R.S.G.B Bulletin

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EDITOR: JOHN CLARRICOATS, O.B.E., J.P., G6CL
ASSISTANT EDITOR: JOHN A. ROUSE, G2AHL
EDITORIAL OFFICE: RADIO SOCIETY OF GREAT BRITAIN
28 LITTLE RUSSELL STREET, LONDON, W.C.1
Telephone: HOLborn 7373

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Current Comment

Stresa 1956

FOR six days during June, delegates from the I.A.R.U. Societies in Region I (Europe) will be meeting in Stresa, Italy, for their second Triennial Conference.

On Tuesday, June 12, the International Committee, consisting of its Chairman, Captain Per-Anders Kinnman (SM2ZD), Vice-Chairman, W. J. L. Dalmijn (PA0DD), Hon. Secretary, Arthur Milne (G2MI), Hon. Treasurer, John Clarricoats (G6CL), R.S.G.B. President, Reg. Hammans (G2IG) and Harry Laett (HB9GA), will meet to discuss Conference arrangements and any last minute business which may require attention. The official opening of the Conference will take place at 4 p.m. that day.

The following two days will be taken up with an opening Plenary Assembly and meetings of the Administrative and Technical Committees with a final Plenary on Saturday, June 16. Although there are no scheduled meetings for the Friday, the Secretariat and probably some ad hoc committees will be hard at it preparing the documents for the final Plenary Assembly.

One may well ask, "Why all this bustle and activity? Why send delegates half across Europe? What do we stand to gain?" The answer can be given in a few words: Greater certainty that our Amateur Radio privileges will remain unimpaired in the years to come.

At the Atlantic City I.T.U. Conference in 1947, Amateur Radio suffered severely (despite the heroic efforts of the lone R.S.G.B. delegation who virtually carried the flag of I.A.R.U.) because many Government delegates from European countries had no knowledge of Amateur Radio and some were actually hostile. When each country, whatever its size or importance has only one vote, the results for us might well be disastrous.

When the French Society, R.E.F., convened the 25th Anniversary meeting of I.A.R.U. in Paris six years ago, there was almost no contact between the Region I Societies and many of them had little or no liaison with their Administrations.

At the I.A.R.U. Conference in Lausanne during 1953, the work done in Paris was consolidated and the Region I Division of I.A.R.U. was put on a sound basis. As a result of that meeting an excellent contact was established between the I.A.R.U. Societies in Region I and they, in turn have greatly improved their relations with their own licence issuing authorities.

The Stresa Conference will consider, and is expected to give final approval to, a Constitution for the Region I Division. In addition, a number of important matters, intimately concerned with our day-to-day activity on the air will be discussed; for example, intruders in the amateur bands, band occupancy, v.h.f. developments and TVI, will be considered by the Technical Committee, whilst the Administrative Committee will deal with the proper representation of Region I at the next I.T.U. Conference and, if necessary, I.A.R.U. participation at the C.C.I.R. meeting later this year in Warsaw, licence conditions and reciprocal licence agreements, etc. There will be plenty of work to do! These Conferences cannot, by any stretch of the imagination, be classed as "Trips for the Boys"! They call for solid hard work, usually extending long after the actual formal meetings have closed for the day. They do not make any dramatic decisions which immediately bring some concrete advantage. Their effect is much more subtle than this but none the less important. The fact that I.A.R.U. Headquarters Secretary, Mr. A. L. Budlong, who is also Managing Secretary of the A.R.R.L., together with Mr. John Huntoon, Assistant Secretary, A.R.R.L., have expressed their intention of making the journey from the United States in order to attend, should, we feel be its own comment on the importance of this great International "Get-together" in Stresa—*A.O.M.*

Bless Those Sun Spots!

TEN metres wide open, the Americans coming in three to a channel, and every one of them S9! That's how it was eight to ten years ago. A sobering thought is that many thousands of present-day licensed amateurs have never experienced such conditions as there were then, and as indeed there will be in the very near future.

When Raymond Lyttleton, in his recent memorable series of television talks about astronomy, gave a description of sun spot cycles, every radio amateur who knows the effect they have on conditions, must have rubbed his hands, at least metaphorically, with pleasure. Not only did Mr. Lyttleton show very recent photographs of the sun in a satisfying degree of spottiness, but he exhibited a number of charts showing the regular procession of eleven-year sun spot cycles since methodical observation began.

There they were, those great years of world-wide DX, generally coming in with a rush and tailing off slowly to the trough of poor conditions from which Amateur Radio has been suffering for the last five or six years.

Already the sun spot effected improvement in conditions is manifest in sundry ways. A big rise in the turnover of QSL cards through the Bureau is reported. Many amateurs who dropped out of the hobby, discouraged by poor conditions, are coming back into it; many a licence is being withdrawn from cold storage. And it is even rumoured that surreptitious brushing up of Morse code proficiency is going on in quarters where the dust had gathered rather thickly!

It certainly looks as though many gardens will remain untilled this year! —*J. H.*

Transmission-Line Tuned Tank Circuits

By A. L. MYNETT, B.Sc. (G3HBW)*

At very high and ultra high frequencies the conventional condenser-and-coil tank circuit becomes unreasonably small and it is necessary to employ other types of resonant circuit. Even at frequencies as low as 144 Mc/s the alternative arrangements are more efficient. The average amateur's difficulty generally lies in the design of such circuits but in this article the author has reduced the complicated mathematical work normally involved to a set of simple curves. His lucid explanations should prove of great value to all v.h.f. and u.h.f. workers.

WHEN power is to be coupled into or out of a valve stage at a radio frequency it is usually necessary to use some form of resonant "tank" circuit.

This comes about because the output impedance of a valve stage (at low radio frequencies anyway) "looks like" a capacitance in parallel with a resistance. The capacitance is of course the output capacitance of the valve and holder and the resistance is its so-called "a.c. plate resistance." The magnitude X_c of the reactance of the capacitance is given by:—

$$X_c = \frac{1}{2\pi fC}$$

A typical case would be a valve with an output capacitance of 20$\mu\mu$F and an output resistance of 50,000 ohms. At 144 Mc/s the reactance of the capacitance would have a magnitude of about 55 ohms and this would obviously exert a serious "shunting-effect" on the output resistance of 50,000 ohms. Any radio-frequency voltage appearing across the combination would cause very heavy "reactive" currents to flow in the output circuit and, consequently, the voltage would remain low (Fig. 1 (*a*)).

If an inductance is connected in parallel with the combination of resistance and capacitance and it is arranged that the magnitude of the reactance of the inductance is equal to that of the capacitance the heavy currents are confined to the LC loop and the shunting effect on the resistive part is removed (Fig. 1 (*b*)).

Other Advantages of the "Tank" Circuit

There are other reasons why such a tank circuit is used. They are:—

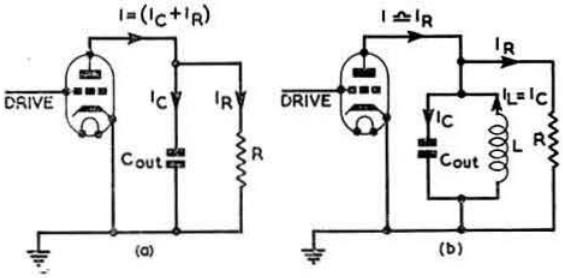


Fig. 1. (a) Currents in output circuit without resonant tank. (b) Currents in output circuit with resonant tank.

*52 The Rutts, Bushey Heath, Herts.

1. The tuned circuit can be used very conveniently as a matching transformer to make the resistance reflected by the load back into the valve circuit equal to the output resistance of the valve thus matching the valve circuit to the load. This is done either by tapping the valve or load down the tuned circuit or by coupling another similar tuned circuit to it.
2. To reduce the output of power at unwanted frequencies. If an appreciable r.f. voltage is allowed to build up at an electrode of the valve at frequencies other than the one required, for example, at harmonic frequencies of the drive, the output at the wanted frequency is usually reduced.

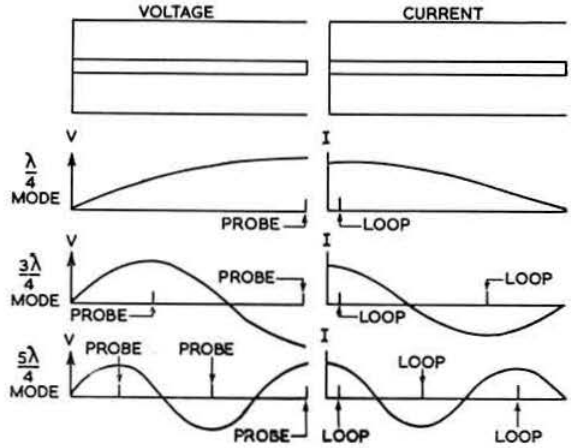


Fig. 2. Voltage and current in a co-axial resonator operating in various modes.

Fields in Transmission-Line Resonators

A transmission line, as far as the amateur is concerned, can be of three main types, viz., parallel wire, co-axial and radial. The first two are well known but the radial type is perhaps less familiar, although very useful. It consists of a pair of parallel equal discs completely overlapping one another.

If a short circuit is put across the end of a transmission line it is found that, when r.f. power at certain frequencies is coupled into the open end, a standing wave system is set up and the line becomes resonant, just like a parallel-tuned LC circuit. Waves travel from the open end, are totally reflected back at the short circuit towards the input end and there are reflected again so as to be in phase with the original waves. In the case of the radial line the short circuit takes the form of a cylinder surrounding the discs, energy being fed in at the centre. The waves travel outwards along the radius, are reflected at the cylindrical wall, and then travel inwards again along the radius, hence the term "radial" line.

The interference between the sets of waves travelling in opposite directions causes permanent points of high and low voltage and current to be found on the line, points of high current being at the shorted end and high voltage at the open end. These features are made clear for all types of line in Fig. 2.

Transmission Lines as Tank Circuits

At low frequencies it is usual to employ a coil and variable condenser in parallel to effect this "tuning-out" of valve capacitance but at v.h.f. the necessary components become too small in size to manage and some other device has to be found especially as, due to lead length, the major part of the tuned circuit retreats inside the valve envelope.

A section of transmission line (parallel-wire, co-axial or even radial) forms an excellent substitute. Such a section of parallel-wire or co-axial line, less than one-quarter of a wavelength long and shorted at the far end, "looks like" a particular value of inductance at one frequency but, unlike a coil, this value changes quite rapidly with frequency and, in fact, at much higher frequencies, the reactance of the line becomes capacitative. This comes about because sections of line shorted at one end and between a quarter- and a half-wavelength long, approximately, present a capacitative reactance at their open ends. Hence at much higher frequencies and consequently shorter wavelengths than those at which the line is less than one quarter-wavelength long, the reactance of the line becomes capacitative because the line becomes longer than one-quarter wavelength at these higher frequencies.

It is possible to tap on to the line or couple another to it for matching purposes, and a transmission line usually possesses the advantage over comparable coils and condensers that it can more easily handle the high r.f. currents and voltages that often appear in a resonant matching system.

Tuning of the line can be carried out by varying the position of the short circuit with a movable shorting-bar or bridge or by a variable capacitance at the open end. It should perhaps be pointed out that transmission-line resonators can be used in higher modes than the quarter-wave one described, with more than one voltage node on the line as shown in Fig. 2. This increases the Q of the circuit a good deal but the bandwidth is reduced, because of energy stored in the unloaded portions of the line between voltage nodes. This does not usually trouble the amateur unduly except possibly for the requirements of Amateur Television.

Higher order modes than the first should be used with caution, however. For instance, consider a disc seal triode being used as a power-tripler final from 144 to 432 Mc/s. The output circuit might apparently be arranged to resonate in a three-quarter wavelength mode. However, a little reflection will make it clear that this might well be rather near the quarter-wave mode resonance at the drive frequency, in which case large 144 Mc/s r.f. voltages would appear at the valve anode, particularly as very little power is being taken from the anode circuit at that frequency, causing severe radiation at drive frequency and, even worse perhaps, a reduction in tripler efficiency. The stage might even go into self-oscillation at drive frequency.

If it were essential, for some reason, to use a mode higher than the quarter-wave in the output circuit, the five-quarter wavelength mode would have to be used, although the line might be found rather cumbersome, being over two feet long!

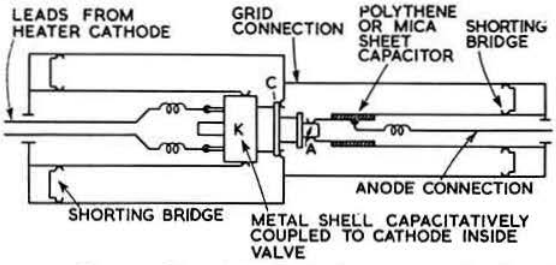


Fig. 3. Common-grid earthed grid circuit arrangement for disc-seal triodes (ACT22, 446A, 2C40, etc.).

Coupling to the Transmission-Line—Valve Coupling.

Coupling to the line tank circuit as far as the valve is concerned is normally just a matter of connecting the valve electrodes across the open end of the line using suitable isolating condensers where necessary.

For instance, when coupling a co-axial circuit to a disc-seal triode grid and anode so that it may be used in a conventional common-grid circuit, the arrangement shown in Fig. 3 might be used for that particular type of disc-seal triode. If the anode connector were of larger diameter than the grid connector as occurs in most air-blast cooled valves, the arrangement of Fig. 4, with the output circuit "folded-back" over the input circuit,

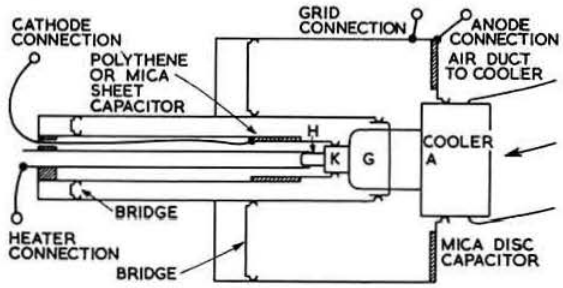


Fig. 4. Common-grid earthed-anode circuit arrangement for disc-seal triodes.

would be more suitable. The same applies to disc-seal tetrodes, the control grid being replaced by the screen-grid in the diagrams.

The other most common type of valve available to amateurs for high-frequency work is the all-glass type with two similar valves in the same envelope and a multi-pin base, e.g. the well-known TT15, 832, 829B (TT18), QQV03/20 and QQV03/20A, QQV06/40 and QQV06/40A, QQV03/10, etc. These are obviously intended to be used with both halves in push-pull and a parallel-wire type of tank circuit is most suitable. This has the advantage that isolating condensers are usually unnecessary as pairs of similar electrodes will be operated at the same d.c. potential. It is best, when using these valves at the highest frequencies, to return only the cathode pin to earth, making supply connections to the other electrodes either directly through chokes or by attaching chokes to the mid-points of the shorting-bars on the transmission lines (Fig. 5).

The parallel-wire lines may be screened to reduce radiation from them to increase their efficiency and

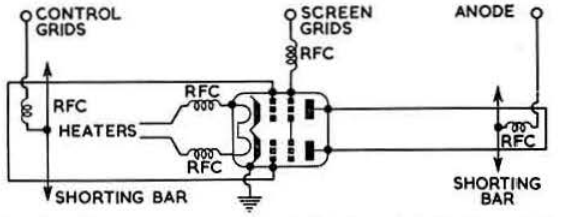


Fig. 5. Circuit arrangements for double beam tetrodes in a single envelope.

reduce strong local r.f. fields but the shield diameter should be made at least twice the distance between the conductors of the line so that it is well clear of them.

Output and Input Coupling

The coupling of power into or out of a transmission line across which a valve is connected can be done either by disturbing the magnetic field component which exists mainly near the shorted end, or the electric field component at the open end of the line.

To couple a feeder into the magnetic field of an open-wire tank circuit a loop of wire is used running parallel to and close to the conductors near the shorted end (Fig. 6 (*a*)). The loop may be either semi-aperiodic or tuned to resonance at the operating frequency with a capacitor or by making it more than a quarter-wave long and using a shorting-bar. In the case of the tuned loop, it can be placed further away from the tank than an aperiodic loop, the feeder being tapped down it to avoid over-damping (Fig. 6 (*b*)).

To couple into the magnetic field of a co-axial line a loop is used running parallel to the axis of the line and with its plane passing through the axis. It is normal practice to use a co-axial feeder with a co-axial tank and such a feeder can conveniently be connected to the loop as shown in Fig. 6 (*c*). For matching, either a two stub transformer may be used or the coupling between loop and line varied by rotating the loop and varying its depth of penetration into the line. The latter methods of varying the loop position require a little mechanical ingenuity to put them into practice but an adjustable loop is easier to make than a two co-axial-stub transformer.

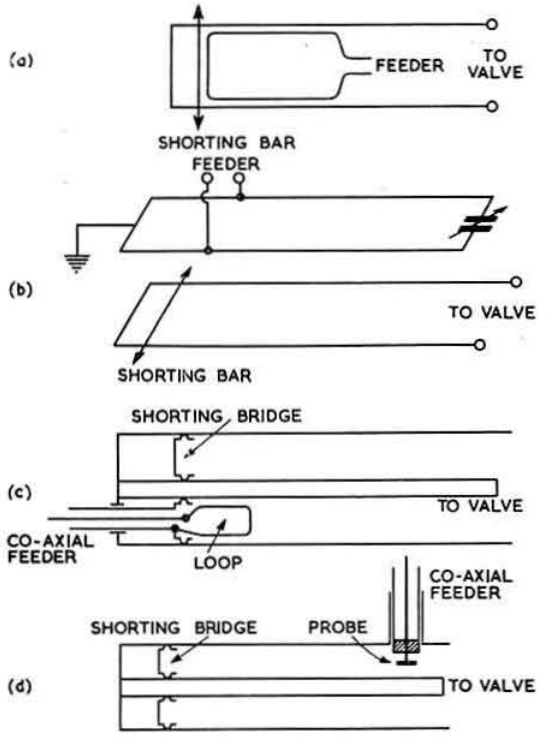


Fig. 6. Diagrams illustrating methods of coupling to line resonators. (a) Semi-aperiodic loop coupling to parallel-wire line. (b) Tuned loop coupling to parallel-wire line. (c) Loop coupling to co-axial line. (d) Probe coupling to co-axial line.

When coupling into the electric field of a co-axial line a "probe" is used near the open end where the voltage is greatest. The "probe" is really a small aerial which, because of its shape, small size and position in the line, responds much more to the electric field than it does to the magnetic field. In practice, the inner conductor of the feeding co-axial line is allowed to protrude through the outer of the resonant line a variable amount so that it is capacitively coupled to the electric field in the line. A small circular metal plate is often fixed to the end of the probe to increase its capacitance to the field if tight enough coupling cannot be obtained without it. Needless to say, the coupling increases with the penetration of the probe into the line which is usually accomplished in practice by using, for the end of the outer of the feeding co-axial line, two telescopic tubes sliding inside one another as indicated in Fig. 6 (*d*).

In general it can be said that it is easier to couple tightly into a co-axial tank circuit with a loop than with a probe, but the probe is simpler to make than an adjustable loop and less likely to cause trouble by resonances of its own. It is, however, easier to feed a balanced feeder with a loop than with a probe.

Further possibilities include feeding a parallel-wire tank from a balanced feeder with a pair of probes near the high-voltage end of the tank and feeding by tapping the feeder directly on to the tank circuit inner conductor. The latter method can only be used when feeding a parallel-wire line from a balanced feeder or a co-axial line from a co-axial feeder unless a "balun" is incorporated somewhere.

These arrangements are rarely satisfactory in practice and descriptions of them are only included for the sake of completeness.

Design of Transmission-Line Resonators

Methods will now be outlined by which line tank circuits may be designed, in the case of parallel-wire and co-axial types. Design methods for radial line resonators are somewhat more complicated and a very full treatment may be found in *Fields and Waves in Modern Radio* by S. Ramo and J. R. Whinnery. This work contains all the necessary graphs and a great deal of other very useful information about transmission lines in general, and is thoroughly recommended.

When designing a resonator to be used as a tank circuit one requires to know first, of course, how long to make the lines. The resonant frequency of a capacitatively loaded shorted line, open-wire or co-axial is given by the following well-known expression:—

$$\frac{1}{2\pi fC} = Z_o \tan \frac{2\pi l}{\lambda}$$

where f *is the frequency*
C *is the loading capacity*
λ *is the wavelength*
l *is the line length*
Z_o *is the characteristic impedance of the line.*

The characteristic impedance is given by:—

$$Z_o = 138 \log_{10} \frac{R_1}{R_2}$$

for a co-axial line with inside radius of the outer R_1 and outside radius of the inner conductor R_2

or $$Z_o = 276 \log_{10} \frac{2D}{d}$$

for an open-wire line with conductor diameter d and centre-to-centre spacing D.

The reader need not be unduly frightened by these expressions as the results have been put by the writer in the form of a simple set of curves (Fig. 7), based in part upon the graph in the article "Design of Trans-

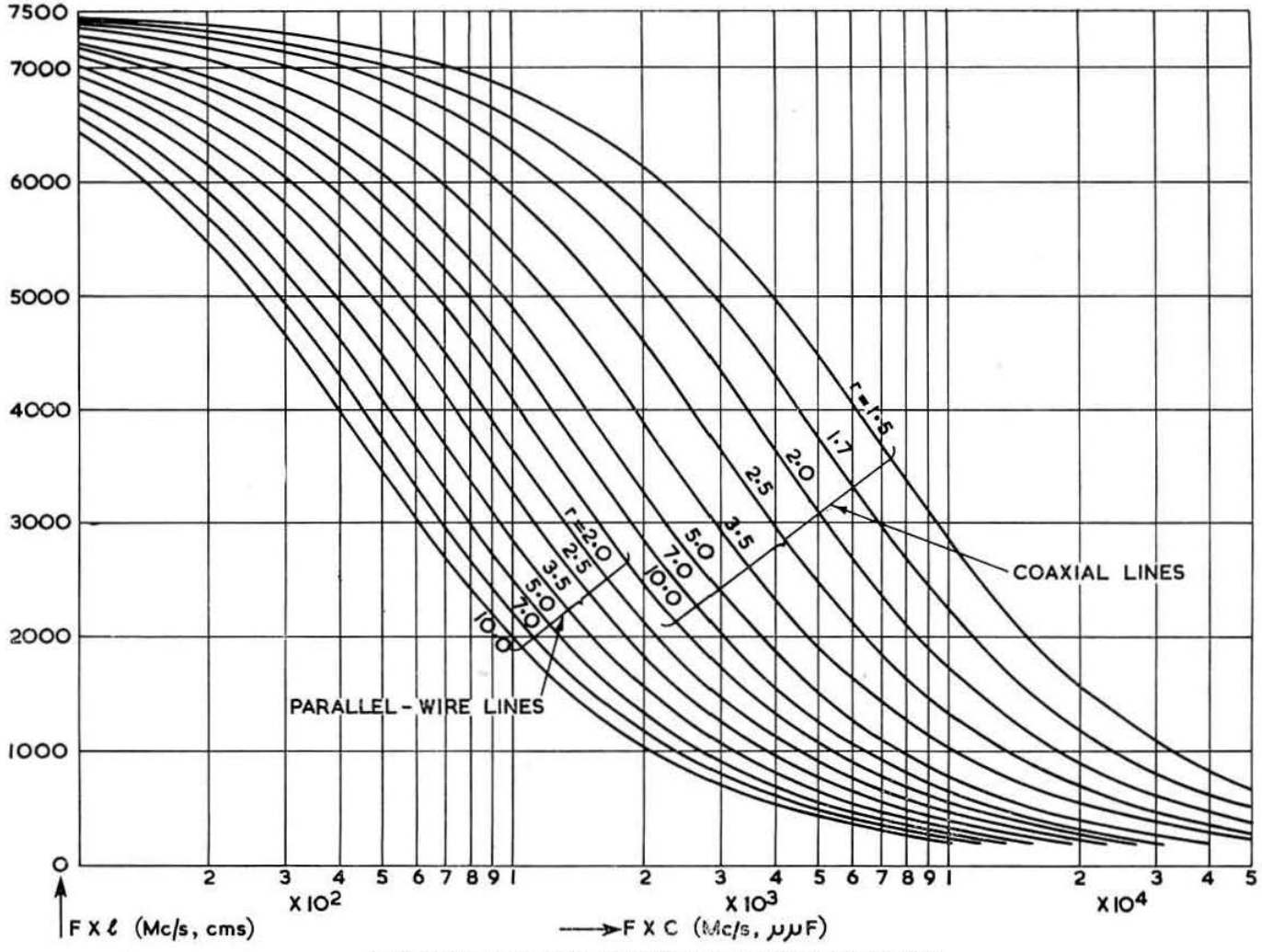


Fig. 7. Resonance curves for capacitatively-loaded transmission-line resonators.

mission-Line Tank Circuits" by Walter C. Hollis which appeared in *Electronics* for May, 1947.

In the graphs, fl has been plotted against fC for different values of Z_o, the symbols having the same significance as before, with f in Mc/s, C in $\mu\mu$F and l in centimetres.

In the case of co-axial lines (the right-hand set of curves) r is the ratio of conductor diameters or radii and for open-wire lines (the left-hand set of curves) r is the ratio of centre-to-centre spacing to conductor diameter.

The following examples should make the use of the graphs quite clear:—

Example (1).

How long must a shorted parallel-wire line of conductor diameter 0.3in. and centre-to-centre spacing 1.5in. be made to resonate at 435 Mc/s, with an end-loading capacitance of 2$\mu\mu$F (the approximate output capacitance, in practice, of a QQV03/20 push-pull arrangement)?

