signal is concerned) the 150-watt input limit is completely out-of-date.

World input statistics are not available, but it is my impression that the average input figure is between 250 and 300 watts, and this takes into account the enormous number of U.S.A. amateurs with their permitted 1 kW. input.

The real crux of the problem is lack of realism in our regulations. I believe that the U.S.A. policy of permitting a maximum of one kilowatt is the right one, and I say this having had the good fortune to examine it on the spot in the U.S., and also having been very closely associated with the problem during the war.

Consider just a few of the aspects:

1. The risk of interference from a 1 kW. rig is little greater than that from a 150-watt rig. A properly adjusted 1 kW. transmitter causes infinitely less trouble than a badly built, maladjusted 25-watt job.

2. A considerable amount of skill is required to handle a transmitter approaching the 1 kW. mark, especially if 'phone is used. One mistake, using those powers with voltages of 2½ to 5 kV., and a great deal of very expensive equipment is wrecked. Think of the valve bill alone if an anode melts; if a Class C stage goes out, then it is probably goodbye to the modulators and rectifiers as well. The consequences, financial and physical, are far less on 150 watts, using 750 volts to 807s. The tendency, therefore, is for the 1 kW. rig to be better engineered and used by more experienced operators.

3. Financially, the full kilowatt (on 'phone especially) is just about the limit, save for a very few. Any worthwhile increase would be towards the 10 kW. mark, meaning engineers on duty whilst the " ham " (?) operated. Therefore the kilowatt can be taken as a " maximum desire " or dream.

4. In all regulations, the power input limit is a " ceiling." One must not exceed it, but similarly one is not forced to work the limit; on the contrary, the regulations demand that the lowest power consistent with reasonable communication be employed.

And so I suggest that the real answer is to raise our " ceiling " to the full kilowatt. The effects would be:

(a) As in the U.S., a very, very few stations would operate up to the legal limit.
(b) Probably 40% stations would operate at between 250 and 300 watts input.
(c) Some 60% stations would continue to operate at 150 watts or less.
(d) Enforcement of the regulations would be infinitely easier with practically no increased risk.

Therefore I conclude with a plea for realism, for a " power ceiling " that will create respect and not evasion, which will be easier to enforce and whose enforcement would have the support of every amateur.

Were the power limit 1 kW., I should personally continue to potter along most happily with an input of 120 watts, from my 807s, not the least bit envious of my higher-powered brethren facing intense problems of B.C.I. and T.V.I., plus far greater expense.

Yours faithfully,
BASIL WARDMAN, G5GQ.

London, N.W.3.

Representation — 1952

Elections

The results of the Ballots for the election of Regional and Town Representatives are as follows:—

Region 1—B. O'Brien (G2AMV), 53 votes;
G. Webster (G5GK), 35 votes.

Region 3—J. N. Walker (G5JU), 34 votes;
J. Turnbull (G6OI), 23 votes.

Region 4—Dr. E. S. G. K. Vance (G8SA), 107 votes;
J. J. Curnow (G6CW), 7 votes.

Members in Hampshire having requested the Council to form a new Region comprising Dorset, Hampshire and Wiltshire, the question of the election of a Representative for Region 6, and possibly for a new Region, is in abeyance.

Edinburgh—A. Dewar, B.R.S.18777, 15 votes;
D. Samson (GM3EQY), 12 votes.

Correction

The address of Mr. S. H. Foster, Region 15 Representative elect, is 31 Belmont *Park*, Belfast.

Town Representatives

The following Corporate Members have been duly nominated to serve as Town Representatives in addition to those listed in the November, 1951, issue of the R.S.G.B. BULLETIN:—