First, work out $f \times C$, in Mc/s and $\mu\mu$F.

$$fC = 435 \times 2$$
$$= 870$$
$$= 8.7 \times 10^2.$$

The ratio, r, of line spacing to diameter is:—

$$r = \frac{1.5}{0.3}$$
$$= 5.0$$

Then, using the curved marked "parallel-wire lines," $r = 5.0$in. project upwards from 8.7×10^2 on the horizontal "$f \times C$" scale to the graph and project across from the point on the graph so found to the vertical "$f \times l$" scale, obtaining:—

$$fl = 2800$$

therefore

$$l = \frac{2800}{435}$$
$$= 6.45 \text{ cm approximately.}$$

The anode pins would obviously absorb quite a good deal of this line length but, if the lines were made 6 cm long, with an adjustable shorting-bar one would be certain that they were long enough.

Example (2).

A transmission line consisting of a pair of 10 s.w.g. copper wires spaced one inch apart and 10 cm long is to be used as part of the anode tank circuit of a TT15 or QQV06/40 p.a. at 145 Mc/s. How much extra capacitance must be added at the valve end of the line to accomplish this?

For a pair of wires approximately $\frac{1}{8}$in. in diameter spaced 1in. r is about 8. Also $f \times l$ is equal to 145 x 10, i.e. 1450. Estimating the position of the "$r = 8$" curve for a parallel-wire line between "$r = 10$" and "$r = 7$," $f \times C$ is found to be about 1.55×10^3, i.e. 1550. Hence the total capacity C required is given by

$$145 \times C = 1550$$
$$C = 1550 \div 145$$
$$= 10.7 \ \mu\mu\text{F}$$

Now the output capacitance of a TT15 or QQV06/40 push-pull stage is around 4$\mu\mu$F in practice, so about 7$\mu\mu$F are required in addition. A 25 + 25$\mu\mu$F split stator condenser should therefore be quite satisfactory giving 12 to 15 $\mu\mu$F extra when "full-in."

Example (3).

A co-axial line with outer and inner radii of 5.0 and 2.0 cm, respectively, is to be used as the resonant tank circuit (short-circuited at one end of course) for a 4X150A power amplifier on the 70 cm c.c. amateur band. What length of line is required?

In this case:—

$$f \times C = 435 \times 4.6$$
$$= 2001.$$

Using the "$r = 2.5$" curve for co-axial lines,

$$f \times l = 4{,}620$$

Hence

$$l = 4{,}620 \div 435$$
$$= 10.6 \text{ cm approximately.}$$

This length would include the length of the anode and cooler of the 4X150A of course but, as in Example (1), a line 10 cm long would be certain to be long enough, especially as the output capacity used in the calculations is that quoted by the manufacturers for the valve, the effective capacity being somewhat greater in practical circuits.

A shorting bridge would be the best method of tuning the line to resonance.

The quickness and convenience of this method of calculating resonant lengths can perhaps only be appreciated by those who have done it several times by the conventional method!

Designing for Maximum Unloaded Q

The tank circuit efficiency is given by:—

$$\text{Efficiency} = \frac{\textit{unloaded } Q - \textit{loaded } Q}{\textit{unloaded } Q} \times 100\%.$$

It is obvious that the highest possible unloaded Q is needed to get the greatest tank circuit efficiency. The Q is greater for radial and co-axial resonators than for comparable parallel-wire circuits and the former types should always be used where possible. It should perhaps be explained that "unloaded Q" is the Q of the tank circuit with the valve in position and all voltages and drive power applied, but with no load coupled up to it. The "loaded Q" is, of course, that measured when the load is correctly coupled to the tank circuit.

For parallel-wire lines, unshielded, the unloaded Q is usually quite low because of power loss by radiation from the line and the best value is obtained by using a small conductor spacing.

To obtain the best Q, the material of the line should be copper or brass fairly smoothly finished, although a highly polished surface is not necessary. To improve its conductivity, the surface of a co-axial or radial line can be silver plated. However, if one lives in an industrial or city atmosphere, the silver plating is rapidly attacked by atmospheric gases and the surface conductivity suffers far more than does that of a copper or brass line. The best solution is to apply a "flash" of rhodium to the silver plating but this is rarely possible for the amateur. It is quite satisfactory to seal off the line as an alternative.

The Q of a co-axial line depends also upon the ratio of conductor diameters and, for fairly heavily capacitatively loaded resonators, which is true in most practical cases, this ratio should be between about 3 and 4.5 to 1.

Care should be taken that the moving contacts on the bridge (if one is used) are irreproachable and they should preferably make contact with the line a little way away from the shorting disc, where the line impedance is somewhat higher than at the current antinode. It is better to use a large number of springy contact fingers rather than to use a few relatively rigid ones.

Attention to these points will often make all the difference between a reliable, satisfactory resonant circuit of high Q and one which possesses none of these qualities.

Resistance Capacitance Bridge for the Amateur

Economical Mains-operated Design

By A. H. KOSTER, Dr. Ing. (G3ECA)*

THE importance of knowing, with reasonable accuracy, the condition and the values of components used in any kind of electronic equipment need hardly be stressed. In the amateur workshop means for measuring resistances are more frequently found than capacity meters. The reasons are that resistance measurements are much easier to make and that many commercial multi-range test-meters incorporate facilities for such measurements. Nevertheless, if such instruments are to cover a wide range of resistance values, they frequently require adaptors which add to the price. Some instruments incorporate means for measuring fairly large capacities, but not small ones. A separate piece of equipment whose sole purpose it is to measure resistances and capacities over a wide range of values is therefore very useful.

The Circuit

The possibility of utilizing the magic-eye as a sensitive indicator for balancing bridges has been recognized by manufacturers of various types of bridges and by the amateur almost right from its introduction. Perhaps the most widespread publicity in amateur circles was given to it by Hay[1] and Scroggie[2]. Early circuits for resistance-capacity bridges called for transformers with a separate winding of 50 to 150 volts to operate the bridge in addition to the normal h.t. and heater windings. Later circuits applied lower voltages to the bridge and inserted an a.f. amplifier between bridge and magic-eye. Although the latter may seem the more complicated way it has a number of advantages from the amateur's point of view.

The amateur will want to measure capacity from a few micro-micro-Farads to several micro-Farads. This is a range of at least a million to one. As the circuit (Fig. 1) reveals, ordinary 50c/s a.c. is applied to the bridge; the impedance which a 10$\mu\mu$F condenser offers at that frequency is 318.6 Megohms. In order to detect whether or not current is flowing through an impedance of that order either a high voltage is necessary to operate the bridge or a sensitive detector. At 10μF the impedance is only 318.6 ohms and a low voltage and almost any detector is satisfactory. A low voltage and an a.f. amplifier with adjustable sensitivity is thus a solution which meets both cases. Since almost any pentode can be used it is also the cheapest.

The bridge voltage is taken from the heater winding, hence a small standard mains transformer with a 6.3 volt heater winding and an h.t. winding of any value between say 200 and 350 volts at 5 mA is suitable. If a metal rectifier is used for the h.t., the transformer need not have a rectifier heater winding.

Some R/C bridges have two scales on the dial, one for resistance and one for capacity. On closer inspection it will be seen that these scales are identical but reversed, which at times is confusing. This can be avoided by providing separate test terminals for resistors and condensers. Alternatively, provision can be made to reverse the connections to the balancing potentiometer so that the same scale and the same pair of terminals can be used. This latter feature has been incorporated in the bridge described here.

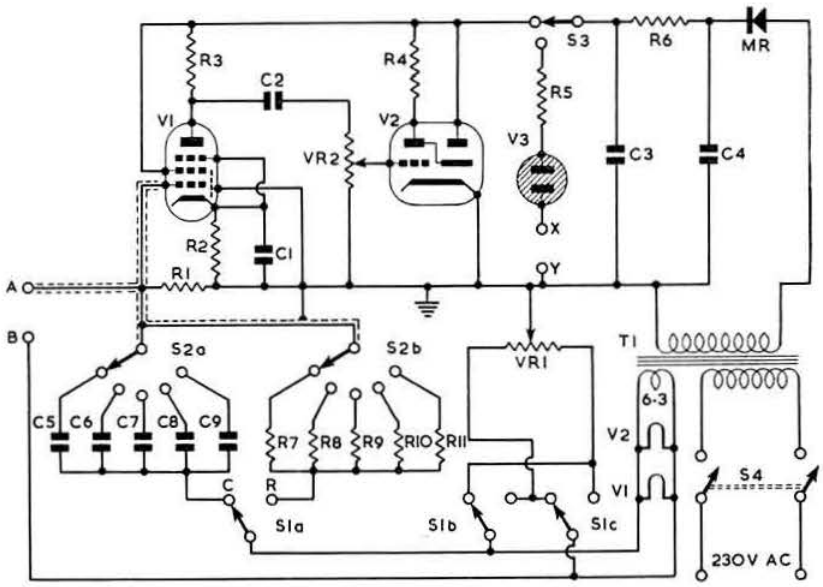


Fig. 1. Circuit diagram of the mains operated resistance capacitance bridge.

C1, 20μF 25V wkg.
C2, 0.1μF.
C3, 16μF 350V wkg.
C4, 8μF 350V wkg.
C5, 100$\mu\mu$F $\pm$ 1%.
C6, 0.001μF $\pm$ 1%.
C7, 0.01μF $\pm$ 1%.
C8, 0.1μF $\pm$ 1%.
C9, 1μF $\pm$ 5%.
MR, Brimar DRM1 rectifier.
R1, 1 Megohm ½ watt.
R2, 5,000 ohms ½ watt.
R3, 100,000 ohms ½ watt.
R4, 10 Megohms ½ watt.
R5, 40,000 ohms 1 watt.
R6, 5,000 ohms 1 watt.
R7, 100 ohms $\pm$ 1% ½ watt.
R8, 1,000 ohms $\pm$ 1% ½ watt.
R9, 10,000 ohms $\pm$ 1% ½ watt.
R10, 100,000 ohms $\pm$ 1% ½ watt.
R11, 1 Megohm $\pm$ 1% ½ watt.
S1a, b, c, 2-way 3-pole Yaxley type switch.
S2a, b, 5-way 2-pole Yaxley type switch, preferably ceramic.
S3, s.p.d.t. toggle.
S4, d.p.s.t. toggle.
T1, 0-220V 5 mA or more, 6.3V 1.5A.
V1, VR65.
V2, 6U5G.
V3, Neon type 10E/223.
VR1, 5,000 ohms Berco type M-20, 3½in. diameter.
VR2, 1 Megohm.
A, B, X, Y, are instrument type terminals mounted as described in the text.

*195 Woodford Avenue, Ilford, Essex

The range switch S1a, b, is a 2-pole 5-way Yaxley-type using one bank for the resistor standards and the other for the capacitors. This in conjunction with the previous points reduces the number of switches, scales and terminals to a minimum, thus making for economy, simplicity and freedom from error. Close tolerance components for the standards are readily and cheaply available. The 1μF condenser may be a little more difficult, but once the bridge is working on the 0.1μF range it can be used to select a suitable 1μF component.

Calibrating the Bridge

The prospective constructor of a bridge is frequently confronted with the difficult question of calibrating the scale. The usual suggestion is to use a decade-box. The blunt facts are that if he has a decade-box he is in an enviable position and does not need the piece of gear under discussion. The alternative advice to borrow a decade-box from a neighbouring amateur usually results in the discovery that such a person is practically non-existent! Fortunately, it is not necessary to go to such lengths since the sub-divisions of the scale can be readily calculated to an accuracy which is quite sufficient for most amateur purposes; if anyone does need a greater accuracy for some unusual purpose it will be necessary to buy a few standards, which by the way can be picked up occasionally on the surplus market.

The balancing potentiometer VR1 is a 3¼in. diameter type. It has a very evenly wound resistance element and the standard angle of rotation is 309°. The absolute value in ohms is of no importance to the calibration. It may be anywhere between say 100 ohms and 10,000 ohms. The lowest permissible figure is fixed by the load it will place on the heater winding and by the amount of heating which takes place inside the potentiometer. The highest value is dependent on the valves V1 and V2, as the heaters are earthed through the slider of VR1. The maximum resistance between heater and earth for a given potentiometer is half its value. If this resistance is excessive hum will appear on the cathodes of the valves and will blur the magic-eye. For the VR65 this occurs if VR1 exceeds 10,000 ohms.

Table I

r	α	r	α
.01	29	1.1	187½
.02	31½	1.2	194
.04	37½	1.3	200½
.06	43	1.4	205½
.08	48½	1.5	211
		1.6	215½
.10	53½	1.7	220
.12	58½	1.8	224
.14	63½	1.9	228
.16	68	2.0	231½
.18	72½		
.20	77	2.2	238
		2.4	243½
.25	87	2.6	248½
.30	97	2.8	253
.35	105½	3.0	257
.40	114	3.5	266
.45	121	4.0	272½
.50	128	4.5	278½
.55	135	5.0	282½
.60	141½	6.0	290½
.65	147	7.0	296
.70	153	8.0	300½
.75	158	9.0	303½
.80	163	10.0	306½
.85	167½		
.90	172	12.0	311
.95	176	14.0	313½
1.00	180	16.0	316
		18.0	318
		20.0	320
		30.0	323½
		50.0	327½
		100.0	331½

The absolute value of VR1 does not appear in the calibration equation and all we need to know is that the angle of rotation is 309°. All the points on the scale can be calculated from

$$\alpha = \frac{r}{1 + r} \times 309 + 25.5$$

where α is the angle and r is any figure between 0.01 and 100 which appears on the scale. The angles for all the necessary values have been worked out and are shown in Table I. The example $\alpha = 77°$ for $r = 0.2$ is shown in Fig. 2 which also gives a complete picture of the scale.

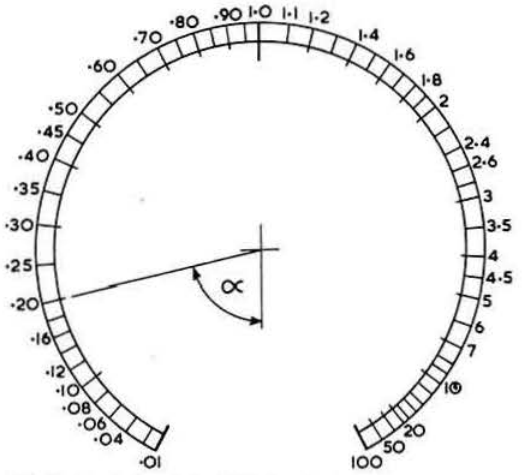


Fig. 2. Typical scale for VR1 showing how α is measured.

Operation

The range chosen by the switch has to be multiplied by the figure on the scale, e.g. for the 10,000 ohm range 0.1 represents 1,000 ohms and 10 represents 100,000 ohms. Normally values between 0.1 and 10 only are used. The lower extreme end of the scale is used on the 100$\mu\mu$F/100 ohm range for capacities below 10$\mu\mu$F and for resistances smaller than 10 ohms. The upper extreme end is used on the 1μF/1 Megohm range for capacities greater than 10μF and resistors greater than 10 Megohms.

Assuming a condenser of, say, 0.02μF is to be measured, it is connected to the terminals A and B, switch S1 is turned to position "C" and S2 to position 0.01μF/10k, i.e. C7/R9. An a.c. voltage then appears across R1 and is amplified by V1 before being fed to the grid of the magic-eye V2 which will close. Since a.c. and not d.c. is fed to V2 those parts of the green eye which lie between fully open and fully closed will be at half brilliance. It would be quite a simple matter to rectify the a.c. before feeding it to V2 but this is not done because the two shades of green are an essential aid to finding the precise point of balance. When turning VR1 a point will be found where the eye opens. This will occur at or near the number 2 on the scale depending on how close the value of the specimen is to 2 × 0.01μF.

For condensers exceeding about 0.001μF and resistors below 10 Megohms the amplification should be kept low

by means of VR2, because the edges of the magic-eye become blurred when applying high amplifications to components of a low impedance. With high resistances and small condensers full advantage can be taken of the amplification. The difference between 2 and 3$\mu\mu$F can be seen, but for great accuracy in that part of the range calibration checks should be made with close tolerance condensers. Such small condensers must be brought right up to the terminals. In view of the high impedances involved the insulation of terminals A and B must be very good, preferably polythene, polystyrene or perspex.

Some commercial bridges provide extra terminals for the purpose of matching components against an arbitrary standard. This is useful if a large number of items have to be matched, but in amateur work this rarely happens and those rare occasions can be met, perhaps less elegantly, by the provisions already made. Therefore no extra terminals have been added. A further facility frequently met is that of power factor measurement. Here again this is of little use to the amateur, because a power factor measurement at 50 c/s is not necessarily applicable to r.f. currents.

Condenser Leakage Tester

The only extra facility which has a definite use to the amateur is the leakage tester. The condenser under test is attached to terminals X and Y and S3 switched to R5. The neon-indicator V3 should produce one single flash when charging the condenser and there should not be another flash for a very long time. Sometimes there are two or three successive flashes of decreasing brilliance, which may be due to a damped oscillatory mode of charging. Bad condensers, depending on their degree of deterioration, will either keep V3 alight all the time, or produce flashing, the speed of which may be from very fast to very slow. Where to draw the line is difficult to say. A safe rule may be that if you have the patience to wait for a second flash the condenser is no good. To learn how good a high quality condenser can be it will be instructive to test one and, while waiting for the second flash, to think about the story of the amateur who bought a five-year-old piece of surplus gear in its original crate and upon opening got a shock from a still charged condenser. Of course, the insulation around terminals X and V3 must be very good. V3 should be as small as possible, preferably a miniature type as used in some v.h.f. wavemeters. The smaller it is the more concentrated and brighter the short-lived flashes will be. The large bee-hive neon is not suitable.

A point which may seem peculiar is that the lead from terminal A to the grid of V1 is screened and will represent a stray capacity to chassis. The fact is that this stray capacity is only active whilst the bridge is unbalanced. If VR1 is adjusted to produce balance there is no voltage across R1 or between A and chassis hence capacity or even a short circuit between A and the chassis has no effect on the measured value of the sample under test. It has, however, an effect on the sensitivity of the bridge in that it reduces the movement of the shadow in the magic-eye when measuring small capacities. Therefore, it should not be increased unnecessarily. Harmful stray capacities which can falsify the readings occur between the terminal A with any unscreened leads to it and anything associated with terminal B. Therefore, the wipers of switch S2, a, b, in particular should be kept well away from the wiring to B. Some stray capacities are inevitable and will affect readings of small condensers below say 15$\mu\mu$F and if accurate measurements are required in that range the previously recommended check measurements must be made.

Results

The instrument has been in use for about two years and has become a permanent fixture on the end of the work bench. It has been copied by several other people without any difficulty and has been found most useful. Among other things, stocks of old paper condensers have been checked, resulting in an almost complete turn-out! Since then there have been far less complaints about the failure of gear.

References

[1] "Universal Measuring Instrument," G. A. Hay, B.Sc., *Wireless World*, May and June 1944.
[2] *Radio Laboratory Handbook*, M. G. Scroggie, B.Sc.

Amateur Television

DURING the evening of Saturday, April 21, 1956, pictures were received at the home of David Bligh, in Lolworth (7 miles west of Cambridge) from G2DUS/T (16 miles) and G2WJ/T (26 miles). Those present at the receiving station included Jeremy Royle (G2WJ/T) and Ian Waters (G3KKD/T). A film show lasting 30 minutes was put on by G2DUS/T.

During the morning of April 22, 1956, G3KKD/T (Ely) received good pictures from G2DUS/T (34 miles). The "programme" consisted of Test Card "C," step-wedge graticule, cine-camera shots of the district and half an hour of amateur cine-film. Picture quality was good. During the evening of the same day G2DUS/T received pictures from G3KKD/T for the first time.

The receiving equipment at G3KKD/T consisted of a 16 element stack array with wire netting reflector (height 50ft), a converter with a CV53 r.f. stage, crystal mixer and cascode low-noise head amplifier into the television receiver.

G3KKD/T is running regular transmissions on 434.16 Mc/s and is willing to co-operate in tests with interested stations.

Wireless "Blind Spots"

W. E. WARING (G3GGS) has sent to Headquarters a cutting from the *Daily Mail* of May 17, 1930, in which that paper's radio correspondent reported certain theories which today it is difficult to believe were ever seriously held. In particular, poor reception in Bournemouth was attributed to the fact that almost all listeners at that time listened to Daventry 5XX. In this way each listener was supposed to steal energy from his neighbour, "therefore attenuating the whole." A contemporary report of the Radio Research Board was quoted as saying that the massed aerials in the London suburbs resulted in the transmission which had to feed these areas being distinctly thinner "since the majority of aerials were tuned to that station."

New Transistor Record?

CYRIL Hubbard (G3CSZ) of Rock Ferry, Birkenhead, has received a report on his Top Band transistor transmitter signals from a short-wave listener in Prague, OK1-00642, who heard G3CSZ at RST349 on February 5, 1956. The distance from Birkenhead to Prague is approximately 800 miles.

Microphones

By G. L. BENBOW, M.Sc., A.M.I.E.E. (ex-G3HB)*

THE microphone is the starting point of any electrical system of communication by speech, as it is the device which converts the sound-wave energy of the human voice into an electrical current or voltage. Its output can then be amplified and used to modulate the output of a radio transmitter. As an energy converting device, the microphone is dependent for its operation on the principles of two sciences, acoustics and engineering, both electrical and mechanical. Probably it is for this reason that its full understanding is shrouded in a certain element of mystery by some radio engineers, professional and amateur alike.

A knowledge of the properties and performance of the particular microphone to be used in a given system is essential for the complete design of the electrical part of the equipment. For much of this knowledge the designer is dependent on the information supplied by the manufacturer; the amount of such information generally increases with the price and quality of the microphone!

Basic Acoustical Principles

A sound wave is a wave of alternating pressure, spreading out from the source, in which the instantaneous air pressure varies above and below the mean atmospheric pressure by an amount which determines the intensity of the sound. Plotting the wave-shape of this pressure wave gives a curve whose shape determines the characteristics by which one sound differs from another. For example, a pure sine wave of pressure results in a pure tone, the frequency determining the pitch. Different musical instruments playing the same note produce waves of varying harmonic content, the proportions of which determine the "tonal quality" or "timbre" of the sound. Harmonics (or overtones) similarly determine the characteristic difference between the male and female singing voice, whilst speech is made up of harmonics of the fundamental pitch and transient waveshapes.

The pressure of a sound wave refers to the variation about the mean pressure and is measured in "dynes per square centimetre". As in other alternating quantities either the instantaneous peak value or the R.M.S. value may be used, the latter being the figure most generally quoted.

In an electrical circuit, an E.M.F. or electrical pressure produces an electrical current, the magnitude of which depends on the electrical resistance. In an analagous manner, an acoustical pressure-wave can produce a movement of the air particles which may conveniently be measured by the velocity of these particles. This velocity depends on the "acoustic impedance" of the air space on which the pressure wave is acting. This, in turn, depends on the distributed mass and elasticity of the air, and can be regarded as a "characteristic impedance" in the same way as the characteristic impedance of a cable or transmission line is determined by the distributed inductance and capacitance.

The wavelength of an acoustic wave is derived in the same way as for a radio wave, except that the wave velocity (this must not be confused with the air particle velocity referred to previously) is 34,400 cm./sec. compared with 300 x 10^6 cm./sec. for electro-magnetic waves.

*81 Anglesmede Crescent, Pinner, Middlesex.

Thus, the wavelength corresponding to a frequency of 100 c/s is given by:

$$\lambda = \frac{34,400}{100} = 344 \text{ cm.}$$

and that corresponding to a frequency of 10,000 c/s by:

$$\lambda = \frac{34,400}{10,000} = 3.44 \text{ cm.}$$

It would seem reasonable to use this variation in pressure and velocity of a sound wave as the actuating force in a microphone, and this, in fact, is done in practice, giving rise to the terms "pressure microphone" and "velocity microphone".

Acoustic pressure is like hydraulic pressure; it acts equally in all directions. Apart from certain complications due to reflection and refraction, which can be eliminated if they are made small enough, a pressure microphone may face any direction relative to the sound and still give constant output. In practice, however, when its size approaches half a wavelength, it will be more responsive to sounds from a direction facing the diaphragm than those from the sides or rear. Thus, at 10,000 c/s where the half-wavelength is 1.72 cm. the "front-to-back" ratio would be quite high for a microphone 3in. in diameter, whereas at 100 c/s, corresponding to a half-wavelength of 172 cm., the same microphone would give the same output regardless of the direction of the sound.

Velocity is a vector quantity, i.e., it has direction as well as magnitude. Since sound waves consist of longitudinal movements of the air particles in the direction

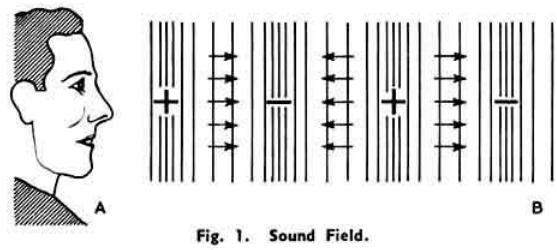


Fig. 1. Sound Field.

in which the wave is travelling, the velocity at any point is at maximum in a direction facing the source and zero in a direction at right angles to this. Thus a microphone whose output is designed to be proportional to velocity will have maximum output when facing towards or away from the source, and zero output when at right angles to the source. This is independent of any refraction effects referred to earlier, i.e., the output is zero in the perpendicular direction even at low frequencies. In Fig. 1, a sound wave is radiated from the source in the direction AB. Regions in which the maximum instantaneous pressure is above or below the normal pressure are indicated by + and — signs respectively. At intermediate positions maximum velocity will occur in the directions shown by the groups of arrows. The pressure will be effective in all directions, but the velocity will be maximum along the line AB and zero at right angles to this line.

It will be seen, therefore, that an ideal pressure microphone has a polar diagram consisting of a circle, whilst a velocity microphone has a diagram like a figure eight, similar to that of a dipole aerial. These diagrams will hold in any plane, i.e., for a pressure microphone, the solid polar diagram is a sphere while that for a velocity microphone is two spheres touching at the position of the microphone.

Basic Electro-mechanical Principles

All practical microphones consist of some mechanical system by means of which either acoustic pressure or velocity, or a combination of both, causes some part of it to move in sympathy with the source of sound. These changes in pressure and velocity are small and occur very quickly; moreover the output is required in the form of a varying electrical current rather than a mechanical indication.

The pressure microphone, therefore, comprises some form of closed cavity containing air at atmospheric pressure. A part of the wall of this chamber is made in the form of a diaphragm which, because it is very small and light, will move in and out in sympathy with the variations in air pressure above and below the mean value, due to the sound wave.

In a velocity microphone, it is usual to arrange a very light membrane to be open to the air on both sides. When the plane of the membrane is at right angles to the direction of movement of the air, it will move with the air; as it is very light, its velocity will be almost the same as that of the air particles.

Since the invention of the microphone well over half a century ago, almost every known electrical phenomenon has been used to convert the mechanical movement of the vibrating element into a corresponding electrical output. Effects commonly used today are the variation of resistance, usually of carbon granules, electro-magnetic induction, the variation of the capacity of a condenser and the piezo-electric effect.

Microphone Design

The design of a microphone is a matter of some complexity, involving careful proportioning of all the mechanical stiffnesses, masses and resistances in the mechanical system and air passages so that the microphone will give as uniform an electrical response as possible when acted upon by sound waves of all desired frequencies. For this reason, the amateur is far less likely to achieve success in constructing microphones, although there are some types which are not altogether beyond the capabilities of those with the necessary mechanical facilities.

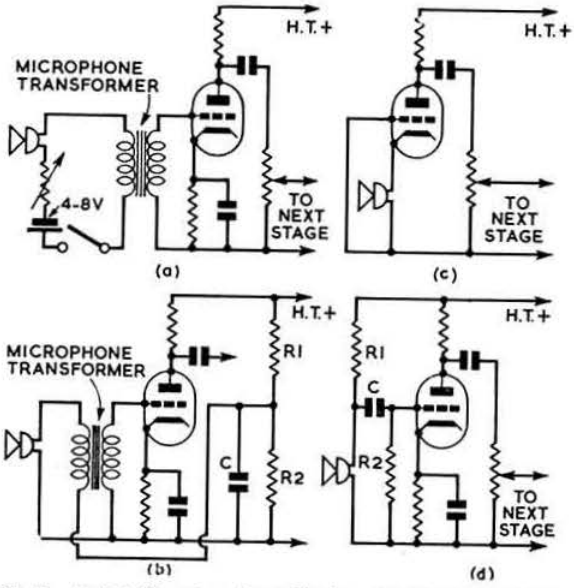


Fig. 2. Typical Microphone Input Circuits. (a) Carbon microphone. (b) Method of obtaining polarizing voltage for a carbon microphone from the h.t. supply (suggested values: C, 50μF 50V wkg.; R1, 33,000 ohms 3 watts; R2, 2,200 ohms 1 watt). (c) Alternative connection of a carbon microphone. (d) Condenser microphone.

Microphone Characteristics

Brief details are given below of the construction and characteristics of the common types of microphone. For further information, the reader is referred to the manufacturers' literature. Full technical data, including calibrations under various conditions, are generally available for the higher quality microphones, although it must be said that much of the information given is meaningless unless it is applied under standard laboratory conditions, which rarely, if ever, hold in the amateur station.

The Carbon Microphone

The carbon microphone is the oldest and simplest type of microphone. Basically, it consists of a capsule filled with granules of carbon attached to a diaphragm. Sound pressure causes the diaphragm to move and so vibrate the granules, causing the resistance to a polarising current flowing through the capsule to be varied in sympathy. The resistance of the capsule (or button) is generally between 200 and 1,000 ohms, while the polarising current, which may be obtained from a battery or from a potentiometer chain across the h.t. supply to the amplifier, is usually between 5 mA and 40 mA. The microphone is normally used with a step-up transformer having a ratio of between 30:1 and 100:1 as shown in Fig. 2 (a) and (b). Although very sensitive, its frequency response is relatively poor. The output to be expected is between 5 and 15 volts at the secondary of the transformer, depending on the ratio and polarising current, which should be as low as possible consistent with the output required.

The carbon microphone is particularly convenient for portable use as its high output is capable of fully driving valves such as the KT66 and 6L6 directly from the transformer. An alternative method of using a carbon microphone is shown in Fig. 2 (c). Here the microphone acts as the bias resistance of the first valve, the grid being earthed. This form of connection avoids the use of a transformer and polarising supply, and is capable of somewhat better quality, though the output is lower.

The Transverse-current Microphone

The transverse-current microphone is a form of carbon microphone. It has a mica diaphragm behind which there is a shallow chamber containing very fine carbon granules. The polarising current passes between carbon electrodes from one side to the other, so that the granules form a very thin layer of carbon through which the current passes from one edge to the other. As with the simple carbon microphone, a polarising current and step-up transformer is required. The frequency response is, however, much better, although the sensitivity is lower. An output in the order of 0.1 to 0.5V across the transformer secondary is normally available.

The Moving-coil Microphone

The construction of the moving-coil microphone is very similar to that of the moving-coil loudspeaker, the impedance of the coil being 20 to 50 ohms. A step-up transformer is required, but no polarising supply is necessary. Frequency response is very good. The calibration of a high-class moving-coil microphone is illustrated in Fig. 3. The output to be expected is approximately 0.02V to 0.05V. A miniature moving-coil loudspeaker makes a fairly satisfactory microphone,

although it tends to be insensitive due to the stiffness of the diaphragm.

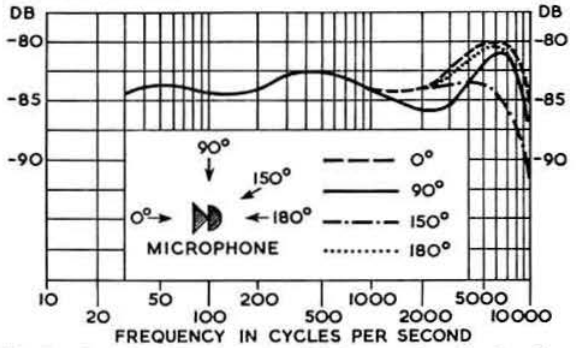


Fig. 3. Free air calibration of a high-class moving-coil microphone (S.T.C. type 4021).

(By courtesy of Standard Telephones & Cables, Ltd.)

The Ribbon or Velocity Microphone

As its name suggests, this type is operated by the velocity of the air particles. It consists of a very thin strip of aluminium foil supported between the poles of a magnet. As the ribbon (which may be only 1in. long, 0.1in. wide and 1/30,000in. thick) vibrates, it cuts the lines of force between the poles of the magnet and so a voltage is induced in the strip. A matching transformer is normally placed within the microphone case to transform the ribbon impedance, which is very low, to 50-250 ohms. No polarising current is required, and the frequency response is very good. (Fig. 4 shows the response curve of a high quality commercial ribbon microphone.)

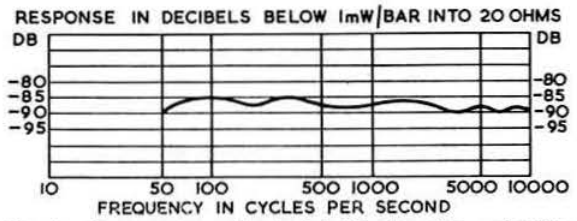


Fig. 4. Response curve of a typical high-class ribbon microphone (E.M.I. type 2350E/2351E)

(By courtesy of E.M.I. Sales & Service, Ltd.)

The Condenser Microphone

The condenser microphone is not commonly used. A thin metallic diaphragm which is vibrated by sound pressure forms one plate of a condenser whose capacity, therefore, varies in sympathy. A polarising voltage of 100 to 200V is required, the usual circuit arrangement being shown in Fig. 2 (d). It is necessary with this type of microphone for the first stage of the amplifier to be close to the microphone in order to prevent the capacity of the connecting cable affecting the output. Consequently, the first stage of the amplifier is often built into the microphone housing. The normal output is within the range of 0.02 to 0.1V.

The Crystal Microphone

This type of microphone utilises the piezo-electric effect whereby if a mechanical strain is applied to a slice of quartz or Rochelle salt, an E.M.F. is generated between opposite faces. This is a very popular microphone amongst amateurs, since its frequency response is good, and neither polarising voltage nor transformer are required. It has a high impedance output and can be connected directly to the grid of the first amplifier stage via a reasonably long length of screened cable (6-8ft). A loading resistance of between 2 and 5 Megohms must be connected across the output at the grid of the valve. If this resistance is decreased below 2 Megohms the low frequency response will be impaired. Output is low—from 0.01 to 0.03V.

There are two types of crystal microphone in general use. The most common consists of a diaphragm which acts directly on the crystal (normally Rochelle salt). In the second type, known as the "cell" type, the diaphragm is dispensed with, and the sound waves act directly on a cell of crystals cemented together and having plated electrodes. Both are capable of excellent quality, the latter type being slightly better but less sensitive.

Summary

This article has indicated the vast range of microphones available, from the sensitive carbon type with an output which may be measured in volts, to the high fidelity crystal type, with an output of only a few millivolts. The output of a microphone is generally specified as a number of decibels below a reference level of one volt per dyne per square centimetre. While this is an excellent method of specifying output under laboratory conditions, it is not very helpful from the practical design point of view. Table I provides an indication of the actual voltage output to be expected from the various types of microphone under average conditions of usage, i.e., for normal speech at a reasonable distance from the microphone.

Table I

Type	Transformer Ratio	Voltage at Grid
Carbon	30–100	5V–15V
Transverse current ...	20–40	0.1V–0.3V
Condenser	None	0.05V
Ribbon	10	0.03V
Moving-Coil ...	30–50	0.1V–0.5V
Crystal (diaphragm)	None	0.05V
Crystal (cell) ...	None	0.01V

Yugoslav Convention

THE Yugoslav National Society (S.R.J.) extend a cordial invitation to foreign amateurs to attend their third Annual Convention, which is to be held this year in Belgrade from July 7 to 9. The programme will include "fox" hunts and competitions and the Convention will end with a Hamfest during the evening of July 9.

Foreign amateurs who wish to take part in competitions using their own gear should notify S.R.J. at least thirty days before the Convention so that the necessary arrangement can be made with the Customs authorities. All enquiries about the Convention should be addressed to S.R.J., P.O. Box 324, Belgrade.

On the day following the Convention delegates will be invited to attend the opening of a memorial to commemorate the centenary of the birth of the scientist Nicola Tesla. From July 11 to 13 prominent scientists will lecture on Tesla's work.

The Tesla Centenary arrangements are in the hands of the State Commission.

The National NC-300 Communications Receiver

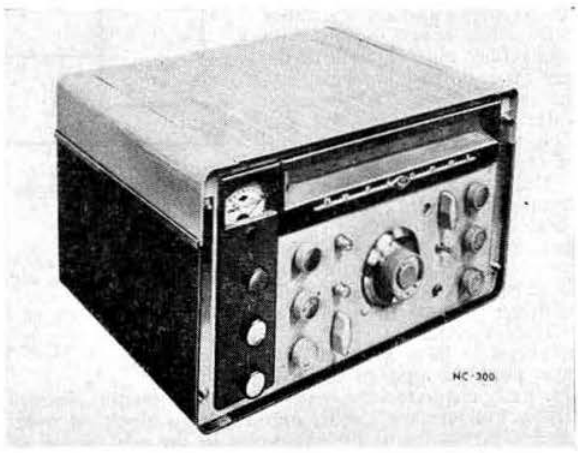
THE NC-300 is a double superhet. for the high frequency amateur bands only and its design is based upon the results of a competition in which amateurs were encouraged to offer suggestions as to their idea of a perfect receiver.

From an inspection of the circuit diagram and the admirably produced instruction book many interesting points in design become evident and it would appear that the long association between the National Company and the Amateur Radio movement has again produced an outstanding receiver from the same stable as the famous HRO and earlier sets in the NC series.

Seven bands are covered, with direct frequency calibration on a drum dial more than a foot long, geared to the band switch and arranged so that only the band in use is visible. The ranges are 1.8, 3.5, 7, 14, 21, 27 and 28 Mc/s. In addition there are direct calibrations for the 50, 144 and 220 Mc/s bands when the receiver is used in conjunction with the appropriate National v.h.f. converters. For these latter ranges the receiver tunes between 30 and 35 Mc/s. The dial can be read to within 2 kc/s without interpolation up to 21 Mc/s.

Provision is made for the inclusion in the receiver of a 100 kc/s frequency marker, controlled by a switch on the panel. A mechanical adjustment of the cursor position may be made to correct possible inaccuracies in the indicated frequency.

A single 6BZ6 pentode r.f. stage is followed by a 6BA7 mixer with a 6AH6 pentode e.c.o producing the first i.f. of 2215 kc/s. An image frequency trap is incorporated in the anode circuit of the 6BA7, and the signal then passes via the crystal filter to a 6BE6 converter where the second i.f. of 80 kc/s is generated.



The National NC-300 " Dream " Receiver, the latest product of the National Company of America. The cabinet is 19½in. wide, 11¾in. high and 15in. deep, and is finished in two-tone grey enamel.
(Photo by courtesy of the National Company).

Following this valve there are two stages of i.f. amplification using 6BJ6s. The coupling between these valves are parallel-fed pairs of mutually screened coils and not the usual inductively coupled transformers. Three stages of selectivity are available by a selection of inductance and capacity tappings, the resultant bandwidths being

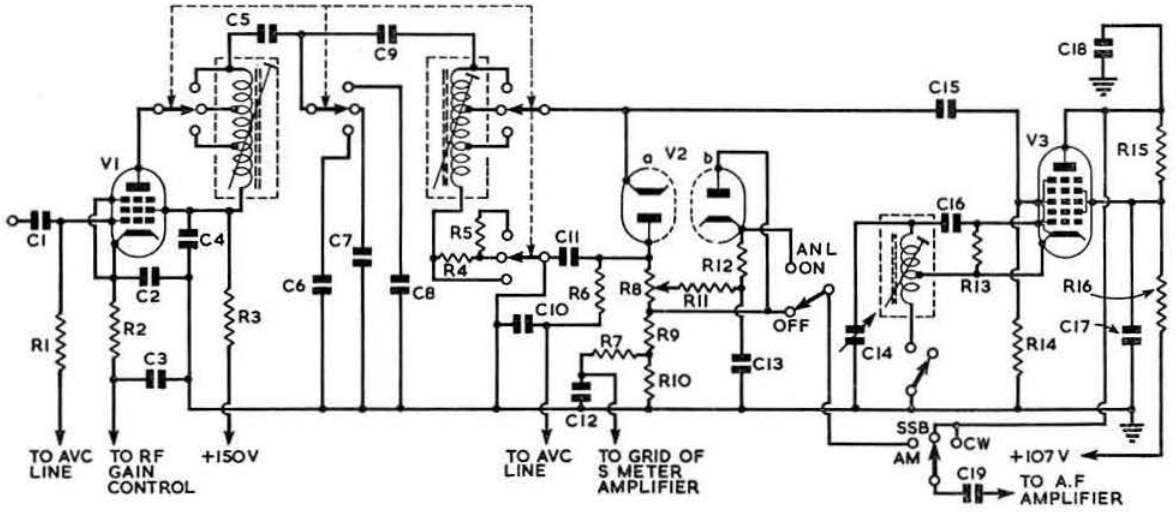


Fig. 1. Circuit details of the coupling between the second i.f. stage and the detector in the NC-300. A similar method of selectivity control, but with different component values, is found in the two preceding i.f. couplers. The circuit of the heterodyne detector for c.w. and s.s.b. reception is also shown.

C1, 15, 5$\mu\mu$F.
C2, 4, 17, 0.047μF.
C3, 0.1μF.
C5, 9, 150$\mu\mu$F.
C6, 0.022μF.
C7, 0.036μF.
C8, 0.001μF.
C10, 12, 13, 0.01μF.
C11, 220$\mu\mu$F.
C14, 12-100$\mu\mu$F.
C16, 100$\mu\mu$F.
R1, 6, 11, 12, 1 Megohm.
R2, 560 ohms.
R3, 2,200 ohms.
R4, 56 ohms
R5, 1,200 ohms.
R7, 470,000 ohms.
R8, 13, 100,000 ohms.
R9, 33,000 ohms.
R10, 14, 15, 68,000 ohms.
R16, 10,000 ohms.

8, 3.5 and 0.5 kc/s without the use of the crystal filter which can, of course, provide additional selectivity together with the advantage of adjustable rejection by means of its phasing control. A 6AL5 double diode acts as signal and a.v.c. rectifier and series noise limiter with adjustable "cut." Details of the last i.f. coupling, together with the a.m. diode rectifier and noise limiter and the c.w. and s.s.b. heterodyne detector, will be found in Fig. 1.

The r.f. and i.f. stages are all connected to the r.f. gain and a.v.c. lines, although the r.f. valve may, at will, be run at full gain for optimum signal to noise ratio on c.w. irrespective of the setting of the r.f. gain control.

The second i.f. valve is arranged to have a longer grid base than the first to improve the a.v.c. characteristic, and the parallel feeding feature makes the receiver almost impossible to block on overload. The choice of time constant in the grid circuit of the second i.f. stage is such as to permit its use as a limiter of impulse noise during c.w. reception when the normal noise limiter is rendered ineffective by the presence of the b.f.o. The latter uses a 6BE6 arranged as an e.c.o. The same valve also functions as the c.w. and single sideband detector, utilising the heterodyne detection principle, and is shown in Fig. 1.

One triode section of a 12AT7 serves as an S-meter amplifier operating from the a.v.c. line, while the other triode is the first audio amplifier with a.f. gain and tone controls in its grid circuit. A switch on the tone control inserts a small capacity in series with the normal grid coupling condenser for bass cut when required.

In the past it has often been the practice, particularly in American communication receivers, to provide several watts of allegedly undistorted output. In this receiver only one watt is claimed, furnished by an underrun 6AQ5, a feature which not only lessens the demands on the power supply but reduces the amount of heat inside the cabinet.

As the NC-300 is a communications receiver it is logical that provision should be made for its operation in conjunction with a transmitter, and to this end some thought has obviously been given by the designer to facilities for muting and c.w. monitoring which are conspicuous by their absence from the majority of communications receivers. The r.f. gain control forms part of a potentiometer network across the h.t. supply and a reduction of gain is accomplished by increasing the positive potential of the cathodes of the controlled stages. In the "Send" position of the Send/Receive switch a 10,000 ohm resistor is inserted at the earthy end of this control, so tending to cut off the controlled valves; at the same time the bias on the output valve is considerably increased. Provision is made for the connection of an external variable resistance to set the level of the *received* signal while the monitoring level is controlled by the receiver's r.f. gain control. Alternatively the receiver may be muted by the application of a negative voltage of 22 to 50 volts to the grid of the first audio frequency amplifier, such voltage being conveniently derived from one of the transmitter grid circuits, so facilitating either break-in on c.w. or push-to-talk on 'phone. Circuit details of these arrangements are shown in Fig. 2.

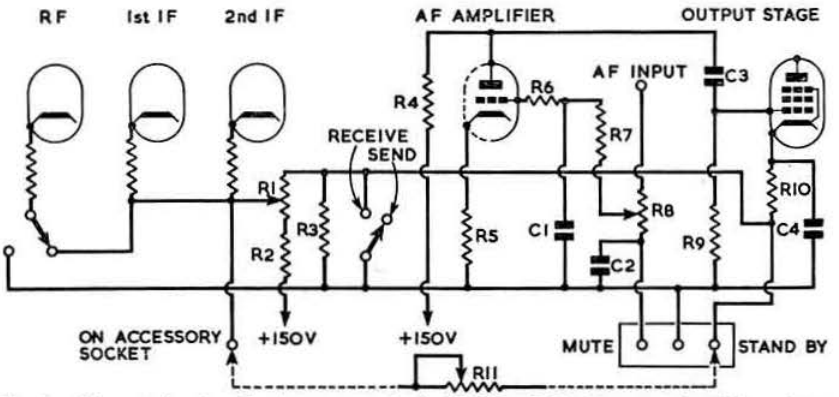


Fig. 2. Gain control and muting arrangements in the NC-300. R11 is the external variable resistor for use in conjunction with R1 for c.w. monitoring. When not required the "MUTE" terminal is connected to chassis.

C1, 47$\mu\mu$F. C4, 20μF. R4, 7, 270,000 ohms. R9, 470,00 ohms.
C2, 0.47μF. R1, 3, 11, 10,000 ohms. R5, 2,200 ohms. R10, 220 ohms.
C3, 0.01μF. R2, 39,000 ohms. R6, 8, 1 Megohm.

An unusual feature of the NC-300 is that the maximum h.t. is only 150 volts: a stabilized voltage of 107 is supplied to all oscillators and to the anode of the S-meter amplifier. In addition a current stabilizer is wired in series with the heater of the h.f. oscillator.

The accessory socket, into which the v.h.f. converters may be plugged, also provides an a.f. input position for use with a pick-up.

The receiver has an attractive panel layout and is housed in a well ventilated cabinet of modern design. Altogether a most interesting piece of apparatus which, although out of the reach of most of us at the present time, shows many trends which may well influence the design of amateur receivers for some time to come.

—*W.H.A.*

East Midlands Regional Meeting

to be held on

SUNDAY, MAY 27, 1956

at

THE EMPIRE HOTEL

FOSSE ROAD NORTH, LEICESTER

Programme

Assemble	11.30 a.m.
Lunch	1.0 p.m.
Business Meeting	2.15 p.m.
Tea	4.30 p.m.

Followed by a draw for prizes

Tickets, price 15/- each, may be obtained from K. G. Chapman (G3AFZ), 292 Gwendolen Road, Crown Hills, Leicester, or W. A. Mead (G5YY), 82 Edward Avenue, Braunstone, Leicester, not later than May 19, 1956. Cars will be met at main road city limits on request. Mobiles will work on 1910 kc/s.

Messrs. C. H. L. Edwards (G8TL) and W. R. Metcalfe (G3DQ) will represent the Council.

CQ Single Sideband

By H. F. KNOTT (G3CU)*

WITH the increasing popularity of the phasing system of single sideband generation, it becomes necessary to issue a word of warning, as a few stations heard recently have apparently overlooked the limitations of their passive type 90° audio phase-shift networks. These differ from the filter transmitter in which the crystal network has a sharp cut-off characteristic, so that the out-of-pass-band signals (i.e., the unwanted sideband) is severely attenuated. With the phasing transmitter, sideband suppression relies on several factors, and the greater the sideband attenuation required, the more accurate the various adjustments must be. This is not to suggest that, say, 35db attenuation is difficult to attain, but only that a certain care in the design of the associated equipment is necessary.

With the simpler networks it is important to note that their design limits their use to a specific portion of the audio frequency range, the range in which the phase-shift does not change substantially more than $1° \pm 90°$. In the case being discussed the range is the 2700 c/s between 300 and 3000 c/s, and it is, therefore, important to limit the speech frequencies in use to this part of the audio spectrum, otherwise undesirable frequencies will appear, both in the wanted and unwanted sidebands, outside the working limits of the audio-phase-shift network. Circuit design of the speech amplifier will usually take care of this, but with the addition of an LC low-pass filter, having a sharp cut-off at 3 kc/s, the radiation of unwanted frequencies is conveniently overcome.

Twenty Metres

The 14 Mc/s band has attracted greater attention over the past few months, with many new countries worked on two-way s.s.b. G3MY, during his first three weeks on the band, worked a large number of VK, ZL, KA, KL7, ZS, ZD4, AP2, W, VE and VO6 stations as well as HR2WC (first European contact). The aerial system in use is a self-supporting 16ft ground plane, with a s.w.r. of 1.2 to 1 on the coaxial feeder; reports of S7 to S9+ have been consistently received. To operate at the higher frequencies a high-level mixer is utilized, and with a selection of suitable crystals, a minimum of 2 watts peak output can be obtained on 14, 21 and 28 Mc/s. This is sufficient to drive four 807s in parallel with an anode voltage of 1100 to 1200 volts, and screen voltage of 405 volts. Fixed bias is used. An output of 400 watts peak is obtainable with practically no grid current, and absence of TVI, in spite of having no low-pass filter. G6LX (Croydon) is still confining his activity to 14 and 21 Mc/s and finds his two-way s.s.b. contacts with new countries is slowly creeping up; however, he finds it hard going at present as only simple aerials are in use.

VR2OG, who has done a considerable amount of work on 14 Mc/s with an occasional excursion to 21 Mc/s, has worked a number of British and European stations. He is in process of rebuilding, the transmitter under construction being for all-bands operation. The exciter is to be crystal controlled at 5.4 Mc/s and the signal heterodyned to cover 3 to 3.4 Mc/s in a balanced mixer (6SN7) by beating with a v.f.o. signal on 2 Mc/s. This output is again mixed in a 6BE6 heptode with the output from a switchable crystal oscillator to cover all bands. To make up for any variations in output, the various signals will be passed to a 6SN7 cascode r.f. amplifier followed by an 807. The p.a. will be push-pull 811As having an MB40L in the grid and an MB150 tuner in the anode circuit. Three all-band tuners in the earlier circuits will be ganged together to cut down on operating controls. The receiver consists of an AR88D with a signal slicer, while a Q Multiplier is nearing completion. Aerials consist of a Vee beam, 300 feet per leg and a three-element wide-spaced rotary for 21 Mc/s.