Region	Town or Area	Name, Call Sign (or B.R.S.) and Address
3	WARWICKSHIRE Rugby	R. T. O'NEILL (G4KK), 41 Catesby Road.
4	LEICESTERSHIRE Leicester	A. L. MILNTHORPE (G2FMO), 3 Winster Drive, Thurmaston.
5	ESSEX Southend	P. F. CLARKE (G3CQL), 29 Station Road, Leigh on Sea.
6	BERKSHIRE Reading	L. A. HENSFORD (G2BHS) 30 Boston Avenue.
6 *contd.*	BUCKINGHAMSHIRE High Wycombe ..	J. SALTER (G3DQC), 6 Peterborough Avenue.
	OXFORDSHIRE Oxford	D. COLLINS (B.R.S.17378), 5 Ellesmere Road.
7	LONDON—EAST Harlow	B. E. ROGERS (G8LC), 20 Priory Avenue.
	LONDON—SOUTH Croydon	R. L. GLAISHER (G6LX), 279 Addiscombe Road.
	LONDON—SOUTH-EAST Dulwich and New Cross	S. H. LEDBROOKE (G3FDV), 36 Lowther Hill, Forest Hill, S.E.23.
	LONDON—SOUTH-WEST East Molesey ..	G. F. BARRETT (G8IP), 23 Warfield Road, Hampton, Middlesex.
8	SUSSEX Hastings	G. W. SPRAY (G3FXA), 255 London Road, Bexhill on Sea.
	KENT Tonbridge and Tunbridge Wells	F. BARNARD (G4FB), 34 Springwell Road, Tonbridge.
9	SOMERSET Bath	P. TOLMAN (G3EKS), 14 Kensington.
13	FIFESHIRE Dunfermline ..	J. F. SHEPHERD (GM3EGW), 12 Park Place.

Vacancy

Mr. W. Green, GM3FBA, has resigned as Representative for the Counties of Dumbartonshire and Argyllshire.

Nominations for his successor should be made in the manner described in the September, 1949, issue of the BULLETIN and sent to reach the General Secretary by January 15, 1952.

(Continued on Page 281)

NEW BOOKS

FOUNDATIONS OF WIRELESS (5th Edition). By M. G. Scroggie, B.Sc., M.I.E.E. Page size 8½" x 5½", 328 pages, 236 illustrations. Published for "Wireless World" by Iliffe and Sons, Ltd. 12/6 (postage 8d.).

First published in 1936, "Foundations of Wireless" has long since become established as a classic in its field, and many thousands have gained their first acquaintance with the principles of radio transmission and reception from its pages. This edition has been entirely rewritten and is illustrated with more than 200 new diagrams. The whole basic theory of radio is covered, starting with the most elementary principles. No previous technical knowledge whatever on the part of the reader is assumed.

Apart from the fundamental laws of electricity and radio, the theory of valve transmitters and all types of modern receivers is described. There is an introduction to the techniques of television and radar, while aerials, power supplies and transmission lines are also dealt with.

A feature of special interest to the beginner is the introductory section which explains fully the use of algebraic symbols, graphs and circuit diagrams. Equally valuable is the comprehensive system of indexing and cross-referencing, enabling the reader to find any information (and particularly the meaning of both British and American technical terms) without difficulty.

CATHODE-RAY OSCILLOGRAPHS (4th Edition). By J. H. Reyner, B.Sc., A.C.G.I., D.I.C., M.I.E.E., M.Inst.R.E. Page size 7¼" x 4¼", 199 pages, 138 illustrations. Published by Sir Isaac Pitman & Sons, Ltd. Price 15/-.

This well-known book is a simple and up-to-date guide to the practical application of cathode-ray tubes to the examination of wave-forms and to numerous other purposes.

The present edition contains three new chapters dealing with special time bases, cathode-ray photography and such recent applications as double-wave recording, pressure recording, and radar pulse technique.

For the up-and-coming radio amateur who wishes to use the cathode-ray tube in his station in the most effective manner this book is a "must."

TIME BASES—SCANNING GENERATORS (2nd Edition). By O. S. Puckle, M.B.E., M.I.E.E. Page size 8¼ " 5¼". 386 pages. 257 illustrations. Published by Chapman & Hall. Price 30/-.

This new edition of a standard treatise has been enlarged to include a description of the important developments in time-base circuits which originated during the 1939-45 war. Chapter 9, which covers the "Miller" circuit, is entirely new, and many modifications and additions have been made to other parts of the book. A number of appendices, including one of 45 pages on the C.R. tube itself, and the numerous practical examples, together with the author's wide experience, make this an essential reference book for all workers with the Cathode Ray Tube.