VE2AEE/G3IXL, who until recently was with a radio company in Montreal, has now joined Raytheon-Canada, who have a new site under construction at Kirtchance, Ontario. He hopes soon to be operating s.s.b. with a Johnson Viking transmitter (p.a. in class B) using a VE3 call. Although he has worked several British stations from VE2XL he has not yet heard any s.s.b. from this country, although HB9FU and a DL9 have been received.

Round and About

Twelve new stations which have become active since the January issue include G2JZ, G3FJN, G3ABJ, G4RT, G3GHE, G3CWB, G3GOP, G3ABJ, G3KNM, GM3FSV and GM2DAU, with G6KI, G5RP, G3JOY and G2BUJ busily constructing transmitters.

G3MY and G2HQ are at present building new receivers for 3.7 Mc/s. Using HRO-type dials and drive the local oscillators cover 3.5 to 4 Mc/s. Excellent stability has been obtained by careful mechanical construction and temperature compensation. Oscillator drift is about 500 c/s from cold in the first 10 minutes, after which the frequency is constant to within 50 c/s indefinitely. Two half-lattice filters at 420 kc/s precede the hexode demodulator, and have a bandwidth of 2.4 kc/s at the "nose" and 3.8 kc/s at 60db down, giving excellent adjacent channel rejection. Other facilities include a.v.c. and selectable sideband operation.

G3ILI is still working on a 144 Mc/s single sideband transmitter, but finds a number of technical problems remain to be overcome at these frequencies before satisfactory operation can be contemplated.

At present a weekly schedule on Sundays is being maintained by G3MY and ZD6KD on 3790 kc/s, at 22.00 G.M.T. No contact has yet been established, but ZS6KD works U.S.A. regularly with voice controlled break-in. DX countries frequently worked on 3.7 Mc/s recently include VE, VO and W with reception reports of British stations from VQ2 and ZD2.

A Grounded Grid Amplifier

Once again it would appear that the best circuit for s.s.b. amplification can also be the simplest. No originality is claimed by G3MY for the circuit shown in Fig. 1, but its simplicity and suitability for s.s.b. operation makes it well worth bringing to the notice of others.

To boost the output of an exciter or mixer by 6 to 8db,

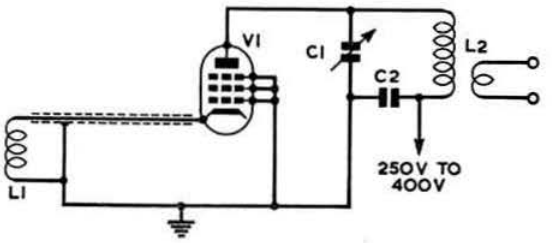


Fig. 1. G3MY's s.s.b. amplifier. C1, L2, to cover required frequency; C2, 0.01μF mica; L1, 3–4 turns; V1, 6CH6 or 5763.

*15 Hampden Road, Wantage, Berks.

a grounded grid class B zero bias amplifier is fed directly from the low impedance output of the previous stage. This overcomes the difficulties encountered when using the more conventional circuits, with the added advantage of no bias worries. It is important that the valves used are those with separate connections to the suppressor and beam plates. Both the 5763 and 6CH6 are in this class, and are most suitable, giving really excellent linearity. Typical operating conditions for the stage are —standing current 5 to 10 mA, sustained whistle 50 mA, and average voice peaks 25 to 30 mA. With 400 volts on the anode the peak output is about 10 watts with 2 watts drive. With 250 volts the output is reduced to between 5 and 6 watts.

Mixer Circuit

In the January column the technical description which preceded the practical circuit of a simple mixer was inadvertently given for a linear or power type mixer. The misunderstanding was due to the performance figures originally received (since modified) by the writer. Although a similar circuit has been used in this way, the mixer described and used by G3CWC was intended to operate on the square law principle.

Both types of mixer are eminently suitable in single sideband working; however, the square law mixer, by virtue of the small input signals required, does not load the v.f.o. circuit, and there is little v.f.o. harmonic output. With this type of mixer it is essential that fixed bias be used, and without an input signal, the valve is adjusted to cut-off. The following sequence should be adopted for setting up: Switch on the v.f.o. and adjust the input level to give a reading of 2 mA anode current. If too much signal is available the low impedance link should be swamped by a 100 ohm resistance. Finally adjust the s.s.b. level to give a reading of 7 to 8 mA.

Contests Diary

1956

June 2–3	-	National Field Day[1]
June 10	-	D/F Qualifying Event (Edgware)[2]
June 16–17	-	Region 1 V.H.F. Contests[2] (organised by individual national societies)
June 17	-	420 Mc/s Contest No.1[4]
June 24	-	D/F Qualifying Event (South Manchester)
July 7–8	-	144 Mc/s Contest[5]
July 8	-	D/F Qualifying Event (High Wycombe)
July 14–15	-	*Short Wave Magazine* All-European V.H.F. Contest
July 21–22	-	*Short Wave Magazine* All-European V.H.F. Contest
August 18–19		Region 1 V.H.F. Contests[3] (organised by individual national societies)
August 19	-	144 Mc/s Field Day No. 2
September 2	-	Low Power Field Day
September 2	-	1250 Mc/s Tests
September 8–9	-	European V.H.F. Contest (organised by D.A.R.C.)
September 9	-	D/F National Final
September 9	-	420 Mc/s Contest No. 2
October 6–7	-	Low Power Contest
November 10–11		Top Band Contest No. 2
November 24–25		21–28 Mc/s Phone Contest

Unless otherwise indicated all contests are arranged by the R.S.G.B.

[1] For rules, see page 284, R.S.G.B. Bulletin, December, 1955.
[2] For details, see page 431.
[3] See page 285, December, 1955, and page 386, March, 1956.
[4] For rules, see page 431.
[5] For rules, see page 431.

Frequency Predictions for May, 1956

PREPARED BY J. DOUGLAS KAY (G3AAE)

On five of the circuits for which predictions are given it is possible that 14 Mc/s will support communications during the whole 24 hours of the day. While absorption and increased atmospheric noise levels may result in these circuits not being workable on 14 Mc/s all day and every day, signals from these areas may appear throughout the 24 hours, so the predictions have been marked accordingly.

BAND	NORTH AMERICA	CENTRAL AMERICA	SOUTH AMERICA	SOUTH AFRICA	NEAR EAST	MIDDLE EAST	FAR EAST	AUSTRALIA
28 Mc/s	1500—2030	1700—2100	1230—2200	0800—1730	0800—2100	1400—1800	0800	0730—0830
21 Mc/s	1100—0000	0900—0030	0900—0030	0630—1830	0700—2300	0800—2000	0700—1800	0600—1030 2100—0030
14 Mc/s	ALL DAY	ALL DAY	ALL DAY	0600—0000	ALL DAY	ALL DAY	0700—2000	1300—0400
7 Mc/s	2200—0800	0200—0600	0200—0600	0000	2200—0400	0100	0000	1900
3.5 Mc/s	0600	0400	0400	0000	0200	0100	0000	1900

These predictions are based on information provided by the Engineer-in-Chief of the Post Office. All times are G.M.T.

Between approximately May and September Sporadic E reflection may result in short skip conditions on the higher frequency bands. The incidence of Sporadic E is unpredictable but is most pronounced around mid-day and dusk.

THE MONTH ON THE AIR

BY S. A. HERBERT (G3ATU)*

PRINTER'S back-logs and an unusually early date for copy, mean that a certain amount of condensation has to be applied again this month, an unfortunate fact for which we crave indulgence. And so, with the hope that normality will soon again prevail, to business.

Twenty Metres

The thing which has struck most people about recent conditions on the band is the remarkable increase in short-skip, or perhaps the loudness of European and Russian signals that makes the skip so noticeable. At any rate, the result has been to make DX work hard work. Actually, there have been some splendid openings to the Pacific and other DX areas, but it becomes too much of a good thing when time after time the VR2 or ZS7 you're working is blotted out by an OK happily working an HA, or a UA1 talking to a UA2!

B.R.S.20106 (Petts Wood) mentions teleprinters and the station sending "U, U, U" all day long, together with all the other pests. However, he got on to some Pacific DX around 19.00 and logged FK8AH, '8AL, FU8AA, KR6SC, JA, KL7 and VR1B on c.w. KB6BA, LU4ZV (19.30), ZM6AR (07.30, in the phone band but working a ZL on c.w.) and VQ1EQ were other good ones (although the VQ1 is uncertain. At any rate your scribe heard him and thought something seemed not quite right). On phone, Norman heard CR5SP, VP1JH (07.45) and he knows of c.w. activity from VR3C, KX6BU, KC6AL and VQ8AL. **B.R.S.20133** (Melton Mowbray) heard phones LX1BG, SV0WE (Crete), while **B.R.S.20317** (Bromley) picked out AC4LP (15.50) and AC4NC (18.07), FG7XB, FK8AH, '8AL, '8AO, FB8ZZ and FU8AA (17.00). **B.R.S.20487** (N. Finchley), now on a.c. mains, celebrated by hearing XE2NT on phone and **B.R.S.2292** (Hounslow) picked up ZD4CC and I5RAM on c.w. **G3JFF** (Kingswear) is on leave and passed his 100C with CT2BO and GC3KAV. All he needs now are 100 QSLs! **G3ATU** worked VR2BA (09.00) and heard signs of activity on c.w. from KJ6BM, VR3B, KC6KU, KG6IG, ZS7H and VK1GA. AC5PN has shown up recently on about 14074 kc/s, around 20.00 G.M.T., averaging RST448.

Ten Metres

Activity has improved of late, with ZD8SC popping up from time to time and causing considerable consternation. **G3DNZ** has so far failed with ZD8SC, but he did chat with JA, KA, VK, VU, VS1, VS2, ZD6RM and MP4QAL on phone, using a ten metre version of the "Moxon" beam. **B.R.S.20106** heard VP1SD and KG4AK on c.w., and FG7XB, VP3HAG, YN1KK and XE1PY on A3, while **B.R.S.20133** logged CR9AH.

Fifteen Metres.

G6YQ (Liverpool) reports ZD1DR active each evening on 21035 kc/s c.w. **B.R.S.20133** logged phones KX6BZ and the strong KR6PI, while **B.R.S.20106** found ZL still coming through after midnight. Rare ones for Norman were ZD9AD (18.20), ZD1DR and XE1PJ on the key and CR5SP, FQ8AK, VK9DB, VP4TM, '4LL, '7BS, '8BF, '8BP *and* BV1US (14.45) on phone. FB8ZZ has been called on c.w. **B.R.S.20135** (Newport, I.o.W.) tuned the phone band for VS6CY, FB8BZ, ZD8SC, TG9WB, ZL and VK. **B.R.S.2292** emerged with KL7ANG, FM7WN, KR6 on phone and MP4BBL, '4QAL on c.w.

Forty Metres

Still plagued by this and that, c.w. DX persists in coming through. **B.R.S.20106** heard W5, 6, 7, UA9 and UI8 and **B.R.S.20317** pulled out FQ8AY, of all people. **B.R.S.2292** logged W5, W7 and KG1BO.

"To beat or not to beat"

The increased activity on ten is already very marked and for the next few years we can expect to see more and more rare stations operating below 28500 kc/s *and*—this is the point—more and more people trying to work them. All would be well if those engaged in the chase were separated by a band of kilocycles from their "prey", but what happens in practice is that large numbers of hopefuls hear a rare station and promptly zero beat the poor chap. The result is that everyone is calling and nobody can hear him—chaos reigns. **ZC4IP** feels strongly on the subject and instances a QSO ZC4VP tried to make with VU2EJ. Hordes of Europeans descended and called them both—fifteen minutes later they were still in full cry, with '4VP and '2EJ quite unable to hear each other through the din. In the circumstances, the ZC4 boys are forced to adopt a "get tough" policy. Anyone deliberately messing up *their* DX knows what to expect, while if they call "CQ" they will indicate where they will listen. ZC4IP adds that—in the main—Gs are not offenders, which is nice to know.

In view of the above, it needs no guessing to forecast the reception given to **ZD8SC** when he appeared, but Stan, who is ex-VP5SC, VQ4SGC and an experienced DX operator, intends to stand no nonsense. He was heard to say that he felt he had a right to choose his own QSOs and would always ignore calls closer than 10 kc/s to his frequency. Fair enough. As he is due to remain on Ascension Is. for the next two years, there should be no need for panic.

However, up comes **G3DNZ** (Wolverhampton), fresh from a QSO with CE3AB, who is somewhat hot under the collar at what he describes as the "deliberate refusal" of ZD8SC to reply to any calls from South American stations. CE3AB himself observes operating etiquette when calling rare DX, but he admits that this is not the case with certain of his colleagues in that continent, some of whom are "plotting" against '8SC. If "plotting" means sitting on his frequency, the plots will come to naught. As for CE3AB—he has nothing

*Roker House, St. George's Terrace, Roker, Sunderland.

to fear. Correct operation should net him a QSO in time.

A further point of view comes from **GD3GMH,** himself by way of being rare DX! Geoff agrees the zero-beat technique lacks just about everything, yet he has himself missed several DX QSOs simply by *not* zeroing the caller. Certain stations, in fact, expect a reply on or near their own frequency and don't bother to listen anywhere else! All of which is mighty confusing, so until the happy day when *nobody* will listen near his own spot, the safest course would seem to be "When in doubt—keep out."

Overseas News

Art Bean, **W7AMX** (Oregon) has compiled a list of stations *active* on 14 Mc/s c.w. from the rarer States of the U.S.A. Seekers after W.A.S. may note the following. **Arizona:** W7s 'AH, 'ANJ, 'JZ, 'JYZ, 'LBN, 'LQB, 'KWO, 'MAL, 'MLL, 'MPS, 'MNE, 'OPY, 'PLU, 'PZ, 'PGX, 'RAB, 'RBF, 'SQA, 'TLG, 'TNW, 'UMS, 'UTN, 'VKO, 'VMP, 'WFY, 'WKM, 'WNC, W6GAL/7. **Idaho:** W7s ASA, 'GHT, 'HP, 'ITN, 'PAX, 'QC, 'UDG, 'UKH, 'VMF, 'VVC, 'VWS, 'WLT, 'WMO, 'WNR. **Montana:** W7s BSU, 'CJB, 'GVF, 'HCW, 'IBH, 'KOR, 'KVU, 'LOD, 'OAZ, 'OSR, 'RZY, 'TAO, 'TKB, 'TPE, 'TRB, 'TSM, 'TVK, 'QYA, 'VGZ, 'WYT. **Nevada:** W7s BVZ, 'CX, 'JU, 'KEV, 'KJQ, 'MRN, 'OYQ, 'PGA, 'PST, 'SHY, 'SNP, 'RBV, 'TVF, 'VIU, YNO/7, K7FDB. **Utah:** W7s EHF, 'FYR, 'IWH, 'KGP, 'MWR, 'NHX, 'ORH, 'QDJ, 'SOJ, 'TTM, 'UMT, 'VEW, 'VEO, 'WQC, 'WRV. **Wyoming:** W7s GGG, 'HX, 'HYW, 'KPZ, 'LE, 'MFL, 'NNX, 'OME, 'PKX, 'PSO, 'QNR, 'TQO, 'WNY.

G3HAX (ex-MS4FM) writes from Asmara that he has recently had QSLs for contacts he did not, in fact, make. G2DHV (16.5.55 on 7 Mc/s) and G3ETH (21.2.55 on 1.8 Mc/s) both worked a pirate. At the time of the G3ETH QSO, the real G3HAX was dining with his wife in Athens! **ET2FM** is now active, mainly on phone, using an all-band 813 rig and rotary beam. **VK4HR** (Brisbane) recently added AC5PN and VS4BA to his 14 Mc/s score (now 227C) and made it 105 on 21 Mc/s with CT2AT, but he has still to hear ZD3 and ZD9.

Meade M. Padgett **(ex-TA3MP)** is now K6EWZ/2. Anyone who failed to receive a QSL from TA3MP should write to Meade at 91, Mitchell Drive, Eatontown, N.J., U.S.A. From 1948 to 1952, **MI3SC** was operated by W5ICJ, who hears that some MI3 cards went astray, but he still has the logs and a supply of cards and will be happy to verify in return for details sent to Lt.-Col. G. H. Darwin (W5ICJ), 1812B, 18th Loop, Sandia Base, Albuquerque, New Mexico, U.S.A.

VR1B—Canton Is. (British Phoenix Group)

As mentioned in the March *M.O.T.A.*, Danny Weil is active daily, although for the first few weeks—even when his signals peaked at S8 in Europe—it was virtually impossible to contact him through the fantastic numbers of calling Ws. By now things should be easier, though. Danny has been dealing with the situation to the tune of twenty or more hours operation in a single day on occasion, so that—given good conditions—Europeans should be making it by now. **GM3DHD** (Edinburgh) received a letter from VR1B on April 14, in which Danny wants it known that he will be active from Canton Is. for about two months. He is on 14,080 kc/s daily, from 07.00 until the band closes, around 09.30-10.00 G.M.T. During those times, he answers Europeans only, unless he has to clear loud Ws from the frequency, when he will return to them after disposing of the said Ws. He pleads with callers *not* to send *his* call numerous times. What he wants to hear is the call of the chap trying to raise him and in this respect, he says he can copy 20 w.p.m. when a signal is 559, but when it is 339, even his 75A4 doesn't help much, so send slowly if necessary, *and* keep off his frequency. The VR1B rig runs 65 watts to a random length wire. He has the elements for a beam, but still needs a boom light enough to carry on his yacht. Meanwhile he is making a wooden boom for use on Canton. His next stop will be Nauru.

G2PS (Westbury) is one of the lucky lads who have worked VR1B—at 07.55 with RST339 both ways and welcome co-operation from others on the frequency. '2PS runs a 20.00 sked with KV4AA and promises to pass on the lastest news regarding *Yasme*.

News from Home Sources

Arthur Milne **(G2MI)** passes the news that PA0GF is ex-PJ0X and ex-JZ0KF, so anyone needing either card knows where to apply. Arthur also sends news that **B.R.S.17666,** Dave Webber, will be /MM this year and as his route includes Pitcairn Is., some of us may get interesting reports!

G2BB (Camberley) worked ZD8SC, who says that, unfortunately, he is unable to cope with B.R.S. reports. '2BB, with the help of 4X4DK, has positively identified the "intruder" whose Arabic "swing" sessions go racketing out on 28,224 kc/s daily. The offender turned out to be the fourth harmonic of Cairo, whose weak fundamental around 7,056 kc/s suggests he is wrongly tuned. With some 120 kW power, he's probably burned out the pea-lamp in his wavemeter.

GM3WO (Falkirk) had the experience of working two VP5DCs in rapid succession on twenty c.w. A QSL from the genuine one (on Grand Turk Is.) warns that c.w. QSOs with "VP5DC" between 03.25 on February 6 and 19.47 G.M.T. on March 13, were with a pirate, who, revoltingly enough, gives the correct name and directions for QSLs. GM3WO heard him knocking off EUs in dozens. The real chap is quite weak and uses only 60 watts.

News from Africa

The *F.O.C. Circular Letter* reveals intentions of Mal, ZE3JO to air VQ1JO for three weeks in August, 1956, during a holiday in Zanzibar. **VQ5GC** is also Zanzibar bound, probably late June, but he will give specific dates ere the time. George also has designs on VQ9, but the snag there is to get back to Africa from the island. Apparently transport to the Seychelles is easy—it's the return journey which is the difficulty. **G2MI** hears from ZD3A that he is due for four months leave. He should have left Gambia by now, as should Bill Wheeler, **ZD3BFC,** who is enjoying five months away, so that ZD3 will be without amateur activity until winter. Bill tried hard to make Top Band history, but his transmitter was putting more r.f. out on 80 than on 160, and so he had to be content with giving G6CJ a listener report from Gambia! However, he plans better things next time, so look out for ZD3BFC next winter on Top Band.

* * *

And that will have to be all for this month. It looks as if it will be the June issue before *M.O.T.A.* gets back to normal and copy can be sent to arrive by May 21 (with a sigh of relief from your commentator!) Apologies meantime for the necessary shortness of the past few efforts and large thanks for keeping up the good work. Good hunting and 73.

TWO METRES AND DOWN

By F. G. LAMBETH (G2AIW)*

WITH the coming of Spring we are confidently expecting an increase in the number of portable and mobile stations operating on 2m and 70 cm. Last year's experiences, admittedly gained largely in a period of excellent conditions, augurs well for the future. This is all to the good and we hope the operators will again experience the best of good conditions, and as a consequence, many will again have the chance of working that rare county which has hitherto eluded them. This question of "County Chasing" which is treated very seriously by an increasing number of operators, leads up to the thought that matters might be eased, especially in c.w. working, if a method of identifying the location of the portable/mobile station by county could be easily devised. To this end, we append a list of counties in the U.K., against each of which a two letter code signal has been tentatively appended. If such code letters were added somewhere in each "CQ" call, listening stations would be able to decide the direction of the caller and the shortened code could also be used as a safeguard in cases of poor propagation.

Comments are invited!

Counties and Suggested Code Letters

ENGLAND AND WALES

AN	Anglesey	FL	Flint	NO	Norfolk
BE	Bedford	GL	Glamorgan	NT	Nottingham
BK	Brecknock	GR	Gloucester	OX	Oxford
BR	Berkshire	HA	Hampshire	PE	Pembroke
BU	Bucks	HE	Hertford	RA	Radnor
CA	Cambridge	HU	Huntingdon	RU	Rutland
CD	Cardigan	KE	Kent	SH	Shropshire
CE	Cheshire	LA	Lancashire	SO	Somerset
CM	Carmarthen	LE	Leicester	SS	Sussex
CN	Caernarvon	LI	Lincoln	ST	Stafford
CO	Cornwall	LO	London	SU	Suffolk
CU	Cumberland	ME	Merioneth	SY	Surrey
DE	Derby	MO	Monmouth	WA	Warwick
DH	Denbigh	MX	Middlesex	WE	Westmorland
DO	Dorset	MY	Montgomery	WI	Wiltshire
DU	Durham	ND	Northumber-land	WO	Worcester
DV	Devon			YO	Yorkshire
ES	Essex	NN	Northants		

SCOTLAND

AB	Aberdeen	FO	Forfar	PH	Perth
AR	Argyll	HD	Haddington	RC	Ross and Cromarty
AY	Ayr	HB	Hebrides		
BA	Banff	IN	Inverness	RE	Renfrew
BK	Berwick	KI	Kincardine	RO	Roxburgh
CL	Clackmannan	KR	Kinross	SD	Sutherland
CT	Caithness	KT	Kircudbright	SE	Selkirk
DM	Dumbarton	LK	Lanark	SG	Stirling
DS	Dumfries	LW	Linlithgow	SK	Skye
ED	Edinburgh	NA	Nairn	SL	Shetlands
EL	Elgin	OR	Orkneys	WN	Wigtown
FI	Fife	PB	Peebles		

NORTHERN IRELAND

AM	Antrim	DN	Down	LY	Londonderry
AG	Armagh	FE	Fermanagh	TY	Tyrone

Station Reports—Two Metres

The period mid-February to mid-March was generally uneventful. Activity remained low and the state of the weather, in the early part, did nothing to help matters. The *Short Wave Magazine* Contest has already been reported on and appears to have been the one bright spark in an otherwise dreary firmament. May better conditions soon arrive!

B.R.S.6327 (Earlsfield) has had the aerial down for repair. It is now up again and many locals, but only a few G-DX stations have been received. **B.R.S.16075** (Shirley, Southampton) has been helping to check gear in readiness for the first v.h.f. field day, and has accordingly not had much time for listening. G3HKT is now on 2m, with two more stations in the area expected on the band shortly. After some noise measurements carried out by '16075 and G5OB, several of the locals have realised that their converters were not so good as they had thought. G3HKT, for example, is now hearing 2m as it should be on his Wallman type cascode converter. Southampton is still suffering badly from TV oscillators and the band is covered with very undesirable signals as a result. Some notes on noise factors for different converters are promised in due course. **B.R.S.19162** (Dewsbury) noted a great increase in activity during the *S.W.M.* contest week-end when East Midlands stations were heard but it dropped again later.

G3FIH (Bath) worked 43 stations in 22 counties and 3 call areas (G, GW and GC) during the same contest but there is little else worth reporting. **G8PX** (Oxford) is still busy "brushing up" portable gear and hopes to be /P very soon. **G3KHA** (Bristol, 4) reminds us of the "West of England 2m Net" on 145.8 Mc/s every Thursday evening at 22.15 (participants '3FIH, '3HHY, '3FKO, '3KPT and '3KHA and anyone else who wishes to join in). There are quite a few stations active in the south-west.

G5MR (Hythe, Kent) has been kept out of the shack quite a bit by weather conditions. Consequently more time has been spent on the bench than on the air, with the exception of March 10/11 when a number of QSOs were made, G6CW (Nottingham) being the best DX worked. Progress is being made with a new converter (cascode ECC84)—the oscillator is working. This is the same type as that used by G2UJ in the R.S.G.B. converter. The note does not appear to be so good as that of the Clapp G5MR has hitherto been using, but further experiment may cure this.

G2DHV (Blackheath) comes back to the old QSL problem, having had only 50 per cent. return for 2/5 metre QSOs. '2DHV hopes to be active on 2m very soon, and was very pleased to meet G5KW/M recently. **B.R.S.20133** (Melton Mowbray) is now listening on 2m from a position 300 ft. a.s.l. and has heard stations from Yorkshire to the Home Counties.

News from Scotland

The 2m band continues to be rather deserted (says GM6WL) but with the better weather some stations should emerge from hibernation! On March 10 GM3EGW was heard taking part in the *S.W.M.* contest

*21 Bridge Way, Whitton, Twickenham, Middlesex.

and worked GM5VG and '6WL. He was complaining of very bad interference from TV receivers in Dunfermline—'6WL says this is equally bad in Glasgow. A large number of Scottish sets have their local oscillator around 72.5 Mc/s and the second harmonic is therefore right in the 2m band! About 20 can be heard at '6WL from about 144.4 Mc/s to above 146. Three or four of them are 10 db over S9; any 2m man would be glad to have such a strong signal! It is all very annoying for any Scottish station trying to find English signals. Conditions were not at all good in Scotland on the week-end of March 10/11. GM3AYC went to great trouble to re-erect his aerial right in the clear—it had to come down again on the Sunday night and it is a pity the conditions did not repay him for the trouble.

GM2FHH (Aberdeen) also complains of TV local oscillators and super-regen receivers! Truly, the 2m band in Scotland must be very lively at present, but not in the way we would hope for!

News from Rhodesia

Via Ken Wall (G2YZ of Bexley, Kent) it is learnt that VQ2AT (Broken Hill, Northern Rhodesia) and VQ4GF (ex-G3BCY) of Nairobi are commencing tests on 2m. The distance between them is 1,350 miles and '2AT is at 4,000 ft. a.s.l. whilst '4GF is at 5,000 ft. a.s.l. Both stations will be using 90 watts input, 10 element Yagis (5-over-5) and 4 valve converters.

R.S.G.B. London

V.H.F.—U.H.F. Convention

Saturday, May 26, 1956

Bonnington Hotel,

Southampton Row, London, W.C.1

Programme

Convention and Exhibition opens -	10 a.m.
Convention Luncheon - -	1 p.m.
Lectures including "Some Aspects of Forward Scatter," by Lieut. Philip Jeter, U.S.A.F. (by kind permission of Col. George M. Higginson, Officer Commanding A.A.C.S. Ruislip), "1250 Mc/s Techniques," "Valves for 1250 Mc/s" and a recorded talk by Ed Tiltan of *QST*, commence -	2.30 p.m.
Convention Dinner - - -	7 p.m.
Presentation of Exhibition Prizes and Free Draw - - - -	9 p.m.
Convention closes - - -	11 p.m.

The Convention is being arranged in co-operation with the London U.H.F. Group.

Tickets may be obtained by post from F. G. Lambeth (G2AIW), 21 Bridge Way, Whitton, Twickenham, at the following prices: Convention and Exhibition only—3/6; Luncheon—7/6; Dinner—12/6; Combined ticket—22/-. Cheques should be made payable to "F. G. Lambeth."

Seventy Centimetre Reports

G2XV (Cambridge) has managed to work G3IRA and '3HAZ for two new counties (Wiltshire and Warwickshire). There have been no reactions yet regarding publishing a list of "really active" 70 cm. operators. It is apparently asking too much to get them all to drop a post-card to the writer!

In Scotland, **GM6WL** says the picture is brighter than it was, with gear very much more efficient than earlier. Activity is good nearly every evening around 7 p.m. and at week-ends multi-way QSOs are possible up to 20 miles or so on phone. GM6KH, '3NG, '3DYC, '3GAB and '6WL are involved, with '3INK occasionally listening. This QSO should be six-way very soon, as '3INK's transmitter will be repaired. The call "CQ 70", once considered a joke, is now of very real value. The West of Scotland Group met at GM6ZV's home recently and discussed plans for the field day in May.

News from France

F3SK (Asnieres) reports that the TV oscillator problem is also serious in France. They have shifting and wobbling carriers, cross-modulated by TV speakers and in other queer ways and as a result the activity on both 2m and 70 cm has lately been very poor in the Paris area. '3SK say G5DT is to be congratulated on his magnificent score of 1,205 70 cm QSOs during 1955. This summer F8TD (St. Nazaire), F3LS, '3YE and '9AJ (in or around Le Mans) will be on 70 cm with 4X150A p.a.'s. It is hoped that contacts will be made with British stations.

Neither F3SK and F8OL are really well, which has led to delays and snags in their experiments on 12 and 24 cm. With the coming of better weather they hope to get going again. Otherwise '3SK will loan his gear to F9CQ and '8MX for tests between France and England from the summer QTH at St. Valery-en-Caux. F9CQ is hoping to bring a French party over for the V.H.F./U.H.F. Convention at the Bonnington Hotel on May 26.

If *you* have not already obtained your tickets for the Convention please do so immediately. Full details are given in the announcement opposite.

* * *

Reports for the next issue should reach the writer as soon as possible.

London V.H.F./U.H.F Convention

Among the prizes kindly donated, up to the time of going to press, for the London V.H.F./U.H.F. Convention are the following:—

Universal Avo-Minor (Automatic Coil Winder & Electrical Equipment, Ltd.).
Tyne "F" Headphones (S. G. Brown, Ltd.).
"*Short Wave Wireless Communication*" (Chapman & Hall, Ltd.).
Panel Signs Sets (Data Publications, Ltd.).
P.T.F.E. Valveholders (Edison Swan Electrical Co., Ltd.).
Ball Point Pen (Enthoven Solders, Ltd.).
"Erie" Resistor Kits (Erie Resistor Ltd.).
"*Second Thoughts on Radio Theory*" (Iliffe & Sons, Ltd.).
McMurdo Radio Components (McMurdo Instrument Co., Ltd.).
QQV03/20A Valve (Mullard, Ltd.).
Bib Gift Packs (Multicore Solders, Ltd.).
"*Radio and Radar Technique*" and "*Introduction to U.H.F. Radio*" (Sir Isaac Pitman & Sons, Ltd.).
Travelling Clock (Siemens Bros. & Co., Ltd.).
Cuff links and Novelties (Stratton & Co., Ltd.).
Condensers (Telegraph Condenser Co., Ltd.).
Transformer (Woden Transformer Co. Ltd.).
Quartz Crystals (Cathodeon Crystals, Ltd.).
Brimar Valves (Standard Telephones & Cables, Ltd.).
Multi-range Testmeter, etc. (Proops Bros., Ltd.).

Amateur Television

By M. BARLOW (G3CVO/T)*

SINCE the last report, four new Amateur Television stations have been licensed: G3KOK/T (Bishops Stortford), G3KRA/T (Chelmsford), G3KQJ/T (Wolverhampton) and G3GDR/T (Abbotts Langley, Herts). The latter has for many months been receiving excellent pictures from G2WJ/T at Dunmow, and now the "bug is biting" in reverse! Already Len has transmitted test bars to G2WJ; some form of picture source is the next item to be built. A regular two-way television contact is obviously on the way, and will be a fitting climax to the months of patient experiment undertaken by the operators of these two stations.

G2DUS/T (Baldock) has sent and received pictures from G2WJ and has sent pictures to G3KKD/T at Ely. G2WJ/T now boasts comprehensive sound and vision mixing and distribution systems, so that any combination of B.B.C., I.T.A., or amateur sound or vision is available all over the house, with microphones at all likely points to catch the viewers' replies! Ralph has recently finished a new lightweight beam of the same pattern as his standard 16 element array; this, together with a 20ft pole, television receiver and converter, is being taken round the countryside (mains supplies permitting) to plot a rough field strength map, and to get some idea of the primary service area of such a TV transmitter.

G3KKD/T, now demobilised, has a 70ft mast at Ely, and is line-of-sight for a tremendous distance. As the viewer interest in his area is so low, however, Ian has fitted up his Fiat as a mobile amateur TV station. On the rear seat go the transmitter (switchable to c.w., m.c.w., phone or TV), basically to the G8SK all-6J6 design, twin-i.f. receiver (for communications or TV), staticon camera control unit, and 9in. monitor/receiver. A small petrol generator travels on the front passenger seat, whilst the 16 element aerial and short pole strap on the roof, giving the car a most impressive appearance! One of G3KKD's immediate jobs is to build a miniature camera to replace the large one seen at many R.S.G.B. exhibitions.

G3KRA/T has built a G8SK transmitter and is modulating it with an EF91-EF91-EF91 cathode follower. As he is still at school, progress is slow and rather expensive. Up north, G3BLV/T (Sunderland) and G3ACK/T (Blyth) continue to work for a two-way QSO, but over the border it appears that TV has no very active adherents. G3CVO/T is held up temporarily whilst a new high-grade oscilloscope is built. The majority of the oscilloscopes to be found in amateur shacks are practically useless for television work, whilst recent professional productions of suitable type are all over the £100 mark. The Y-amplifier of G3CVO's c.r.o. is 3db down at 6 c/s and 8 Mc/s; the unit is fitted with a beam switch and line selector facility. The latter enables any desired line of the complete television picture to be viewed on its own; by choosing, say, that line of the Test Card C containing 2.5 Mc/s bars, the response of the item under test can easily be seen. Incidentally, for accessibility and to reduce stray capacities, a novel form of construction is employed. Each sub-unit is made of a paxolin panel held to the main frame of angle iron, components being secured by soldering to a small tag mounted where required in the paxolin. All the components face outwards and all the valves inwards, making servicing very easy. The vision transmitter is producing reasonable pictures, now that a subtle fault has been cured. This was due to the use of pillar ceramic condensers for decoupling in r.f. circuits; the circulating r.f. currents heat the ceramic, causing serious drift and eventual breakdown. A mica condenser must be used in such positions, although the ceramic type is perfectly satisfactory where there is no circulating r.f.

*10 Baddow Place Avenue, Great Baddow, Essex

An unretouched photograph of the results seen on the monitor screen of G3AST (Luton). The original was a photographic negative, the scanner a 5FP7 and the monitor a VCR97. The picture shows the excellent results obtainable with simple equipment.
(Photo by G3AST)

Midlands Activity

Birmingham now has a very active amateur television group. Seventeen members, under the chairmanship of Tom Douglas (G3BA), are enthusiastically building cameras, monitors, receivers and the like. G3KBA/T has obtained some new QV03/10s for the vision transmitter, and is currently televising 16mm cine film. Due to his bad location in the centre of Birmingham, plans are afoot to relay the signals from G3EJO on higher ground. The film scanner consists basically of a Kodascope projector, with the intermittent mechanism retained. The scanning tube is a 9in. MW22-14 picture tube, which is found to give better pictures than the 5FP7. The raster size is 4in. by 3in. and the projector is two feet from the scanner. A shutter blanks the film during pull-down, the projector being driven through a belt drive from a synchronous motor. A 931A photocell is used, with gamma correction in the video amplifier to correct for the curvature of receiving c.r.t. characteristics. A normal 405 line scan is employed; it is possible to run the unit non-synchronously but this introduces slight flicker. 3 Mc/s bars can be seen clearly in the centre of the picture. G3DFL hopes to be able to supply pictures from his Flying Spot Scanner (using an ACR2X tube) to the G3KBA/T modulator, and eventually the group hopes to build a live camera.

* * *

On March 8, G2DUS/T brought his TV camera to G3CVO/T. Live pictures were transmitted to G2WJ/T, who then transmitted similar pictures back to G3CVO. This is the first time a two-way live camera QSO has been effected in this country. Experiments are now in hand to make a duplex TV contact. G2WJ has also received pictures from G3GDR/T, G3KOK/T and G2DUS/T; the latter has been heard by G3KKD/T at Ely. G3EJO has received G3KBA/T in Birmingham. G3KPX/T at Maidenhead is the 21st television station licensed.

Radio Amateur Emergency Network

By C. L. FENTON (G3ABB)*

THE Council agreed that R.A.E.N. shall co-operate to the full with the British Red Cross Society, and details are now being dicussed with them. Full information will be published as soon as possible.

Plans are also being discussed for the holding of a second R.A.E.N. Rally in the autumn. All the suggestions which were made by members following last year's Rally are being examined; other suggestions can still be considered if received by the Honorary Secretary in the near future.

Membership Cards

New membership cards, which will not require annual renewal, will be available shortly. E.C.O.s are requested to advise the Honorary Secretary of their requirements, and cards will be supplied to them in bulk for issue to their members. Where no E.C.O. has been appointed, members should write direct to the Honorary Secretary enclosing a stamped addressed envelope.

Lifeboat Sets

The Committee realizes, with considerable regret, that a number of members are still awaiting delivery of lifeboat sets for which they paid several months ago. At that time equipment was being received faster than it could be disposed of, and was presenting a storage problem. In order to overcome this, advance orders were accepted in order to institute a "waiting list," so that sets could be despatched immediately they were received. Unfortunately, supplies have not materialized in the quantities promised, and none has been received for several months. Urgent action is being taken to obtain a resumption of deliveries, and it is hoped to complete outstanding orders in the fairly near future.

Stop Press

A further quantity of lifeboat sets has just become available, and will be distributed as quickly as possible.

News from the Groups

Lincolnshire. G2FT and G3DXI are to conduct experiments in the use of 28 Mc/s for fixed and mobile rigs as an alternative to Top Band. G2FT expresses concern at the thought of mobile stations moving into coastal areas and, by erecting a good aerial system with an unfortunate choice of frequency, causing interference to Coast Stations in the vicinity. This is a point which should be watched by Top Band mobiles during the summer season. *Staffordshire.* Efforts are being made to practise approved procedure, and the Newcastle-under-Lyme E.C.O. is anxious to establish links with adjacent groups. This is a point which could well receive the consideration of E.C.O.s in other areas, and some effort be made to establish a regular link between all E.C.O.s for the interchange of ideas.

Another idea from Newcastle is the preparation of a "Data Folder" for each member within the group. This folder could contain a copy of each of the official R.A.E.N. instruction and procedure leaflets, copies of local instructions, net details, etc., and a list of all local members, showing call-signs, addresses, and telephone numbers.

Following a meeting held in Stoke-on-Trent on March 8, a regular Sunday net has been initiated, operating at 10.30 a.m. on 3750 kc/s. Consideration is also being given to the development of portable crystal controlled 10-metre equipment, thus working on similar lines to the Scunthorpe, Lincolnshire, Group.

Yorkshire. Ten members met in York recently, and fixed local net frequencies as 3620 kc/s and 3700 kc/s, ± 20 kc/s, operational at 07.30, 18.00, 18.30 and 18.45 B.S.T. Four cars are permanently equipped with mobile gear. A local exercise is being arranged for May 6.

Norfolk. The County Controller has recently organized a full-scale exercise in co-operation with the police. Ten stations participated, with a control station at Police Divisional Headquarters. Operating on Top Band, contact was maintained with fixed and portable stations along the coast-line of the division, and with Holt and Norwich. Some trouble was experienced due to obliteration of speech by the high wind on microphones, and it is proposed to overcome this by the use of throat microphones. This test was carried out in daylight; further tests are to be conducted at night. The use of 28 and 144 Mc/s will also be checked before finally deciding on Top Band. Meanwhile, approval has been obtained for the erection of permanent aerials at Police Divisional Headquarters for the use of the Control Station in any emergency call-out.

More members are required in Norfolk, and it is requested that interested persons should contact the County Controller.

Again we appeal to E.C.O.s to send regular reports, including details of future planning, to the Honorary Secretary.

Appointments and Resignations

The following have been appointed E.C.O.s :—

E. C. Halliday (G3JMY), 14 Boverton Road, Filton, Bristol, 7.

J. R. Brindley (G3DML), 45 Rosendale Avenue, Chesterton, Newcastle-under-Lyme.

T. J. Wright (G3HRP), 236 Queensway, Ashby, Scunthorpe, Lincs.

* * *

V. J. Reynolds (G3COY) has resigned as E.C.O. for Stoke-on-Trent.

Change of Address

The address of Mr. F. K. Parker (G3FUR), E.C.O. for Stamford, Lincs, is now 64 Tinwell Road, Stamford.

"Race for Life"

AMATEUR Radio plays an important part in a distinguished new French film *Race for Life*, now being shown at the Academy Cinema, London, W.1. As it was made with the co-operation of Reseau des Emetteurs Francais (the French national society) it is not surprising that the Amateur Radio scenes have an air of authenticity generally sadly lacking in similar productions.

This is a film to take non-amateur friends and relations to see: apart from being excellent entertainment in its own right it captures the true feeling of Amateur Radio and the Ham Spirit.

Blazer Badges

SOCIETY blazer badges are temporarily out of stock but orders can be taken for delivery in mid-June. Please state whether black or dark blue background cloth is required.

*"Niarbyl," Gay Bowers, Chelmsford, Essex. (Telephone: Danbury 518).

The Radio Components Show

THE annual exhibition staged at Grosvenor House, London, by the Radio and Electronic Component Manufacturers' Federation has come to be regarded, and rightly so, as one of the most important dates in the radio industry's calendar and this year's event—the thirteenth—certainly lived up to the high standards set by previous exhibitions.

With 156 stands to choose from it is impossible in the space available to do more than mention some of the highlights and it is hoped that those selected will indicate some of the trends at the present time.

The Hornbeam

At last year's show J-Beams introduced the skeleton slot fed Yagi array for Band III television following their success with skeleton slot beams in the two metre amateur band. This year they sprang another surprise in the shape of the Hornbeam, an array covering any single frequency in Band I plus all channels in Band III. The higher frequency section of the array comprises a skeleton slot 32 inches square fed by a delta matching section about 30 in. long to the centres of the two horizontal sides. The "V" formed by the matching section provides useful forward gain in phase with that from the slot and a gain of approximately 8 db over a dipole is obtainable over the whole band. The lower frequency aerial elements are attached to the points where the delta matching section joins the slot, the reflector rod being supported at the feeder end of the section. The Band I elements are adiustable for length and the feeder is 80 ohm coaxial. The principle of a skeleton horn would appear to be well suited to our v.h.f. bands and it will be interesting to see whether 2 m and 70 cm Hornbeams will be in evidence in due course.

New Valves

Ferranti showed a series of ceramic valves for the first time in this country. The frequency range extends up to 2,000 Mc/s and it is claimed that the valves are smaller and require less cooling than is necessary with conventional types.

Among the new Mullard valves are a pair of triode/output pentodes on B9A bases, the ECL82 having a 6.3 volt heater and the PCL82 with a 16 volt 300 mA heater for a.c./d.c. operation. The triode sections have a mutual conductance of 2.5 mA/V at 100 volts on the anode while the pentode sections show a slope of 6.4 and 7.5 mA/V respectively. A half-wave indirectly heated rectifier, the PY32, is a comparatively small valve, mounted on an octal base, and has the unusually high output current of 275 mA. It is intended for series operation in the heater lines of television receivers and has a 29 volt 300 mA heater.

For those interested in battery operated f.m. receivers there is the DF97 r.f. pentode designed for service as mixer, r.f. or i.f. amplifier or oscillator. The filament requirement is 25 mA at 1.4 volts and the slope 1.0 mA/V at 85 volts and 1.75 mA on the anode.

Ferrite Developments.

Both Mullard and Plessey showed "beads" of ferrite material for suppressing parasitic oscillations. These beads are in the form of tubes 0.2in. long and slightly less in diameter and, when slipped over a wire, increase the inductance of that section and so appear as small chokes but without the disadvantage of d.c. voltage drop. Applications include heater chokes and grid, anode and screen stoppers in both transmitters and receivers. Two grades are produced, one covering the a.f. range and the other suitable for frequencies up to around 100 Mc/s.

Another interesting development involving ferrite material is the magnetic reactor made by the Wireless Telephone Co., part of the Plessey group. One use is to replace the reactor valve in the modulator of an f.m. transmitter. The device operates in a manner similar to that of a magnetic amplifier, i.e. the control of the effective permeability of ferrite material by the application of a varying magnetic field. A secondary winding is wound toroidally on a ferro-ceramic core and a transverse field is superimposed on this by a primary winding mounted on a laminated yoke. By passing a.f. through the latter winding and associating the primary with the oscillator circuit, frequency modulation may be obtained. Automatic frequency control may be applied in a similar manner to that adopted with a normal reactor valve modulator. The device is very compact, measuring about 2in. by 1½in. by ¾in.

The Model 888 Eddystone Double Superhet Receiver

The long awaited Model 888 Eddystone double superhet. communication receiver is shortly to be released. It will cover the amateur bands from 1.8 to 30 Mc/s only, each band being spread across the "slide-rule" dial extending the full width of the receiver. Variable selectivity is provided including a 1 kc/s audio filter with a bandwidth of 100 c/s and negligible insertion loss. The receiver may be used as a c.w. or 'phone monitor, means being provided for setting the stand-by sensitivity as required by the outputs of different transmitters. A crystal calibrator is standard equipment and the price will be £110. Other new Eddystone products include two additional sizes of die-cast alloy boxes and a variable condenser of 390$\mu\mu$F capacity and 1,250 volts rating intended for the output end of a pi-filter coupling network.

Labgear exhibited for the first time a crystal diode milli-voltmeter operating on the "slide back" principle and entirely independent of external power supplies. The six ranges cover 20 mV to 32 volts at frequencies between 0.05 and 250 Mc/s with an input impedance greater than 10,000 ohms.

The Labmatch direct reading standing wave ratio meter is for use with coaxial feeders of either 50 or 75 ohms impedance and in addition may be employed for adiusting low-pass filters, or baluns or as a harmonic indicator. The price is £5.17.6.

The Wireless Telephone Co. displayed a number of i.f. transformers including a sub-miniature component having a Q of 100 at 465 kc/s and contained in a can only ½in. square and 1½in. high.

Copper-loaded Solder

The speed with which soldering bits develop pitting is well known and it has been discovered by Multicore that the use of a copper-loaded solder can increase the useful life of a bit by as much as ten times by lessening the absorption of copper from the bit by the alloy normally used. Their new Savbit Type 1 solder alloy takes advantage of this fact and at the same time is lower in price.

The use of radio activity in the plastics industry has resulted in the production of polythene which, after

irradiation, is thermosetting instead of thermoplastic and capable of resisting temperatures in excess of 200 degrees Centigrade. Such insulation is employed for cables made under the name of Irraydol by the Wandleside Cable Works.

* * *

The shape of things to come—automation, transistors, atomic energy and radio activity—could be discerned in a survey of the stands. The special components designed for use with printed circuits, and for automatic installation in them, foreshadowed the robot assembly lines of the electronics factories of the future. A public address amplifier on the Lustraphone stand no larger than a box camera but capable of ten watts of audio output when powered by a 12 volt battery showed the advance in the transistor field while articles in niobium and zirconium on the Murex stand demonstrated how these, until recently, metallic curiosities are in demand in the nuclear energy field with which the art of electronics is so closely allied—*W.H.A.*

The London Audio Fair

THE first London Audio Fair, held at the Washington Hotel, Mayfair, in April, 1956, was a great success, the attendance, despite inclement weather, being well in excess of 23,000 for the three days. On the ground floor of the hotel forty exhibitors displayed their varied products while the majority had demonstration rooms as well where the merits of the many different types of equipment could be judged.

The Acoustical Manufacturing Company's demonstration of a full frequency range, distortionless, push-pull electrostatic speaker aroused very great interest. This is a development of the model demonstrated at the B.S.R.A. Exhibition last year and employs the principles described in the articles "Wide Range Electrostatic Speakers" by P. J. Walker which appeared in the *Wireless World* for May to August, 1955.

The new presence unit for the G.E.C. Metal Cone loudspeaker also drew large crowds and in the minds of many visitors the controversy concerning this speaker has now been finally answered. On the same stand G.E.C. (née Osram) valves for audio applications were also displayed.

E.M.I. exhibited the Emisonic range of reproducing equipment comprising the Model 3055 pre-amplifier and the Model 3056 power amplifier which has a power output of 20 watts. A noteworthy feature of the pre-amplifier is that printed circuit technique is used; a presence control is employed in addition to the usual equalizing and balance controls. These two items are designed to be used in conjunction with the Model 3054 loudspeaker unit which incorporates a 13¾in. elliptical bass reproducer and a 24in. electrostatic high frequency unit which is bowed over an arc of 60° to give wide non-directional high frequency distribution. The new "99" long play recording tape giving an increase of 50 per cent in playing time compared with standard types was also on show. Mullard, Ltd., were another firm showing audio valves.

Thermionic Products, Ltd., introduced a 10 watt amplifier and control unit which utilizes the popular and successful ultra-linear output stage and has a frequency response within 0.5 db from 20 to 30,000 c/s. The total harmonic distortion is 0.05 per cent. The sensitivity of the control unit is 6 mV.

Reslosound, Ltd., showed a miniature ribbon microphone and a new dynamic microphone type DP which is not subject to the hazards of sweating or fouling by ferrous dust. This is a tube type with a corrected pressure gradient characteristic thereby making it directional. Lustraphone, Ltd., were showing their universally adopted full vision pencil series model type LFV/59 microphones, which are available in various stylings for the widest variety of uses under practically every condition and requirement. Cosmocord, Ltd., had their excellent range of microphones on show and of particular interest in their wide variety of pick-ups was the GP.61 ceramic turnover cartridge.

Collaro, Ltd., were exhibiting a new tape transcriptor consisting of a tape deck fitted with four heads with twin tracks and running speeds of 3¾, 7½ and 15in. per second. Truvox, Ltd., showed the new tape recorder type R1 which embodies all the excellent facilities embodied in the Mk. III tape deck. A mechanical counter is supplied as an optional extra, whereby a given portion of the tape can be accurately located. Grundig (Great Britain), Ltd., were demonstrating the TK 820/3D "specialist" tape recorder which has two speeds (3¾ and 7½in. per second). The twin track recording system used gives 2,400 ft of sound track per spool, reversing being fully automatic.

Dynatron, Ltd., showed the F.M.1 and Ether Pathfinder A.M./F.M. Tuner type T.10. The F.M.1 is a pre-tuned f.m. tuner unit, station selection being achieved by the use of a simple switch.

Plessey, Ltd.'s Ionophone loudspeaker type D15 is a development of Klein's original Ionophone with a remarkably smooth frequency response from 2,000 c/s and seems to possess complete freedom from interference. This speaker employs no moving parts as the sound waves are created by glow discharge from a kanthal electrode contained in a small quartz glass tube.