PRINCIPLES OF ALTERNATING CURRENTS. By W. Sluckin, B.Sc. (Eng.), B.Sc. (Lond.). Page size 7¼" x 4¼", 320 pages, 165 illustrations. Published by Cleaver-Hume Press Ltd. Price 10/6.

This book—the third volume of the *Cleaver-Hulme Electrical Series*—is intended to cover the basic theory of A.C. work, but because theory by itself is often unpalatable the principles have been related to and illustrated by the common electrical practice. No previous knowledge of A.C. theory is assumed other than some familiarity with Electricity and Magnetism at an elementary level.

The twelve chapters cover Alternating Currents; Vector Representation of Alternating Quantities; Alternating Current Circuits; Electrical Resonance; Polyphase Working; Principles of Transformers; Transformers in Operation; Power Transmission and Distribution; Power Factor Improvements; A.C. Measurements; Alternating Currents and Electronics; Some A.C. Appliances.

The book is rounded off with a series of test questions associated with the 12 chapters. Answers are given to the numerical questions.

RADIO HANDBOOK (13th Edition). Page size 9½" x 6½". 736 pages, fully illustrated. Published by Editors and Engineers, Santa Barbara, California, U.S.A. From R.S.G.B. Headquarters. Price 48/- post free.

This handbook—now in its 13th Edition—is probably the most comprehensive treatise ever offered to the Amateur Radio enthusiast. Its scope is immense, ranging from an Introduction to Radio (Chapter 1) to Radio Mathematics and Calculations (Chapter 29), taking in, along the way, D.C. and A.C. Circuits; Valve Principles; Radio Receiver Fundamentals; Generation of R.F. Energy; A.M.; F.M.; S.S.B.; Transmitter Design; Keying and Control; Radiation; Aerial Systems; Directive Arrays; T.V.I. and B.C.I.; Workshop Practices; Mobile Equipment; Receiving Equipment; Low Power Transmitters; Power Amplifiers; Modulation Equipment; Transmitter Construction; Power Supplies and Measuring Equipment. The book is lavishly illustrated with well-produced line diagrams and half-tone blocks.

We have but one criticism—the price. The average Britisher, who has been caught in the spiral of inflation, will probably think twice before spending 48s. on a book which is only liable to make him long for the day when some of the more interesting equipment described therein can be built up from readily available components. To those with 48s. to spare, R.S.G.B. will be pleased to supply a copy.

ENCYCLOPAEDIA ON CATHODE-RAY OSCILLOSCOPES AND THEIR USES. By Rider and Uslan. Page size 11" x 8½". 982 pages, fully illustrated. Published in Great Britain by Chapman & Hall. Price 75/-.

This mighty tome—it weighs 5½ lb.—is the first attempt to present in one volume a cross section of cathode-ray oscilloscope theory and applications which embraces virtually all the field of activity where this device is used. The volume contains 22 chapters each contributed by an expert in his subject.

The high cost may perhaps militate against the sale of this book to more than a few private individuals in Great Britain, but it will undoubtedly find a place in many technical libraries as well as in Radio Clubrooms where communal facilities exist.

The illustrations are excellent, as is the production.

HISTORY OF THE THEORIES OF AETHER AND ELECTRICITY. By Sir Edmund Whittaker, F.R.S. Page size 9½" x 6", 434 pages. Published by Thomas Nelson & Co., Ltd., Price 32/6.

The book is a sequel to the author's earlier work, *A History of the Theories of Aether and Electricity from the Age of Descartes to the Close of the Nineteenth Century*, published in 1910.

After discussing the theory of the aether up to the time of Newton's death in 1727, the author deals with electric and magnetic science prior to the introduction of the potentials. Reference is then made to the theories put forward by Galvani, Ohm and Faraday and by the great mathematical electricians of the middle of the Nineteenth Century. It is here that we read for the first time of the propositions which ultimately led Maxwell and Hertz to conduct their epoch-making experiments on electro-magnetic fields and electric fields.

In a later chapter an account is given of the discovery of the electron and of the pioneer work of J. J. Thomson on cathode rays. There is a final reference to the electronic theory of metals and thermionics.

Sir Ernest Whittaker's retirement from his professional chair has enabled him to find time to produce for posterity a classic, which will stand the test of time on many scores, but none stronger than that of authenticity.