An American visitor remarked that the Fair was a great deal better than anything similar held in the U.S.A. That seems to augur well for the future.—*E.F.*

North Eastern Regional Meeting

to be held on

SUNDAY, JULY 8, 1956

at

THE WINDMILL HOTEL,
BLOSSOM STREET, YORK

Programme

Assemble - - -	1.0–1.30 p.m.
Meeting - - - -	2 p.m.
Lecture (To be announced)	3.30–4.30 p.m.
High Tea - - - -	5.30 p.m.
Draw for Prizes - -	6.15 p.m.
Group Photo - - -	6.30 p.m.

Tickets, price 8/6 each, may be obtained from the T.R., G. Nottingham, (G3DTA), 23 Abbotsway, Muncaster, York.

An Official Guide will be provided to conduct those not attending the meeting on a sight-seeing tour.

Society News

Amateur Radio Exhibition

FROM time to time it has been suggested that the Amateur Radio Exhibition should be held elsewhere than in London. With that thought in mind the Council decided at its February 1956 meeting to invite the Manchester, Birmingham and Bristol Groups (in that order) to undertake the organisation of the 1956 Exhibition. For various reasons the three Groups declined the invitation.

The Council has now decided not to hold an Amateur Radio Exhibition during 1956.

The question of holding a London Exhibition during 1957 at a new venue will be discussed by the Council later this year.

The Post Office Radio Interference Service
An Official Statement

THE basic principles on which the Post Office radio interference investigation service operates are:—

(a) The service is set in motion by individual complaints by licensees who are experiencing interference.
(b) The cost of tracing a source of interference is borne by the general body of persons who complain of it.
(c) The cost of curing interference is borne by the persons causing it.

The service is intended primarily to meet the needs of the public sound and television broadcasting services; and the costs of the service to holders of broadcast receiving licences is met out of the revenue accruing from licence fees. Two conditions have first to be observed by an applicant for the service.

(a) The programme which he is trying to receive must be one of those appropriate to his area.
(b) He must satisfy the Post Office that all reasonable steps have been taken with his receiving installation to minimise the effects of the interference.

In the case of amateurs, the licence fees have been calculated on the basis of the costs to the Post Office of the work associated with issuing and amending the licences. No element has been included in the fees to provide for interference investigation, the reasons being:—

(a) The Post Office is not equipped or staffed to handle anything more than very occasional requests by amateurs.
(b) The Post Office could normally only investigate interference of such a strength as would cause appreciable interference to a reasonably strong broadcast wanted signal; and it is difficult to devise a simple means of ensuring that this condition is met, before an investigation is made, in the case of amateurs, who customarily work on very low received signal strengths.
(c) Many amateurs, because of their technical knowledge, may prefer to trace interference themselves.
(d) To keep down the cost of the amateur licence.

In the light of these considerations, it has been thought preferable that the cost of tracing interference to amateurs should be recovered from the individual amateurs wishing to avail themselves of the service; and the service is therefore put at their disposal on a repayment basis.

When a source of interference has been traced, the Post Office has usually been able to secure clearance of the trouble, or at least its reduction to a reasonable level, by the goodwill of the owner of the source. In the small minority of cases in which co-operation is not forthcoming, the receiving licence can be revoked if the cause of the trouble is a radio or television receiver, and use can be made of Statutory Regulations where an appliance driven by a small electric motor is involved.

R.S.G.B. News Bulletin Service
GB2RS 3600 kc/s
Sundays—10.00 B.S.T.

London Lecture Meetings

BOTH the February and March meetings, held at the Institution of Electrical Engineers, London, were well attended.

At the February meeting, with the co-operation of the London U.H.F. Group, Messrs. G.M.C. Stone (G3FZL) and D. W. Furby (G3EOH) lectured on U.H.F. Transmitters and U.H.F. Receivers respectively and displayed typical examples of contemporary amateur practice in the u.h.f. field.

"Colour Television" was the subject of Mr. P. S. Carnt's lecture at the crowded March meeting, at which the President, Mr. R. H. Hammans (G2IG), took the chair. Mr. Carnt used an experimental colour receiver and slides to illustrate his lecture, which was followed by a lively discussion. A vote of thanks was proposed by Past President Arthur O. Milne (G2MI).

(We hope to publish a précis of Mr. Carnt's outstanding lecture in a future issue of the BULLETIN—Ed.)

"Fundamental Principles of Modulation"

ON page 319 of the January, 1956, issue under the heading "Modulation Depth" the sentence which begins "The ratio of A or B . . . " should read "The ratio of A or B (which are assumed to be equal) to C is known as the 'modulation depth' or 'modulation factor'."

Mr. David Wooderson (G3HKK) is thanked for suggesting a clarification of the text.

Tests and Contests

Affiliated Societies' Contest 1956

THE question asked last year, "Has the Stourbridge & District Society come to stay as the Ace of Clubs?" seems to have been answered, for this year they are once again winners of the Edgware Trophy. Surrey Radio Contact Club have pulled up from fourth to second place while the R.A.F. Amateur Radio Society (Locking) made a fine effort in improving their position from thirteenth to third.

Interest in the contest this year is shown by the number of logs submitted, a total of 37, an increase of 10 over last year. From the comments received by the Contests Committee it is clear the contest spirit was very much in evidence and although many stations suffered from the effects of the cold weather all operators who took part enjoyed their turn on the key.

Thanks are due to the many other stations who came on during the contest and gave single points to those who managed to work nearly all competing stations, a factor which helped to give the leaders their position in the table. No station worked all competitors.

TT.11s and 807s were again equally popular as p.a. valves while the HRO took pride of place as the receiver. The majority of aerials were half-wave, although one station put up 500ft of wire 40ft high and another 199ft at a height of 120 ft.

Thanks are due to Coventry Amateur Radio Society (G2ASF) and Ilkeston and District Amateur Radio Society (G3JSZ) for submitting check logs.

Position	Society	Call-sign	Points
1	Stourbridge & District Amateur Radio Society	G3BMY	783
2	Surrey Radio Contact Club	G3BFP	761
3	R.A.F. Amateur Radio Society	G8FC	720
4	Harlow & District Radio Society	G3ERN	716
5	Gravesend Amateur Radio Society	G3GRS	709
5	Sutton & Cheam Radio Society	G2AYC	709
7	Thames Valley Amateur Radio Transmitters Society	G6MB	707
8	West Kent Amateur Radio Society	G3JRD	697
9	Courtauld's Amateur Radio Group	G3CQD/A	696
10	Sheffield Amateur Radio Club	G4JW	690
11	Oxford & District Amateur Radio Society	G3KLH	688
12	Slade Radio Society	G3JBN	686
13	Cheltenham Amateur Radio Society	G3GPW	685
14	Grafton Radio Society	G2AOW	682
15	Bournville Radio Society	G6BV	651
16	Thanet Radio Society	G3DOE	646
17	Barnsley & District Amateur Radio Club	G2AFV	629
18	Ariel Radio Group	G3GDT	604
19	Medway Amateur Receiving & Transmitting Society	G2FJA	595
20	Vickers-Armstrongs (Aircraft) Limited Sports Club	G3IVW/A	590
21	Acton, Brentford & Chiswick	G3IIU	585
21	Portsmouth & District Radio Society	G3DIT	585
23	North Kent Radio Society	G3ENT/A	582
24	Salisbury & District Short Wave Club	G3FKF/A	568
24	Wirral Amateur Radio Society	G2AMV	568
26	Nottingham University Radio Society	G3JKO	554
27	South Shields & District Amateur Radio Club	G3DDI	541
28	Edgware & District Radio Society	G3ASR	539
29	Admiralty Electronics Society, Bath	G3BPU	530
30	Kingston & District Amateur Radio Society	G3KIN	520
31	Aberdeen Amateur Radio Society	GM3BSQ	478
32	York Amateur Radio Society	G3HWW/A	474
33	Scarborough Amateur Radio Society	G4BP	368
34	Romford & District Amateur Radio Society	G2BVN	348
35	Ravensbourne Amateur Radio Club	G3HEV/A	103

First Top Band Contest, 1956

THIS contest followed a very similar pattern to the November event, approximately equal entries again being received for each of the two sections. W. A. Higgins (G8GF) is to be congratulated on repeating his previous success in the Long Section, while S. J. Heard (G3IEW) narrowly displaced G3BMY and G3IGW to take second place in the same section.

W. R. Steverson (G3JEQ) gained a clear lead in the Short Section over G8GF and G3IEW, but was unable to maintain it in the early hours and was finally placed fifth in the Long Section.

Those who stayed up for the full period were rewarded by the unusual appearance of four German stations—at the time of the contest they had permission to operate between 04.30 and 06.30, but this concession has since been withdrawn. Conditions on the whole were fair (they were not good to begin with, but scoring rates did not suffer unduly in the scramble among the "regulars") and soon improved.

The Contests Committee would like to repeat its plea to all those who take part to send in their logs —there was evidence in the entries received of a number of stations being active for quite long periods of the contest without submitting entries. The two experimental split contests, and the comments received upon them from entrants, have provided the Committee with many points for discussion before the rules for the next event are decided upon, but anyone interested and who has not already expressed his views is invited to do so between now and August—write to the Hon. Secretary of the Committee, c/o Headquarters.

Equipment used by the leading stations was as follows:

G8GF: e.c.o. (6J5)-p.a. (807); half-wave end fed aerial; HRO receiver.

G3IEW: e.c.o. (6S17)-b.a. (6SJ7)-b.a. (6AG7)-p.a. (6L6); half-wave end fed aerial; HRO receiver.

G3JEQ: "G5RV" all-band transmitter; half-wave end fed aerial; CR100 receiver.

G3BMY: V.f.o.-b.a.-b.a.-p.a. (807); half-wave end fed aerial; CR100 receiver.

G3IGW: V.f.o. (6AB7)-b.a. (6L6)-p.a. (807); 400-foot tapped wire aerial; Eddystone 750 receiver.

Check logs are gratefully acknowledged from HB9QA, G2IM, G2HCZ, G3AAJ, G3BZG, G3JBN, G3KRC, G6QM, DL1IX.

Short Section

Psn.	Call-sign	Points	Psn.	Call-sign	Points
1	G3JEQ	112	20	G2KK	57
2	G8GF	107	20	G3IWC	57
2	G3IEW	107	22	G4XC	56
4	G3BMY	106	23	GD3UB	55
5	G2JF	104	23	G3BHR	55
5	G5JU	104	25	G3JVU	52
7	G6BQ	97	26	G4CM	51
8	G3GZB	88	26	G3JBK	51
9	G2AOW	86	28	G3CWW	45
10	G3ERN	84	†	G3FVG	44
11	G4DC	82	29	G3IIS	43
12	G6VC	80	29	G3JKO	43
13	G3KKP	79	31	G3FZC	41
14	G2AZY	74	31	G3HKX	41
15	G3FRV	72	33	G3HTI	38
16	G3KLH	69	34	G2XP	37
*	G5MP	64	35	G3JSN	28
†	G3KKZ	64	36	G8BN	26
17	G3HIW	63	37	G2HDR	24
17	G3JII	63	38	G2BLA	22
19	G5MR	61			

* *Disqualified—late entry.* † *Disqualified—no declaration.*

Long Section

Psn.	Call-sign	Points	Psn.	Call-sign	Points
1	G8GF	158	20	G3HDZ	88
2	G3IEW	156	21	G3HES	86
3	G3BMY	155	22	G3IRL	84
3	G3IGW	155	23	G4CM	82
5	G3JEQ	150	24	G3JBK	81
6	G6BQ	145	25	GM3EHI	79
7	G3ERN	121	26	G3JUZ	78
8	G3FUR	113	27	G3FZC	76
9	G5MR	108	27	G3GFS	76
10	G4XC	104	29	G3KPJ	74
10	G3IXX	104	30	G2XP	70
*	G5MP	102	31	G3FDS	69
12	G2KK	98	32	G2ZR	68
13	G3KLH	97	33	G6OO	59
14	G3HIW	95	34	G3GDW	58
15	G2ZZ	92	*	G3JFT	52
15	G3JKO	92	35	G2BLA	42
17	G3YF	89	36	G3KDF	36
17	G6UT	89			
17	G3AKY	89			

** Disqualified—late entry.*

Direction Finding Contests, 1956

DETAILS of the Edgware qualifying event are as follows:—

Sunday, June 10

Organiser: R. H. Newland (G3VW), 10 Holmstall Avenue, Edgware, Middlesex (COLindale 1443).

Frequency: 1873 kc/s.

Call-sign: G3BZG/P.

Map: Ordnance Survey, New Popular Edition, Sheet 161.

Assembly Point: Merrion Avenue, adjacent to Stanmore Station (Metropolitan Line), N.G.R. 51/175925.

Assembly Time: 13.30 B.S.T.

Intending competitors should notify the Organiser at least 7 days in advance, stating the number in their party requiring tea. The venue for tea will be announced at the start of the event.

National Field Day, 1956

THE Official List of Stations taking part in National Field Day on June 2-3 will be sent to all T.R.s and A.R.s early in May. Any member who wishes to obtain a copy may do so by sending a stamped addressed envelope to Headquarters.

144 Mc/s Contest, 1956

RULES for this contest are substantially the same as last year, but only fixed station operation will be permitted. *No portable or mobile station entries will be accepted,* but contacts with such stations may be claimed by fixed stations. The rising serial number has been added to the reports exchanged, also the letter "A" to indicate operation on 144 Mc/s to avoid any confusion in contacts with other European stations which may be competing in multi-band events.

Rules

1. The Contest is open to all fully paid-up members of the R.S.G.B. resident in Europe.

2. Only the entrant will be permitted to operate the station for the period of the contest.

3. Contacts may be made on telephony, c.w. or m.c.w.

4. An entrant must operate in accordance with the terms of his licence.

5. The station must be operated for the duration of the event from the address shown on the entrant's licence. The National Grid Full Six-Figure Reference must be given in all entries from G, GD, GM and GW. In all other cases entries must show the latitude and longitude (to the nearest minute) of the station location.

6. Only one contact with a specific station, whether fixed, portable or mobile, will count for points. Proof of contact may be required.

7. Contacts with unlicensed stations will not be permitted to count for points.

8. Entries should be written on lined foolscap or quarto paper or typed on plain paper (on one side only, please) and must be set out in the form shown below:—

144 Mc/s CONTEST, JULY 7–8, 1956

Name..... Claimed Score.....

Address..... Call-sign.....

National Grid Full Six-Figure Reference (or latitude and longitude—see Rule 5 above).....

Transmitter..... Aerial system.....

Receiver .....

Time G.M.T.	Call-sign of station worked	My report on his signals	His report on my signals	Location	Estimated distance (miles)
1705	G3—	579A001	569A011	Oxford	40
1710	G2—	559A002	569A014	Bedford	55
1718	EI2—	569A003	549A020	Dublin	200
1730	G3—	55A004	56A031	Watford	30
				Claimed score :	325

Declaration: I declare that my station was 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.....

9. The contest will start at 17.00 G.M.T. on Saturday, July 7, and finish at 19.00 G.M.T. on Sunday, July 8, 1956.

10. An exchange of RST or RS reports, followed by the letter "A" and a three-figure serial number starting between 001 and 100 and increasing by one with each successive contact, together with station location, will be required before points may be claimed, e.g., RST579A001 Oxford.

11. For each contact, points may be claimed equal to the number of miles between the two stations.

12. Entries must be addressed to the Hon. Secretary, R.S.G.B. Contests Committee, Radio Society of Great Britain, New Ruskin House, 28/30 Little Russell Street, London, W.C.1, and must bear a postmark not later than Monday, July 16, 1956.

13. The Mitchell-Milling Trophy will be awarded to the winning entrant. A Certificate of Merit will be awarded to the entrant placed second.

First 420 Mc/s Contest, 1956

OPERATION from several locations, if desired, will be permitted during this contest, and operators may use portable, mobile or fixed call-signs. The rising serial number rule has been added, as this is now general practice in accordance with the I.A.R.U. recommendation. In addition, a letter "B" is to be sent in each report between the RST or RS report and the serial number, to indicate the band in use. The addition of this letter is intended to avoid any confusion which could otherwise arise as to the band in use, where the dates of R.S.G.B. v.h.f. events coincide with other European v.h.f./u.h.f. events—in 144 Mc/s contests the letter "A" will be used, in 1250 Mc/s the letter "C," etc. In multi-band events, the appropriate letter to the band in use will be used during each contact, thus avoiding the possibility of working or calling harmonics.

Rules

1. The Contest is open to all fully paid-up members of the R.S.G.B. resident in Europe.

2. Any mode of transmission may be used, provided that the entrant adheres to the terms of his licence.

3. The station may be operated from more than one location. The National Grid Full Six-Figure Reference must be recorded in the log for each location in the case of entries from G, GD, GM and GW. In all other cases, entries must show the latitude and longitude to the nearest minute of the station locations. Logs must show clearly when station location has been changed.

4. Only one contact may be made with a specific station, whether fixed, portable or mobile, during the contest. Proof of contact may

be required, and contacts with unlicensed stations will not be permitted to count for points.

5. Entries should be written on lined foolscap or quarto paper, or typed on plain paper (on one side only, please), and must be set out in the form shown below :—

FIRST 420 Mc/s CONTEST, JUNE 17, 1956

Name..... Claimed Score.....
Home Address..... Call-sign.....
Site(s) of station.....
National Grid Full Six-Figure Reference(s) (or latitude and longitude—see Rule 3).....
Transmitter .....
Receiver..... Aerial system(s).....

Time G.M.T.	Call-sign of station worked	My report on his signals	His report on my signals	Location received	Estimated distance (miles)
0905	G6AAA	559B001	469B005	Oxford	50
0915	G8BBB	569B002	589B003	Bedford	45
0935	G5XYZ/M	56B003	56B010	Watford	25

(Whenever location is changed the new position must be shown against the log entry for the first contact from the new position —see Rule 3.)

Claimed score : 120

Declaration : I declare that my station was 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.....

6. The Contest will start at 09.00 G.M.T. and finish at 23.00 G.M.T. on Sunday, June 17, 1956.

7. An exchange of RST or RS reports, followed by the letter "B" and a three-figure serial number starting between 001 and 100 and increasing by one for each successive contact, together with station location, will be required before points may be claimed, e.g., RST559B001 Oxford.

8. For each contact points may be claimed equal to the number of miles between the two stations.

9. Multiple-operator entries will be accepted provided that (a) the call-sign and signature of the operator concerned is recorded for each contact; (b) the declaration is signed by only one operator, who will be regarded as the entrant. The combining of entries from more than one station (other than fixed-, portable- or mobile-operation under the same call-sign) is not permitted.

10. Entries must be addressed to the Hon. Secretary, R.S.G.B. Contests Committee, Radio Society of Great Britain, New Ruskin House, Little Russell Street, London, W.C.1, and must bear a postmark not later than July 2, 1956.

Electronics Exhibition, 1956

THE Eleventh Annual Electronics Exhibition organized by the Northern Division of The Institution of Electronics will be held at the College of Technology, Manchester, from July 12 to 18, 1956. Tickets of admission will be available free of charge from exhibitors or from the Hon. Exhibition Secretary, Mr. W. Birtwistle, 78 Shaw Road, Thornham, Rochdale, Lancs.

Radio Astronomy Lecture

DR. Martin Ryle (G3CY) of the Department of Physics, University of Cambridge, is to give a lecture on "Possible Amateur Programmes in Radio Astronomy" to the British Astronomical Association on May 30, 1956. The meeting will be held in the Lecture Hall of the Royal Astronomical Society, Burlington House, London, W.C.1, commencing at 5 p.m. Although accommodation is limited, R.S.G.B. members are invited to attend.

Silent Keys

SIDNEY ALLCORN (G2FIH)

The death occurred on February 5, 1956, of Sidney Allcorn (G2FIH) who had been a member of the Society since 1938. A keen radio amateur, Mr. Allcorn edited the magazine *Aurora* before the last war. For more than 36 years he had been House Steward at Leighton House in Kensington, the former home of the famous Victorian artist Lord Leighton, which is now a museum, meeting place and library.

To his widow and young daughter Tonia we extend our sympathies.

JACK BOOTH (G3DMP)

With regret we record the death on February 7, 1956, of Jack Booth (G3DMP), of Wakefield. Licensed since 1948, his principal interests lay in the technical field and in operation on low frequency bands. His station was entirely home-made. He will be greatly missed by his many friends.

Our sympathy is extended to his widow and four children.

W. F.

CHARLES G. BULLOCK (G3HHG)

It is with deep regret that we report the death at the early age of 27 of Charles H. Bullock (G3HHG), of Merry Hill, Wolverhampton, after an illness of nearly three years. He was a keen amateur and a popular member of the Wolverhampton Radio Society, his main interest being single sideband. From 1949 until the commencement of his illness in 1952, he was an Assistant Experimental Officer with the Ministry of Supply at Malvern.

To his father and mother we offer our condolences in their tragic loss.

ERIC J. HARTLEY (G2FBI)

We regret to report the death of Eric J. Hartley (G2FBI), of Burnley, on January 28, 1956, and extend our sympathies to his wife in her bereavement.

JOHN ALEXANDER HAY (G3AAR, GM3AAR)

John Alexander Hay (G3AAR, GM3AAR) was the Radio Officer of the York airliner which crashed in Malta shortly after take-off on February 18, with the loss of all on board.

John Hay became interested in radio as a hobby whilst still at school in 1933; he joined the Society, as B.R.S.1948, in 1935 and became T.R. for Hull in 1936-37. During the war he served in the Royal Artillery on radar duties, attaining the rank of Staff Sergeant. On demobilisation he settled in North Kensington and obtained one of the first post-war amateur licences. In 1952 he took up duties as an airlines Radio Officer, moving to Scotland shortly afterwards. In 1954 he returned to the South of England.

A keen c.w. operator, who worked many rare DX stations without the aid of elaborate aerial systems or high power, he was always ready to help others. He will be sadly missed by his many friends as a radio amateur in the best sense.

Our deepest sympathy is extended to his widow and young son in Caterham, and to his parents in Hull. B.R.S.1936.

REGINALD MITCHELL (G5LH)

With deep regret we record the death on February 2, 1956, at the age of 58, of Reginald Mitchell (G5LH). First licensed as G5KZ in 1921, he was licensed again as G5LH in 1936 after a lapse of 7 years. He was a member of the First Class Operators' and TOPS C.W. clubs and was active on most bands until just before his death. His interest in Amateur Radio was very great and his passing will be mourned by his many friends.

The funeral was attended by Messrs. W. T. Pickard (G8KP), R. L. Duthie (G6IW) and T. F. Herdson (G6ZN).

To his relatives we extend our sympathy in their bereavement.

T. F. H.

W. L. V. (VIC) PARKER (G6WJ)

With the passing of Vic Parker (G6WJ), of Barmston, near Driffield, Yorkshire, Amateur Radio has lost one of the real old-timers. Despite indifferent health for some time, he was a regular member of the local net. Only the day before his death he was discussing the erection of a new aerial system.

The Society was represented at the funeral by Zonal Representative W. R. Metcalfe (G3DQ), J. A. North (G2KO) and D. J. Redshaw (G3GAW).

Our sympathy is extended to his wife in her sad bereavement.

HAROLD SIDNEY URCH (G6DJ)

The death occurred in January, 1956, of Harold Urch (G6DJ). Although not active since the war, he was a popular member of the Bristol group and was an enthusiastic member of the District 5 team which won N.F.D. in 1934. His first experiments in wireless took place before the First World War. Later, he was a marine operator for a time.

He will be greatly missed, particularly by older members. We extend our sympathies to his wife and family. G5UH

Council Proceedings

Résumé of the Minutes of the Proceedings at a Meeting of the Council of the Radio Society of Great Britain, held at New Ruskin House, Little Russell Street, London, W.C.1, on Thursday, December 15, 1956, at 6 p.m.

Present.—The President (Mr. H. A. Bartlett in the Chair), Messrs. L. Cooper, C. H. L. Edwards, D. A. Findlay, R. H. Hammans, F. Hicks-Arnold, J. H. Hum, R. G. Lane, A. O. Milne, L. E. Newnham, and John Clarricoats (General Secretary).

Apologies for Absence

Apologies for absence were submitted on behalf of Messrs. W. H. Allen (in hospital), W. H. Matthews, W. R. Metcalfe, H. W. Mitchell and W. A. Scarr.

* * *

Membership

(a) *Resolved* (i) to elect 86 Corporate Members and 7 Associates; (ii) to grant Corporate Membership to 5 Associates who had applied for transfer; (iii) in future not to publish in the Résumé the name of any blind member whose subscription has been waived.

(b) The Secretary reported that of the 713 members whose subscriptions became due on September 1, 1955, 106 became overdue on November 30, 1955. Of this number 12 were London, 58 were Country, 27 were Overseas Corporate Members and 9 were Associates. Of those overdue 5 London, 35 Country and 20 Overseas Members held call-signs.

The Secretary submitted details of the 11 Members (including 1 Associate) who had written to resign during the 4 weeks ended December 10, 1955. Of this number 4 gave no reason and 7 stated they had lost interest.

Applications for Affiliation

Resolved to grant affiliation to the University of Bristol Amateur Radio Society.

Amateur Radio Exhibition

(a) It was reported that the paid attendance at the 1955 Amateur Radio Exhibition was 2,139 compared with 2,560 in 1954, 2,746 in 1953 and 2,707 in 1952. A total of £287 13s. 0d. was taken on the R.S.G.B. stand including £97 12s. 0d. from the sale of the new edition of the *Call Book*. Although the Society's outgoing expenses were about the same as in previous years, revenue from the letting of stands showed a considerable reduction. It was estimated that the Exhibition had been run at a loss of approximately £70 compared with a profit of £32 in 1954.

(b) *Resolved* to authorise the Secretary to write letters of thanks on behalf of the Council to those members who undertook long hours of duty on the Society's stand.

Amateur Radio Call Book

(a) *Resolved* to award honoraria amounting to £5 5s. 0d. each to Messrs. Tyndall and Biggs in appreciation of their services to the Society in connection with the preparation of the 1956 Edition of the *Call Book*.