* * *

Christmas Book

TELEVISION WORKS LIKE THIS. By Jeanne and Robert Bendick. Page size 9½" x 6". 64 pages, profusely illustrated. Published by Phoenix House, Ltd. 8/6.

Here is the ideal Christmas gift book for the up-to-date young person who wants to know all about television—and what youngster doesn't, these days? Liberally illustrated with large drawings and cartoons, the book explains pictorially every phase of television from studio to receiver, the accent being on behind-the-scenes items such as telecine, TV recording, studio and control room activities, caption roller, special camera effects, outside broadcasts, etc. The text is simple and lucid, and covers a great deal of ground without delving into circuit technicalities. *Television Works Like This* would be an attractive addition to any junior bookshelf, and is presumably intended for children of the age group 10 to 15 years.

REPRESENTATION *(Continued from Page 280)*

County Representatives

The following are amendments to the list of County Representatives published in the February, 1950, issue of the R.S.G.B. BULLETIN:—

Region	Town or Area	Name, Call Sign and Address
4	LEICESTERSHIRE	CAPT. V. H. THOMAS (G2CUR), 3 West Avenue, Wigston.
8	KENT (outside London)	W. E. NUTTON (G6NU), 42 Richmond Road, Gillingham.

NEW MEMBERS

The following have been elected to membership:—

Corporate Members (Licensed)

G2DUP L. G. Bacon, 46 Loftus Road, London, W.12.
GI3CSK J. Sturrock, 4 Courtrai Park, Strabane, Co. Tyrone.
G3DLQ J. S. MacAulay, 33 St. Quentin Lines, Catterick Camp, Yorks.
G3FDV S. H. Ledbrooke, 36 Lowther Hill, Forest Hill, London, S.E.23.
G3FLQ F. Robinson, Robinia, Manor Farm, Fish Dam Lane, Carlton, Barnsley, Yorks.
G3FZP H. G. Davidson, 233 Salisbury Avenue, Barking, Essex.
G3GQY G. C. Mowat, 36 Bassingham Road, Wandsworth, London, S.E.18.
G3HGP *J. Blackham, 77 Upper Moss Lane, Manchester 15.
G3HKF *G. R. Singleton, 8 Pendle View, Grindleton, Nr. Clitheroe, Lancs.
G3HKL P. G. Taylor, Room 122, Block 7, 365 S.U., R.A.F. Uetersen, 2 T.A.F., B.A.O.R. 3.
G3HKM D. S. Wigglesworth, The Gables, Mount Pleasant, Cambridge.
G3HNC B. Dyer, 65 Pontefract Road, Ferrybridge, Knottingley, Yorks.
G3HOI H. B. Heath, 6 A.H.Q. (P.), Compton Bassett, Calne, Wilts.
G3HPS G. H. Bedford, 57 Raleigh Hall, Eccleshall, Stafford.
G3HRB J. Coatsworth, 36 Summerhill Road, South Shields, Durham.
G3HRE F. Watson, 2 Posy Row, Etherley, Bishop Auckland, Durham.
G3HSD †C. A. Blizzard, 25 Howard Road, Bristol 3, Glos.
G3HSN T. Preece, 53 Gloucester Avenue, Northampton.
G3HTE P. A. Wilson, 7 Wolstenholm Road, Sheffield 7, Yorks.
G3HTN R. C. Fermor, 7 St. Margaret's Road, St. Leonards on Sea., Sussex.
GM3HTS A. M. Brown, 135 Kings Gate, Aberdeen, Scotland.
G3HTT *W. T. Cheesewoxth, 21 Tower St., Launceston, Cornwall.
G3HUH *Miss V. E. Stent, Orchard Cottage, 34 Laleham Road, Staines, Middlesex.
G3HVM *V. A. W. Male, 85 Common Rise, Walsworth, Hitchin, Herts.
G4WQ J. G. Carlson, 20 Bewick Street, South Shields, Durham.

Corporate Members (Overseas)

DL4XS C. S. Dunning, 1945 A.A.C.S. Square, A.P.O. 57, U.S. Zone of Germany.
VQ3CF H. A. Seaman, 63 Manor Drive, Shelthorpe, Loughborough, Leics.
VS7LB L. H. Blok, 12d Wilson Gardens, Huduhumpola, Kandy, Ceylon.
ZS6BW A. Sachs, P.O. Box 256, Johannesburg, South Africa.