(b) *Resolved* to accept an estimate from South London Press, Ltd., for printing 1,000 additional copies of the *Call Book*.

Staff

The Secretary reported that all efforts to recruit additional clerical assistance had so far failed. An advertisement in *The Daily Telegraph* had produced no results.

£3% Defence Bonds (Fourth Issue)

Resolved to convert the Society's current holding of £1,000 3% Defence Bonds into £1,000 4% Defence Bonds (Conversion Issue) on May 1, 1956.

V.H.F. Liaison Officers' Meeting

A copy of the Minutes of a Meeting of V.H.F. Liaison Officers, held in Brussels during the weekend of November 18-20, 1955, was submitted for information. (A précis of the Minutes appeared in the January issue of the BULLETIN.—Ed.).

Whitworth Cup

The Secretary reported that Mr. W. Whitworth (B.R.S. 20480), of Cambridge, had donated a cup to the Society.

Resolved (a) to accept on behalf of the Society the cup donated by Mr. Whitworth; (b) to record the Council's thanks to Mr. Whitworth; (c) to invite the Contests Committee to suggest a Contest or Event for which the Cup can be presented.

Election of Council 1956

The Secretary reported that due to a mistake members were asked to vote for five instead of four Ordinary Members to fill the vacancies in the Council which would occur on December 31, 1955.

Resolved to authorise the President and General Secretary to take immediate advice on the difficulties which had arisen with a view to being in a position to give an answer prior to the Annual General Meeting on December 16, 1955. (A statement dealing with the Election of Council for 1956 appeared in the January, 1956, issue of the BULLETIN—Ed.).

Cash Account

Resolved to receive and adopt the Cash Account for November, 1955, as prepared and submitted by the General Secretary.

Reports of Committees

Resolved (a) to receive and adopt as Reports the Minutes of Meetings of the R.A.E.N., Technical, Contests, Exhibition (Home Constructors' Section) and V.H.F. *ad hoc* Committees; (b) to adopt the various Recommendations contained in the Reports of the Contests and V.H.F. *ad hoc* Committees.

The Recommendations dealt with (i) the award of Society trophies to Contests Winners; (ii) the setting up of the necessary machinery for the co-ordination of v.h.f. activities throughout the United Kingdom by the holding of National and Regional Conventions and Meetings, and the publication of technical articles; (iii) a proposal authorizing Messrs. Hammans and Scarr to make tentative arrangements for the holding of a v.h.f. convention in London during 1956.

Headquarters' Station

The following resolution was submitted from the Bristol Group:—

"That whilst thanking Council for their full and prompt reply to our request for information concerning the sale of Headquarters' Station equipment, the Bristol Group nevertheless accepts this with the reser-

vation that in their view the amount of commission and expenses allowed to be deducted was excessive, bearing in mind the circumstances involved in the transaction."

Resolved to receive the resolution.

Other Business

The President read to the meeting a resolution recently passed by members of the Scarborough Amateur Radio Club. The resolution commented on some alleged dissatisfaction during the visit of the General Secretary to Scotland. The General Secretary undertook to write to the Scottish R.R. concerned and to report the correspondence at the next meeting of the Council.

Retiring President

Members spoke in praise of the manner in which the President had performed his duties during the year. Mr. Bartlett, in reply, thanked his colleagues for their kind remarks. He also spoke of the services rendered to the Society by Mr. Leslie Cooper (retiring Penultimate Past-President) who would not be seeking re-election. Mr. Cooper thanked the President and other members of Council for their good wishes.

The meeting terminated at 9.5 p.m.

Résumé of the Minutes of the Proceedings at a Meeting of the Council of the Radio Society of Great Britain, held at New Ruskin House, Little Russell Street, London, W.C.1, on Tuesday, January 17, 1956, at 6 p.m.

Present.—The President (Mr. R. H. Hammans in the Chair), Messrs. H. A. Bartlett, C. H. L. Edwards, D. A. Findlay, R. G. Lane, W. H. Matthews, W. R. Metcalfe, H. W. Mitchell, A. O. Milne, W. A. Scarr, J. Taylor and John Clarricoats (General Secretary).

Apology for Absence

An apology for absence was submitted on behalf of Mr. J. H. Hum.

* * *

Welcome to New Member

The President extended a warm welcome to Mr. J. Taylor, newly-elected Zonal Representative.

Scottish O.R.M.

Arising from a discussion which took place at the previous meeting, the Secretary submitted correspondence which had passed between himself and two Society Representatives in Region 14. Both representatives had expressed surprise that complaints of alleged dissatisfaction had reached the Society through the medium of a resolution passed at a meeting of a local club.

The information contained in the correspondence was noted.

Membership

(a) *Resolved* (i) to elect 36 Corporate Members and 5 Associates; (ii) to grant Corporate Membership to 6 Associates who had applied for transfer.

(b) The Secretary reported that of the 765 members whose subscriptions became due on October 1, 1955, 126 became overdue on December 31, 1955. Of this number 20 were London, 74 were Country and 24 were Overseas Corporate Members and 8 were Associates. Of those overdue 10 London, 34 Country and 21 Overseas members held call-signs.

(c) The Secretary reported that 13 members wrote to resign during the five weeks ended January 14, 1956. Of this number 3 had resigned on financial grounds, 4 gave no reason, 5 stated they had lost interest and 1 was on National Service.

The Secretary reported that during the first seven months of the present financial year approximately 850 members had failed to renew their subscription at the end of 3 months, and approximately 450 new members had been elected, representing a nett loss of approximately 400.

Applications for Affiliation

Resolved to grant affiliation to the undermentioned Societies and Clubs:—

Glasgow University Radio Society,

Amateur Radio Club, Royal Air Force Station, Changi, Singapore.

Malayan Amateur Radio Transmitters' Society.

Zonal Representation

The view having been expressed that it appears anomolous that zonal representatives can be elected to Council with, in effect, only 10 votes, consideration was given to a proposal that a new method of electing zonal representatives should be evolved.

Resolved to give further consideration to the proposal at the March, 1956, meeting of the Council.

Certificates and Awards Booklet

The Secretary was authorised to obtain estimates for printing a certificates and awards booklet.

B.E.R.U. Contest Rules

Consideration was given to correspondence from the Contests Manager of N.Z.A.R.T. in which he mentioned that the 1956 B.E.R.U. Contest rules reached him too late to be published in the December, 1955, issue of *Break In*.

After general discussion it was agreed to leave the matter of B.E.R.U. Contest rules with the Contests Committee.

Region I V.H.F./U.H.F. Rules

Consideration was given to a Report, prepared by the Contests Committee, on the rules for Region I V.H.F./U.H.F. Contests published in the December, 1955, issue of the BULLETIN.

During the discussion it was pointed out that the Region I Contest rules would not replace the rules drawn up by the R.S.G.B. Contests Committee for R.S.G.B. V.H.F./U.H.F. Contests.

It was agreed to refer the Report of the Contests Committee to the *ad hoc* V.H.F. Committee with a recommendation that the information contained therein be used as a basis for a Stresa I.A.R.U. Conference paper.

Resolution from Guildford

Consideration was given to a resolution passed at a Guildford Group meeting regarding the publication in the BULLETIN of papers read at meetings of the Society held at the Institution of Electrical Engineers, London.

The Secretary's reply to the Group was approved. In this he explained that the authors of technical papers are always invited to prepare an article for publication in the BULLETIN.

Recorded Lecture Library

Mr. Edwards agreed to arrange for all future technical lectures delivered to the London membership at the Institution of Electrical Engineers to be recorded, with a view

to their being included in the R.S.G.B. Recorded Lecture Library.

Abolition of the 12 months' Probationary Period on C.W.

A petition was submitted signed by 4 R.S.G.B. members and 7 non-R.S.G.B. members (6 of whom were not licensed) resident in Cannock, Staffs, protesting against the abolition of the 12 months' probationary period on c.w.

The Secretary's reply to the petition was approved. In this he pointed out that the recent "relaxation" simply meant that the G.P.O. had reverted to the pre-war arrangement which permitted everyone to use telephony on being licensed.

Printing Charges

A letter was submitted from Haycock Press, Ltd., in which notice was given that charges for printing done after January 1, 1956, would be increased by at least 10 per cent.

Cash Account

Resolved to receive and adopt the Cash Account for December, 1955, as prepared and submitted by the Secretary.

Reports of Committees

Resolved to receive, as a Report, the Minutes of a Meeting of the *ad hoc* V.H.F. Committee held on January 5, 1956, and to adopt the recommendations contained therein.

The recommendations dealt with proposals to hold V.H.F. Conventions in London and in the North of England during 1956, and to set up a permanent V.H.F. Committee.

Resolved to hold a V.H.F. Convention at the Royal Hotel, London, on Saturday, May 26, 1956.

Resolved to receive, as Reports, the Minutes of Meetings of the Contests Committee held on December 8, 1955, and January 5, 1956.

Other Business

Mr. Metcalfe reported that members of R.A.E.N. had done good work during the recent flood emergency in Lincolnshire and Yorkshire coastal areas.

Mr. Mitchell considered that the Contests Committee should re-introduce a B.E.R.U. Telephony Contest. Mr. Matthews agreed to discuss the matter with the Contests Committee.

Mr. Lane enquired whether the Society would reimburse local groups for the cost of providing accommodation for sponsored lectures. It was stated that the lecturer's expenses would be paid by the Society but the local group would be expected to pay the costs of the meeting.

The meeting terminated at 8.55 p.m.

Résumé of the Minutes of the Proceedings at a Meeting of the Council of the Radio Society of Great Britain, held at New Ruskin House, Little Russell Street, London, W.C.1, on Monday, February 20, 1956, at 6 p.m.

Present.—The President (Mr. R. H. Hammans in the Chair), Messrs. C. H. L. Edwards, K. E. S. Ellis, D. A. Findlay, F. Hicks-Arnold, J. H. Hum, R. G. Lane, W. H. Matthews, W. R. Metcalfe, H. W. Mitchell, A. O. Milne, L. E. Newnham, W. A. Scarr, J. Taylor and John Clarricoats (General Secretary).

Apologies for Absence were submitted on behalf of Messrs. W. H. Allen and H. A. Bartlett.

* * *

Membership

(a) *Resolved* (i) to elect 67 Corporate Members and 8 Associates; (ii) to grant Corporate Membership to 8 Associates who had applied for transfer.

(b) The Secretary reported that of the 622 members whose subscription became due on November 1, 1955, 118 became 3 months overdue on January 31, 1956. Of this number 19 were London, 81 were Country, and 15 were Overseas Corporate Members and 3 were Associates. Of those overdue 13 London, 38 Country and 11 Overseas Members held call-signs.

(c) The Secretary reported that 29 members wrote to resign during the five weeks ended February 18, 1956. Of this number 3 had resigned on financial grounds, 16 gave no reason, 6 stated they had lost interest, 3 had resigned for business or service reasons and 1 on the ground of ill-health.

Applications for Affiliation

Resolved to grant affiliation to the Deal and District Amateur Radio Club, the Glacier Radio Club and the Southampton University Amateur Radio Society.

Zonal Representation on the Council

Resolved that Mr. Taylor's period of office shall, unless ruled otherwise at a later date by the Society's legal advisers, be for a period of three years as from January 1, 1956.

Amateur Radio Exhibition

After carefully considering views put forward by the Exhibition (Home Constructors' Section) Committee and by Mr. P. A. Thorogood (Exhibition Manager) it was

Resolved (a) not to hold an Amateur Radio Exhibition during 1956 at the Royal Hotel, London; (b) to investigate the possibilities of holding an Amateur Radio Exhibition during 1956 in Manchester, Birmingham or Bristol (in that order).

The Secretary was instructed to write, in the first place, to the Region 1 Representative, and to inform Mr. Thorogood of the Council's intention, with a view to seeking his advice.

I.A.R.U. Region 1 Committee Meeting—Amsterdam

The Secretary tabled the Minutes of the I.A.R.U. Region I Committee Meeting held in Amsterdam during October, 1955. (A report of the main business discussed at the Amsterdam meeting appeared in the November, 1955, issue of the BULLETIN.—Editor.)

I.A.R.U. Region 1 Conference—Stresa, Italy

Resolved to appoint Mr. H. A. M. Clark, B.Sc.(Eng.), M.I.E.E., G6OT (Chairman of the R.S.G.B. Technical Committee) and Mr. W. A. Scarr, M.A., G2WS (Past-President of the R.S.G.B. and President of the I.A.R.U. Conference, Paris, 1950), to serve as R.S.G.B. Delegates on the Technical and Administrative Committees respectively, at the I.A.R.U. Region I Conference to be held in Stresa during June, 1956.

The 7 Mc/s Band

The Secretary was instructed to seek an assurance from the G.P.O. that the band 7000-7100 kc/s will become an exclusive amateur allocation as from March 1, 1956, and

that the United Kingdom will protest vigorously in the event of other Services being found to operate in that band.

Licence Matters

The Secretary reported upon discussions which had taken place between representatives of the Society and the G.P.O. on a variety of licence matters.

Amateur Radio Handbook

Consideration was given to a resolution passed at a meeting of East London members to the effect that the Society should publish a new edition of the *Amateur Radio Handbook*.

After discussion it was resolved to inform the East London Group that the Council is unable, for economic reasons, to proceed with plans for producing a new edition of the *Amateur Radio Handbook*.

The Secretary was instructed to explain that the Society would have to risk upwards of £2,000 on the production of a new Handbook and that the retail price would probably be of the order of 21s., compared with 3s. 6d., the price of the previous edition.

Awards and Certificates Booklet

Resolved to accept an estimate from South London Press, Ltd., for printing 3,000 copies of an Awards and Certificates Booklet. (Material for the booklet is being compiled by Mr. Ron Perks, G4CP.—Editor.)

Letter from Wing-Commander W. E. Dunn

Consideration was given to a letter from Wing-Commander W. E. Dunn, G2LR (Vice-President, R.A.F. Amateur Radio Society) in which he complained that the Minutes of the 29th Annual General Meeting of the Society conveyed the impression that the Air Ministry was responsible for dalliance in disposing of the Headquarters' station.

Resolved to publish a statement of explanation in the Society's Journal.

Letters from Mr. D. Deacon

Consideration was given to correspondence from Mr. D. Deacon, G3BCM, in which he complained that the Minutes of the 29th Annual General Meeting of the Society did not accurately record his remarks at that meeting.

The Secretary was instructed to reply to Mr. Deacon on lines suggested by the President and Hon. Treasurer.

Letter from Mr. H. Millington

Consideration was given to a letter from Mr. H. Millington, GW2BMN, in which he complained that he did not receive value for his subscription. It was resolved to receive the correspondence and to instruct the Secretary to write suitably to Mr. Millington.

BULLETIN *Deliveries*

The Secretary reported on the difficulties which had arisen as a result of a dispute in the printing industry. He stated that the Society's printers had been asked to print a skeleton February issue but had not been able to do so.

Regional and County Meetings

Resolved (a) to authorise Mr. G. A. Swinnerton to hold a District Meeting in Birmingham on April 7, 1956, and to appoint Messrs. Findlay and Newnham as representatives of the Council.

(b) To authorise Dr. E. S. G. K. Vance to hold a Regional Meeting in Leicester on May 27, 1956, and to appoint Messrs. Edwards and Metcalfe as representatives of the Council.

(c) To authorise the Secretary to enquire from the Representatives for Regions, 1, 2, 5, 6, 7, 9, 10, 11 and 12 whether it is their wish to organize a Regional or County Meeting in their Region during 1956.

Guildford Group

Consideration was given to a resolution passed at a meeting of Guildford members requesting to be informed of the reasons which had prompted the Council to advertise for a Deputy General Secretary.

The President agreed to write and explain the reasons to the Guildford Group.

Metcalfe Trophies

Mr. Metcalfe handed to the President two trophies—one a miniature of the other—which he had donated to the Society. The President thanked Mr. Metcalfe for his generous gift.

The Secretary was instructed to prepare a draft set of rules governing the award of the Metcalfe Trophy and to submit it to the next meeting of the Council.

Contest Matters

The Council accepted various recommendations of the Contests Committee concerning recent Top Band Contests.

It was agreed to include a mobile section in the first 1956 144 Mc/s Contest and to award the Whitworth Cup in connection with the forthcoming 21 Mc/s Contest.

Cash Account

Resolved to accept and adopt the Cash Account for January, 1956, as prepared and submitted by the Secretary.

Reports of Committees

Finance and Staff Committee

Resolved to receive, and adopt as a Report, the Minutes of a Meeting of the Finance and Staff Committee held on January 27, 1956.

The Committee recommended the Council to introduce a five-day week at Headquarters and to approve an increase of salary for a junior member of the staff.

Resolved to accept the recommendations.

V.H.F. Convention Sub-Committee

Resolved to receive, and adopt as a Report, the Minutes of a Meeting of the V.H.F. Convention Sub-Committee held on February 17, 1956, and the various recommendations contained therein.

R.A.E.N. Committee

Resolved to receive, and adopt as a Report, the Minutes of a Meeting of the R.A.E.N. Committee held on December 31, 1955, and one of the two recommendations contained therein.

A recommendation regarding co-operation with the British Red Cross Society was referred back to the Committee for further consideration. A recommendation authorizing the Chairman and Hon. Secretary of the Committee to incur urgent travelling expenses without prior approval of the Council up to a total of £10 in any one year was approved, as was a suggestion by the Committee that the Society should seek to co-operate with Outward Bound Schools.

The meeting terminated at 9.35 p.m.

Letters to the Editor . . .

Abolition of Morse Probationary Period Opposed

DEAR SIR,—I would like to voice my protest against the granting of the privilege of telephony operation immediately on receipt of a transmitting licence. This appears to me to be a very retrograde step which will almost certainly result in a lowering of operating standards and certainly a generation of operators will be produced who can hardly read Morse. It is quite obvious that the great majority of new licensees will never actually use c.w. at all, and consequently will never build up a solid foundation on which to base their subsequent operation. They will be the losers by it in the long run although they probably do not realise it. However, it may well be that we shall lose the advantage of being considered a useful reserve of trained operators suitable for immediate employment in time of National Emergency. This view of amateurs by those in authority has, I feel sure, been largely responsible for their tolerant attitude towards us with regards to allocation of frequency space in the very crowded radio spectrum. The newer operators will definitely not be complete operators if they can only scrape through a 12 w.p.m. test and then proceed to forget it. A lot of people do that already, of course, but the enforced 12 months of c.w. operation does a lot to get the c.w. efficiency in most cases up to a level which is never quite forgotten. I think we may lose a useful advantage in our negotiations if we allow radio amateurs to become merely a group of unskilled telephone operators. Of course, it may turn out to be an advantage to those older amateurs who can use c.w. to its best advantage.

I waited impatiently for my 'phone ticket to arrive, but those 12 months taught me how to use the simplest form of communication first and to get the transmitter efficient in that mode of transmission before launching out with another mode which is capable of causing considerable interference if not correctly adjusted, both to other amateurs and to the TV and radio public.

May I therefore suggest that 6 months should be the very minimum period of enforced c.w. operation, and that logs should be submitted as proof of activity.

I do not wish to see the very excellent hobby of Amateur Radio degenerate into a plaything for potential telephone operators. Let us be reasonably efficient in both sides of our art or we may find we will *lose* both sides. I hope that you will not support the continuation of this privilege indefinitely. I do not see that it can have any beneficial effect whatever.

Yours faithfully,

Wells Green, near Crewe. E. F. STEVENTON (G3JJA).

[Our correspondent probably does not realise that the recent "concession" granted by the G.P.O. is really only a return to the pre-war arrangement which permitted a new licensee to use telephony immediately. Our correspondent also may not know that many hundreds of pre-war amateurs joined the services in September, 1939, as skilled operators—EDITOR.]

QSL Percentages

DEAR SIR,—In the November 1955 BULLETIN, Canon Waring asks about the experience of amateurs who have QSL'd 100 per cent. over a period.

G3DKI (my home station) has been QRT for nearly four years, and it can be assumed that no more cards are now likely to arrive. QSL cards were sent to all stations on first contact, and in many cases a second reminder card was sent later. From some thousand contacts with European stations the overall proportion of replies was 54 per cent. from the U.K., and 45 per cent from the rest of Europe: the highest score from individual countries being 86 per cent. from Scotland, followed by 76 per cent. from Holland. DX stations worked were too few for statistical analysis.

Comparative figures for contacts made from Australia cannot be given accurately, because outstanding QSLs for recent contacts may yet be received; so far, however, the proportion is only 24 per cent.

Although some cards may undoubtedly go astray for various reasons, there still seem to be many amateurs who just do not bother to QSL. It would be more in keeping with the spirit of Amateur Radio if they would at least send a card in return for one received.

Yours faithfully,

Victoria, Australia. S. J. LLOYD (VK3AST), Surgeon Lt. Cdr., R.A.N.

DEAR SIR,—The percentages of QSL cards received by G5PS and others prompts me, as a British Empire station, to give below my own percentage of returns. The position is somewhat different from that of a U.K. station but at the same time an interesting comparison.

W1	70	W7	50	DL	80
W2	50	W8	74	F	69
W3	52	W9	51	HB	94
W4	72	W0	48	LU	63
W5	73	G/GM etc.	75	PY	50
W6	72				

I would add that I QSL 100 per cent to all first contacts with any station and usually through the Bureaux rather than direct.

Considering all things, I think the percentage of returns favourable, although a few of the rarer confirmations would be appreciated!

Yours faithfully,

Salisbury, Southern Rhodesia. MAL GEDDES (ZE3JO, ex-G2SO).

More Thoughts About QSLs

DEAR SIR,—I was interested to read my namesake's letter on the subject of QSLs. As a B.R.S. member who has recently returned to the great hobby after a lapse of many years I would say that I was surprised to find QSLs were still as popular—and as controversial!—as they were in pre-war days. I try to see the "other chap's" point of view and when sending cards we must face the fact that, even if it is to a DX station, a report on a contact with a G will not tell the operator very much beyond that learned during the QSO. Another point, of course, is that if he is bouncing in with a 599 signal the chances are that one *more* SWL card will not be welcomed. The thing to do seems to be—dig down amongst the fourth and fifth layer of QRM and find the weaker, struggling signal. Another type who may appreciate a card is he who keeps calling CQ, although we may hear stations calling him in between. One more point—c.w. calls rarely draw as many listener reports as 'phone transmissions.

I don't recommend Malcolm's practice of recording percentage of cards drawing a reply—it sounds depressing! Just send a card when you think it will be useful—if it is you'll get one back.

One more point—being human beings B.R.S. members will still send cards to the exceptional DX man—even if he *is* working a G—and I do it myself in contravention of the rules I have set out! But sometimes the unexpected will happen; that after all is the essence of Amateur Radio.

Yours faithfully,

Hounslow, Middlesex. C. HARRINGTON (B.R.S.2292).

T.V. From C.P.

DEAR SIR,—I refer to that portion of *Current Comment* (January issue) headed "B.B.C. Crystal Palace," and in particular to the second paragraph wherein the writer states that, *inter alia*, " . . . receivers designed for upper sideband . . . such receivers comprise all t.r.f. types . . . "

I would point out that a number of t.r.f. receivers, e.g., the H.M.V. 1807 series, are designed so that the vision circuit operates on the lower sideband only. There is no reason why these receivers should not operate satisfactorily now that the new London B.B.C. station is in operation.

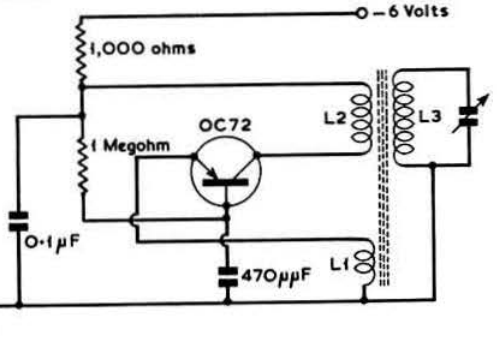
Yours faithfully,

Romford, Essex. R. F. STEVENS (G2BVN).

[Editorial Note.—Mr. Stevens is quite correct. Several models of t.r.f. receivers using lower sideband were, in fact, released in 1949, the H.M.V. 10 in. and Pye 12 in. are examples, but they represent a small percentage of the total.]

Transistor Oscillators

DEAR SIR,—With reference to Mr. Stead's interesting article on transistor oscillators (December issue) I should like to comment on the statement that the commercial junction transistor will not oscillate above 600 kc/s. Using the common base arrangement I have found that many Mullard OC71s will oscilate up to 1 Mc/s, and the OC72s will do so at 2 Mc/s, if attention is paid to coil efficiency. Ferrite cores and Litz wire should be used to achieve an unloaded Q of at least 150.



The 2 Mc/s transistor oscillator circuit used by G2CQJ. L1 is 4 turns, L2 20 turns and L3 30 turns of 20/47 Litz wire wavewound or jumble wound on a ¼ in. Ferrite rod.

The power output is, of course, limited but there is no reason why a Top Band transmitter and superhet receiver should not be made from available components.

Yours faithfully,

Yelverton, Devon. J. C. HARVEY (G2CQJ).

Baluns and TVI

DEAR SIR,—I much appreciated "Dud" Charman's (G6CJ) clear exposition of the function of, and necessity for, the balun in co-axial fed aerials in *Aerial Reflections* in the December, 1955, issue of the BULLETIN.

Apart from some 28 Mc/s second channel, all the TVI trouble which I have experienced has been due to swamping. The four cases concerned are of interest:

(1) In a bad case of sound and vision interference the trouble was cleared completely by cleaning the receiver co-axial plug which had become oxidized.

(2) A set designed for twin screened feeder has been fed with a co-axial cable terminated with a two-pin plug. Swamping is severe, particularly at high frequencies or when using vertical polarization.