Corporate Members (British Receiving Stations)

1915 †K. G. Jackson, 44 Warwick Road, Bishops Stortford, Herts.
2450 †R. Brand, 5 Leycroft Close, Loughton, Essex.
6619 †S. Bagley, 66 Peveril Road, Sheffield 11, Yorks.
6876 †G. J. Pope, 46 Fioriston Avenue, Hillingdon, Middx.
6966 †J. Burt, 30 Portland Street, Troon, Ayrshire, Scotland.
14536 †A. Hall, 5 Appleton Gate, Newark on Trent, Notts.
15627 †W. P. Dore, Ty Newydd, Groesffordd, Glan Conway, Denbighshire, Wales.
16443 †N. R. Curtis, 10 Hedley Street, Gosforth, Newcastle on Tyne 3.
19322 †N. F. Bounsall, c/o 2 King Edward's Road, Ruislip, Middlesex.
19323 N. Jacobs, 41 Queenborough Gardens, Ilford, Essex.
19324 W. E. Wyatt, 33 Dartford Road, South Shields, Durham.
19325 G. W. Wharram, 8 Park Street, Knowle, Bristol 4.
19326 L. R. Hall, 10 Grafton Avenue, Woodthorpe, Nottingham.
19327 G. G. Stow, 88 Merlin Grove, Beckenham, Kent.
19328 P. J. L. Binns, Officers' Mess, C.D.E.E., Porton, Salisbury, Wilts.
19329 R. E. Shenton, 36 Eastgate Street, Stafford.
19330 R. E. Pitt, 64 Bath Buildings, Montpelier, Bristol 6.
19331 G. Bryce, 27 Dalblair Road, Ayr, Scotland.
19332 W. H. Hughes, 191 Oldfield Road, Coventry.
19333 A. Fearnley, 72 Leeds Road, Shipley, Yorks.
19334 D. D. Deans, 102 Broadlands Avenue, Enfield Highway, Middlesex.
19335 A. C. Emeny, 52 Garrison Lane, Felixstowe, Suffolk.
19336 J. B. Harris, L.R.C.P., 5 London Road, Bicester, Oxon.
19337 A. C. Halliwell, 96 Lyndhurst Road, Hove, Sussex.
19338 J. E. Cox, 138 Kirkwood Road, London, S.E.15.
19339 W. A. Lynn, Sutton-St. James, Nr. Spalding, Lincs.
19340 P. Dawson, 79 Wilsthorpe Road, Long Eaton, Notts.
19341 D. B. Spencer, Flaxley, Whitworth Road, Periton, Minehead, Somerset.
19342 R. V. Willis, 197 Baldwins Lane, Hall Green, Birmingham 28.
19343 G. W. Pragnell, 27 Cleveland Gardens, High Heaton, Newcastle on Tyne 7.
19344 D. Turner, 672 Filton Avenue, Bristol, Glos.
19345 K. A. Fox, 116 Panxworth Road, South Walsham, Norwich.
19346 1812343 Cpl. M. W. Smallwood, Cpls. Club, 4 Wing, 2 R.S., Yatesbury, Nr. Calne, Wilts.
19347 E. C. Morton, 28 Kingsnowe Drive, Bankhead, Rutherglen, Lanarkshire, Scotland
19348 *D. M. Saunders, Glenmore, Monkfrith Way, Southgate, London, N.14.
19349 *J. J. Glass, 16 Wedderburn Drive, Harrogate, Yorks.
19350 *F. T. Hardiman, 12 Carlisle Road, Romford, Essex.
19351 R. Cockcroft, 2 Pictonville, Bradenham Road, High Wycombe, Bucks.
19352 W. K. Wilson, 179 Kingarth Street, Crosshill, Glasgow S.2.
19353 E. Edwards, 32 Lorne Street, Wrexham, N. Wales.
19354 P. C. Hayward, c/o Ploughley Rural District Council, Waverley House, Bicester, Oxon.
19355 P. J. Parsons, Churchford, Little Torrington, N. Devon.
19356 D. E. Conduit, 24 Blinkbonnie Terrace, Slamannan, Scotland.
19357 J. C. Budgen, c/o Manor Farm, East Marden, Chichester, Sussex.
19358 E. G. Robinson, 136 High Road, Beeston, Notts.
19359 R. C. Pearn, 3 Granville Road, Manchester 18, Lancs.
19360 J. Hynd, 27 Victoria Terrace, Dunfermline, Scotland.
19361 R. Todd, 6 Rosewood Street, Belfast, N. Ireland.
19362 T. G. Charlton, 17 Thelwall Lane, Warrington, Lancs.
19363 G. R. Cobb, 114 Clifton Road, Shefford, Beds.
19364 D. F. J. Walmsley, 36 Woodstock Avenue, Isleworth, Middlesex.
19365 J. R. Pamplin, 189 Mortlake Road, Ilford, Essex.
19366 L. Virtue, Glenlyn, Hoopern Avenue, Exeter, Devon.
19367 P. R. Symes, 36 Rope-Walks, Bridport, Dorset.
19368 H. Walker, 3 Northgate Rd., Balornock, Glasgow N.
19369 G. W. P. West, 12 Wishford Road, Wilton, Salisbury, Wilts.
19370 N. R. Smith, 8 Roland Avenue, Holbrooks, Coventry.
19371 B. E. Cook, 19 Recreation Road, Andover, Hants.
19372 R. Thornton, 31 Blakeney Grove, Leeds 10, Yorks.
19373 A. Staddon, Longford Mills, Minchinhampton, Nr. Stroud, Glos.
19374 A. G. Hall, 2 Mount Pleasant, Spring Gardens, Frome, Somerset.
19375 D. G. Chambers, 35 St. Winifred's Avenue, Harrogate, Yorks.
19376 R. H. Saville, 1 Dent Street, Tindale Crescent, Bishop Auckland, Co. Durham.
19377 *H. J. George, 167 Cambridge Street, Rugby, Warks.
19378 *A. H. Jenkins, 3 Barton Street, Barton Hills, Bristol 5.
19379 H. G. Lassman, 75 Farleigh Road, Stoke Newington, London, N.16.

Associates and Junior Associates

†W. G. Ashley, 42 Topham Square, Risley Avenue, Tottenham, London, N.17.
S. Babbs, 28 Grove Lane, Kingston on Thames, Surrey.
A. R. Cooke, 17 Belper Road, West Hallam, Derby.
†H. Davies, 2 Boundary Street, Rochdale, Lancs.
A. T. W. Field, Sunnihart, The Hart, Farnham, Surrey.
L. Hamilton, Halls Land, Cochno Road, Hardgate, By Clydebank, Glasgow, Scotland.
J. R. S. Innes, P.O. Box 7, Takoradi, Gold Coast, W. Africa.
R. E. Norman, 143 Hurst Road, Smethwick, Staffs.
P. C. Knight, 65 Suez Road, Cambridge.
†J. K. Nettell, Vernmal, Post Office Lane, St. Ives, Ringwood, Hants
W. Park, 1 Atholl Crescent, Perth, Scotland.
H. E. Payne, 52 Bullhead Road, Borehamwood, Herts.
D. A. Pedder, 69 Marmion Road, Portsmouth, Hants.
G. Rengasamy, 138 Serangon Road, Singapore 8, Singapore.
R. A. Richardson, 227 Harbottle Street, Byker, Newcastle on Tyne 6.
V. W. R. C. Lionheart-Richardson, 213 Minkwood Road, Herne Hill, London, S.E.24
D. M. Roylands, 3 Newbury Parade, Newbury Park, Ilford, Essex.
A. D. Stewart, Broomfield, Fixby, Huddersfield, Yorks.
R. C. Taylor, 169 Wickham Chase, West Wickham, Kent.
J. H. R. Thornhill, 184 Clarence Gate Gardens, London, N.W.1.
R. F. Warren, 84 Chiltern Drive, Surbiton, Surrey.
N. Wilkinson, The Lodge, Brandon Colliery, Durham.
J. F. Winstanley, 222 Revidge Road, Blackburn, Lancs.

* Denotes transfer from Associate Grade.
† Denotes re-elected.