(3) A new installation has *two* co-axial feeders in parallel from the aerial—one to the front sitting room and one to the dining room. The dealer says they are "stub-matched" by cutting off lengths until a picture is obtained. Needless to say the picture is poor and swamping occurs at high frequencies and with vertical polarization.

(4) A three-element array, placed at eaves level, is "screened" from the transmitter by my aerials. The feeder passes over the ridge to a room on the opposite corner of the house and is 70ft long. Swamping is again severe at high frequencies and with vertical polarization.

Case 4 will not respond to the insertion of a high pass filter—the aerial has a balanced folded dipole but the co-axial feeder is connected as in Fig. 1 in the December article.

While three sets are still affected by swamping there are eight others within comparable distances (100 yards) which work quite happily while I am on the air.

My purpose in quoting these cases is to direct attention to the fact that installation of TV aerials by those who are apparently ignorant of aerial theory is a factor to be reckoned with in TVI. A second factor of great importance appears to be that of gradual oxidisation and corrosion of connectors at any point in the receiver aerial system (vide case 2).

I am now, however, of the opinion that the greatest contributory factor is that a great many TV aerials are at fault in their design. If the aerial accepts r.f. and noise it is asking a great deal of the receiver to reject it particularly if the feeder is long and has picked up considerable voltage on its outer or supporting structure which is acting as an aerial at other than the design frequencies. I suspect that herein lies the answer to the hundreds of "incurable" cases of TVI which are keeping the amateur bands clear of signals between 7 and 11 o'clock in the evenings. My feeling is that the Society's attention should be directed to a complete analysis of factors of aerial design, installation and maintenance, which may give rise to TVI; unbalance seems to be the key factor, with oxidized and corroded joints a close second.

It appears that if a television receiving aerial is to be designed for minimum "proneness" to interference it should be completely balanced or short circuited at frequencies other than the design frequency. Consequently, unless balanced screened twin feeder is used the only effective arrangements would be those shown in Figs. 3, 4a, 4b and 7 in the December *Aerial Reflections*—Figs. 2a, 2b and 2c would not modify the reception characteristics at frequencies other than the design.

If a clear case can be made against poor design, installation and maintenance (of aerials) it should be placed before the G.P.O. and the manufacturers, just as have the problems of i.f. and second channel. It is my view that responsibility for TVI attributable to poor aerial design and installation should be placed firmly where it belongs. An improvement in design and balance would surely also eliminate or reduce a great deal of the various forms of interference that deface the great majority of screens in urban areas.

I would welcome Mr. Charman's views on this question and wonder if a survey classifying current models of TV aerials by circuitry could be put in hand.

Incidently, I am sure that many members would appreciate data on velocity factor and spacing which would be of practical application in designing co-axial line baluns.

Yours faithfully,

Barrow-in-Furness, Lancashire. JOHN CASSON (G2ACT).

TVI in Fringe Areas

DEAR SIR,—I am in full agreement with your correspondent Stan Brigham (G2FXB) that TVI is responsible for the decrease in membership of the Society. In this district, it is impossible to work during TV hours (in spite of TVI proofing) with television aerials only a few feet from the aerial. Your suggestion that interference can be cured at the receiver is not workable because owners of TV sets do not care to have them "tinkered with." They feel they are right and the amateur is wrong, in any case they are too numerous to attempt a cure.

Many of the Old Timers in this town have given up their licences from a feeling of frustration, and local meetings have now ceased with the result that no new blood is being recruited into the movement.

With the possibility of a further extension of TV hours, I, like G2FXB, foresee a further downward trend of Amateur Radio in fringe areas unless such steps as he sets out in his letter are adopted.

Yours faithfully,

Ipswich, Suffolk. ALF REEVE (G8WN).

N.F.D. Results

DEAR SIR,—My letter on this subject which you kindly published in the October BULLETIN has, I feel, been amply rewarded by the correspondence and discussion it evoked.

I would like to apologise to the Contests Committee as a whole for appearing to be facetious, but this was not my intention. I for one am more than indebted to them for the tasks they so ably undertake in their own free time and at no expense to Society members.

From the nature of the correspondence and the remarks of the Hon. Secretary of the Contests Committee (January, 1956, BULLETIN), as well as from other views I have obtained, there is a growing opinion that preliminary or draft lists of contest results should be prepared by the full time staff of the Society as part of an organised office routine. This procedure would follow the practice of other comparable Societies, not least of which is the A.R.R.L.

As stated in print "only the first, second and third places are checked exhaustively" (G3ERO, January, 1956, BULLETIN). The task of the Committee should therefore be to vet, approve and confirm the results prepared by an efficient staff at Headquarters. I am aware of the difficulty with

clerical assistance but this is no real argument against the views stated. The membership as a whole would be pleased to assist in finding a way out of the labour crisis, but the appeal was very distinctly addressed to Council (Minutes, 15 November, 1955, Council Meeting). (The Secretary reports to the Council not to the membership. An appeal to the membership made in the form of an advertisement published in the January and April BULLETIN produced no results.—Ed.) I shall be interested to hear in due course the views of those more intimately connected with the business of the Society.

Yours faithfully,

London, S.E.25. D. DEACON (G3BCM).

"My Continuous Wave Emission Is Very Rusty"

DEAR SIR,—Granting that we are amateurs, one still feels that we should at least try and reduce the misuse of technical terms to a minimum, particularly when this misuse may be overheard by those who are technically qualified in radio. Of recent months there has been an ever-growing misuse of the term "c.w." and this is by no means confined to the more newly licensed members—it has even crept into the BULLETIN on occasion. C.w. stands for "continuous wave," normally indicating an unmodulated transmission which, for amateur purposes, is broken up into the dots and dashes of a code. This code is known as Morse Code, after the name of the gentleman who originated it, and it was used by lamp, flag and telegraph sounder long before the term c.w. was thought of. C.w., on the other hand, can be broken up into any suitable code, the Japanese telegraph code being but one example. Bearing in mind these facts, the absolute absurdity of remarks such as "My c.w. is a bit rusty," "Afraid I don't get much c.w. practice these days," etc., becomes plain. The man operating on phone and having a slight cold might just as well say "Afraid my plate and screen amplitude modulation is a bit hoarse today!"

So, Sir, let us give Samuel Morse his just due and say what we mean—"My *MORSE* is a bit rusty" (or "pretty good" as the case may be).

Yours faithfully,

Wirral, Cheshire. ANGUS D. TAYLOR (G8PG).

A Plea for Tolerance

DEAR SIR,—I feel I must write and take up the cudgels on behalf of many of my Continental friends who are being maligned by more than one inconsiderate and ill-mannered "G."

On numerous occasions, particularly during the last few weeks, I have overheard such remarks as:—

"These Frogs cluttering up the Band again."

"They are real shockers these Frogs."

"B—— Continentals all over the place."

"Can't get a word in for Froggies and Eyties."

Surely the 80-metre band is not for the exclusive use of the British! Has it ever occurred to you gentlemen that some of these Continentals referred to so slightingly—particularly the Frenchmen, may quite possibly, understand some English? Fortunately, those with whom I was in QSO when the first remark quoted was made do not understand any English, but nevertheless, they have other friends who do—and who may quite easily have been listening at the time.

I am quite aware that there are numerous French commercial transmissions, notably the police using the callsign "Romeo" on the 80-metre band, and at times these transmissions leave much to be desired, but they are *not* F amateurs, and if the rude remarks quoted were intended to refer to these "Romeo" transmissions, the innocent French amateur with limited English is likely to misunderstand.

There are a number of quite large nets operating on 80 metres in the mornings, and it is quite easy for a foreign station (with limited or no English) to find what is for the moment a quiet spot on the band and there make a transmission, only to find that he has tuned up in the middle of a net, as he happened to take the frequency of a station who was listening at the time. Surely this is no crime—if the net is an untidy one (and many are) occupying considerable space, it is unavoidable at times. Could we perhaps have a little tolerance and understanding, and if we *must* be rude—let it be to one another.

Your faithfully,

East Dulwich. MARGARET MILLS (G3ACC).

QSL Cards

DEAR SIR,—Doubtless I am not alone in cursing the operators of certain stations (particularly in "rare" countries) who faithfully promise to QSL, but whose cards do not materialise. On reflection, however, I wonder if the fault always lies with those operators.

In this country, there are at least three QSL Bureaux, namely the R.S.G.B., I.S.W.L. and *Short Wave Magazine*. I send out cards exclusively via R.S.G.B. (unless I send direct). I get cards back (most efficiently) via the R.S.G.B., but I also frequently receive cards via I.S.W.L., of which I am not a member. For a long time, I despaired of getting a QSL from Hungary, but one day some arrived via I.S.W.L. One card from that bureau had on it "G3ESP, via R.S.G.B." I never get cards now from *S.W.M.*, probably because I have no envelopes there. Some years ago, however, one or two cards were sent to me, with a notice stating that unclaimed cards in the future would be destroyed. Perhaps that explains why I wait in vain for cards from MF2AG, FM7WD and LZ, to name a few.

Do these bureaux work independently? Could they not agree to pass around to each other unclaimed cards? But for the fact that my name and address appears in the call books, perhaps I would never have received the cards from I.S.W.L. Has any bureau the right to destroy unclaimed cards? Surely an example could be taken from the G.P.O., who spare no pains to get mail correctly delivered if the address is vague or incorrect.

Regarding the R.S.G.B. Bureau, while personally having no complaint about the service, there is one point which was brought to my notice. A friend worked an LU-Z station in Antarctica. He QSL'd via R.S.G.B., but had the card returned, stamped "Unlicensed Station," on the grounds that the particular territory is British. Yet the A.R.R.L., for its DXCC, allows LU-Z and CE7Z stations, as well as the "official" VP8. Since R.S.G.B. is politically neutral, has it the right to adjudicate on this disputed territory? After all, publicity was recently given in *Month on the Air* about an "under cover" (i.e. unlicensed pirate) station in Afghanistan. Let's be consistent!

Yours faithfully,

Ackworth, Pontefract W. FARRAR (G3ESP).

Can You Help?

● M. Darke (GM3KGK), 7 Joppa Gardens, Portobello, Midlothian, who wishes to know the values of the coils and variable capacitors in the TU9B unit (7700-10,000 kc/s)?

● L. G. Hutton (B.R.S.20074), 29 Elmstead Avenue, Marston Green, Birmingham, 33, who requires details of the alignment or conversion of the receivers DST100, Marconi type RG35 Model 1133/2 and the Admiralty Oscillator G.35 (15-25,000 kc/s)?

● H. Lawson (B.R.S.17087), BM/NEASO, London, W.C.1, who wishes to know the intermediate frequency of the U.S. Signal Corps receiver type BC-603D for 20-28 Mc/s f.m.? Information on the conversion of this set for use in the 85-100 Mc/s band would also be appreciated.

● W. R. Metcalfe (G3DQ), Carr Farm, Flamborough, East Yorks., who requires the manual for the CNY.1 transmitter-receiver?

● H. C. Murfitt (B.R.S.4671), 12 Heather Drive, Dartford, Kent, who requires the manuals for the R.C.A. AR88 and ex-R.A.F. R.1359 (120 to 500 Mc/s) receivers?

● T. Murgatroyd (G3AYK), 14 Grange Park Avenue, Roundhay, Leeds, 8, who wishes to borrow the manual for the Meissner Signal Shifter De Luxe (manufactured in 1942)? He would also like to hear from any member who has successfully TVI-proofed this equipment.

● B. O'Brien (G2AMV), 1 Waterpark Road, Prenton, Birkenhead, who requires information on the ex-A.M. frequency meter designated as Test Set type 253? Information as to whether any manufacturer is now making 110 kc/s air-cored i.f. transformers would also be appreciated.

● A. Parker (G3KH), 133 Station Road, Cropston, Leicester, who requires a small supply of ceramic stand-off insulators about 1¼in. high with an oval base and two-hole fixing (not the small midget size)? Efforts to obtain them through all normal channels have failed.

● R. Reynolds (G3IDW), 136 Beech Avenue, Swindon, Wilts., who requires the instruction book and circuit diagram for the RME70 receiver?

● W. G. Simpson (G3KGS), 4 Nelson Road, Wanstead, London, E.11, who wishes to borrow the service manual for the National NC100XA?

● A. R. Stevenson (Associate), 15 Greyfriars Avenue, Hereford, who requires the manual for the Marconi CR100 receiver giving full details of how the cord drive for the pointer is fixed? Difficulty is being experienced because there are no inspection holes in the drive assembly.

● K. A. Townsend-Green (ZL2AXY, ex-G3HXY), c/o Freemantle Park Farm, Hannington, near Basingstoke, who would like to hear from any member who has built a tape recorder and used it for monitoring a frequency?

Regional & Club News

Acton, Brentford and Chiswick.—Meetings will be held at the A.E.U. Rooms, 66 High Road, Chiswick, W.4, at 7.30 p.m. on May 15 and June 19.

Aldershot & District Amateur Radio Society.—Efforts are being made to re-form the society and full details may be obtained from J. St. T. Ruddock (G8TS), " Stoneyford," 44 Hazell Road, Farnham, Surrey.

Barnsley & District Amateur Radio Club.—The Annual Dinner at the King George Hotel was a great success. At the meeting on May 11 at the same hotel, J. Ward (G4JJ) will give a talk on " Transistor Developments."

Bristol.—Recent events have included a lecture on " The Antennamatch " by Council Member F. Hicks-Arnold (G6MB), a discussion on TVI-proof transmitter design and a film show arranged by Mullard Ltd. The next meeting will be on May 18 at Carwardine's Restaurant when D. V. Newport (G3CHW) will give a talk on " Clamper-valve Protection for Tetrode Power Amplifiers."

British Amateur Television Club (Chelmsford).—At a special meeting on April 8 the Chairman (C. Grant Dixon, M.A.) gave a demonstration of his colour equipment, the highlight being the reception of a colour bar signal from G2WJ/T (Dunmow). On May 10 at 7.30 p.m. F. H. Townsend, M.I.E.E. (Vice-President) will give a lecture on " Recent Developments in Camera Tubes " at Marconi College, Arbour Lane. *Hon. Secretary:* D. S. Reid, 4 Bishop Road, Chelmsford, Essex.

Brighton & District Radio Club.—At an Extraordinary General Meeting on March 27, 1956, J. Trangmar, 33 Lennox Street, Brighton, was elected *Hon. Secretary*. The other members of the committee remain the same.

Bromley.—Arrangements for N.F.D. will be discussed at the meeting at the Shortlands Hotel, Station Road, Shortlands, Kent, on May 4 at 8 p.m.

Bury.—The group now meets at 8 p.m. on the second Tuesday in each month at the George Hotel, Kay Gardens. All local amateurs are invited to attend. Further information may be obtained from the *Town Representative:* J. E. Hodgkins (G3EJF), 24 Beryl Avenue, Tottington, near Bury, Lancs.

Chester & District Amateur Radio Society.—Meetings are held at 7.45 p.m. on Tuesdays at the Y.M.C.A., Chester. *Hon. Secretary:* D. Rickers (GW3HEU), 97 Ruabon Road, Wrexham, Denbs.

Glasgow.—The next meeting of the group at the Christian Institute, 70 Bothwell Street, C.2, will be held on May 25 commencing at 7.15 p.m. when there will be a talk entitled " Further Tips for New Licensees " and arrangements for N.F.D. will be discussed.

Grafton Radio Society.—Recent lectures have included " Ideas on Simple Phone Rigs " by Basil Wardman (G5GQ). The society's annual field day will be held at Hampstead Heath on June 9–10 when two stations will be in operation on 7, 14, 21 and 28 Mc/s c.w. and 1.8 and 3.5 Mc/s phone and c.w. *Hon. Secretary:* A. W. H. Wennell (G2CJN), 145 Uxendon Hill, Wembley Park, Middlesex.

Hastings & District Amateur Radio Club.—The club has obtained new premises at 22 Middle Street, Hastings, where meetings are held on Tuesdays at 7.30 p.m. Light refreshments are available. Workshop facilities are being arranged. The club call is G6HH. *Hon. Secretary:* W. E. Thompson (B.R.S.19773), 8 Coventry Road, St. Leonard-on-Sea, Sussex.

Hull & District Radio Society.—Meetings are held on the second and last Tuesday in each month at 7.30 p.m. at the Royal Oak Hotel (Tony's), Hull.

Isle of Man Amateur Radio Society.—The A.G.M. and Dinner were held at the Manor Guest House, Victoria Road, Douglas, on April 18. The society has now closed down for the summer and will resume activities in the autumn. *Hon. Secretary:* R. A. Davies (B.R.S.20886), 2 Laureston View, Ballaquayle Road, Douglas, I.o.M.

Jersey, C.I.—Meetings of the group are held at the Commercial Chambers at 7.45 p.m. on the last Tuesday in every month.

London Members' Luncheon Club.—DJ1BZ (Stuttgart) and VS6BJ (Hong Kong) were welcomed at the April meeting by Stanley Vanstone (G2AYC), Chairman. The next meeting is on May 18 at the Bedford Corner Hotel, Bayley Street (off Tottenham Court Road). Members usually gather in the bar from 12.30 p.m. onwards for lunch at 1 p.m. Visitors, from home and abroad, will be very welcome. Those intending to be present are asked to telephone the *Hon. Secretary:* Frank Fletcher (G2FUX) on Ruislip 2763 or R.S.G.B. Headquarters, HOLborn 7373, at least 24 hours in advance if possible.

Lothians Radio Society.—At the meeting at 25 Charlotte Square on May 17 a second talk on " The Beginners' Transmitter " will be given. On May 31 R.S.G.B. members will discuss final arrangements for N.F.D. A bus tour is arranged for June 10 and the A.G.M. will be held on June 14. *Hon. Secretary:* John Good, 24 Mansionhouse Road, Edinburgh, 9.

Medway Amateur Receiving and Transmitting Society.—Meetings are held on alternate Mondays at 7.30 p.m. at " The Golden Lion," High Street, Old Brompton. A Social Evening is arranged for May 23. *Hon. Secretary:* H. Cheeseman, 265 Cliffe Road, Strood, Kent.

Neath & Port Talbot.—The next meeting of the group will be held at the Royal Dock Hotel, Briton Ferry, at 7.30 p.m. on May 29 and not on June 5 as previously announced. Apart from this date, meetings are held on the first Tuesday in each month.

North Kent Radio Society.—The society is holding an exhibition on May 12 at the Congregational Hall, Bexleyheath. An amateur station will be in operation under the society's call-sign G3ENT. The local model aircraft, yachting and engineering clubs are also taking part. *Hon. Secretary:* F. C. Beadle (G3KLI), 56 Balliol Road, Welling, Kent.

Portsmouth & District Radio Society.—At the A.G.M. the following officers were elected: *President:* S. T. G. Weston (G6WS); *Hon. Secretary:* L. B. Rooms (G8BU), 51 Locksway Road, Milton; *Hon. Treasurer:* D. W. J. Haylock (G3ADZ). L. E. Newnham (G6NZ) is *Life Vice-President*. Meetings are held on Tuesdays at the Club Rooms, British Legion Club, Queens Crescent, Southsea. Visitors are welcome.

Nottingham & District Amateur Radio Society.—The winners of the Notts County Contest organized by the society were: Section A—first G3ELJ, second G3ITG, third G3JKO; Section B—first G3JKO, second G3JWK, third G3ELJ; Listeners—first G. K. Upton, second E. W. Smith. At the A.G.M. the following officers were elected: *Chairman:* C. W. Hage; *Hon. Treasurer:* A. G. Gwynne; *Hon. Secretary:* J. Rayner (G3KTQ).

Romford & District Amateur Radio Society.—At the A.G.M. the following officers were elected: *Chairman:* F. Simmons (G2FWJ); *Hon. Secretary:* N. Miller, 55 Kingston Road, Romford; *Hon. Treasurer:* E. Boxcer (G3AUG). Meetings are held on Tuesdays at 8.15 p.m. at RAFA House, 18 Carlton Road, Romford.

Scarborough Amateur Radio Society.—The following officers and Committee members were elected at the A.G.M.: *President:* L. H. Dale; *Vice-President:* W. R. Metcalfe (G3DQ); *Chairman:* H. Jones (G3GBH); *Vice-Chairman:* S. Stephenson (G3KS); *Hon. Treasurer:* G. Palliser (G3IXF); *Hon. Secretary:* P. B. Briscombe (G8KU), Roseacre, Irton; *Committee Members:* H. Wiggins (G2CP), G. Brown (G3FVW), M. Watson (G3JME), F. Powell (B.R.S.18461).

Scunthorpe Amateur Radio Society.—This new society holds meetings fortnightly. The *Chairman* is W. Porteous (G3KNP), the *Hon. Treasurer* is I. Rhyder (G3JWR) and the *Hon. Secretary* J. Stace (G3CCH), 38 Skippingdale Road, Scunthorpe, who is also the *Town Representative*.

Shefford & District Amateur Radio Society.—Full details of meetings of the society, which are held at Digswell House on Fridays at 8 p.m., may be obtained from the *Hon. Secretary:* G. R. Cobb (G3IXG), 7 Hitchin Road, Shefford, Beds. The next meeting is on May 18 when R.S.G.B. members will discuss plans for N.F.D.

Slade Radio Society.—Meetings at the Church House, High Street, Erdington, are arranged for May 25 (" Rectifier Circuits," N. B. Simmonds), June 8 (" Industrial Electronics," D. W. Morris) and June 22 (" Oscilloscope Design and Applications for Amateur Use "). The second D/F test for the

Harcourt Trophy will be held on June 3. *Hon. Secretary:* C. N. Smart, 110 Woolmore Road, Erdington, Birmingham 23.

Stockport Radio Society.—At the A.G.M. the following were elected: *Chairman:* D. J. Birch (G3AOO); *Vice-Chairman:* A. Smith (G3AYT); *Hon. Secretary:* G. R. Phillips (G3FYE), 7 Germans Buildings, Buxton Road, Stockport; *Hon. Treasurer:* W. H. Banks (G2ARX); *Hon. Auditor:* F. E. Wood (G4JN); *Committee Members:* E. G. Wigzell, A. Royle (G3FOE), S. May (G3ENL), R. W. Dawson (G3JLX), N. Paul (G3AUB). Details of meetings, which are held at the Blossoms Hotel, Buxton Road, may be obtained from the Hon. Secretary.

Sutton & Cheam Radio Society.—The very successful Eighth Annual Dinner was held on March 10 at "Wilsons," Grove Road, Sutton. Entertainment was provided by the Top Band Toppers, the Sutton & Cheam "Chore-isters," Nigel and Chris, and the Cliff Bridges Trio. Those present included Leslie Cooper (G5LC), President of the Thames Valley Amateur Radio Transmitters' Society and G. A. Bird (G4ZU). The A.G.M. was held on April 17. *Hon. Secretary:* F. J. Harris (G2BOF), 143 Collingwood Road, Sutton.

Tees-side Amateur Radio Club.—Meetings are held on alternate Fridays at Settlement House, 132 Newport Road, Middlesbrough. Details may be obtained from the *Hon. Secretary:* B. B. Wilson (B.R.S.19449), 18 Holdenby Drive, Park End, Middlesbrough.

Thanet Radio Society.—The Ninth Annual Dinner was held at the San Clu Hotel, Ramsgate, on March 10 and was attended by 76 people. Among those present were the President and Mrs. Hammans, Mr. and Mrs. Arthur Milne, Mr. and Mrs. W. H. Allen, and the General Secretary and Mrs. Clarricoats. The Art Contest was won by Mrs. Allen and the children's section by Angela Hind. Mr. Hammans (G2IG) won an out-sized parsnip donated by John Cook. Thanet Society president (Mr. G. A. Chapman, G2IC) was in the chair and the event was organised by Mr. Norman Cramp (chairman). *Hon. Secretary:* J. Barnes (G3BKT), 18 Grange Road, Ramsgate.

Thames Valley Amateur Radio Transmitters' Society.—At the A.G.M. the following were elected: *President:* Leslie Cooper (G5LC); *Vice-President:* Alan Mears (G8SM); *Hon. Secretary:* Ken Rogers (G3AIU), 4 Links Road, Epsom; *Hon. Treasurer:* Graham Leicester (G3IKC); *Contests Manager:* Gerry Billison (G6GB); *Committee Members:* Frank Hicks-Arnold (G6MB) and Ernie Dedman (G2NH). The Society meets at the Carnarvon Castle Hotel, Hampton Court, at 8 p.m. on the first Wednesday in each month.

Torbay Amateur Radio Society.—The A.G.M. was held at the Y.M.C.A., Torquay, on April 21. At the meeting on May 19 there will be a junk sale. *Hon. Secretary:* L. H. Webber (G3GDW), 43 Lime Tree Walk, Newton Abbot.

Affiliated Societies

THE following are additions to the list of Affiliated Societies published in the October, 1955, issue of the BULLETIN.

Deal & District Amateur Radio Club, c/o B. Taylor, 2A St. Leonard's Road, Deal, Kent.

Glacier Radio Club, c/o J. Taylor, 43 Bilton Road, Greenford, Middlesex.

Glasgow University Radio Society, c/o Ian R. Cameron, 14 Netherburn Avenue, Netherlee, Glasgow, S.4.

Malayan Amateur Radio Transmitters' Society, c/o S. A. Faulkner, Dept. of Inland Revenue, Suleiman Building, Kuala Lumpur, Malaya.

Royal Air Force Changi Amateur Radio Society, c/o F. Ellesmere, Royal Air Force, Changi, Singapore, 17.

Southampton University Amateur Radio Society, c/o J. Gutteridge, Connaught Hall, Wessex Lane, Swaythling, Southampton.

LONDON MEMBERS' LUNCHEON CLUB
will meet at the Bedford Corner Hotel, Bayley Street, Tottenham Court Road, at 12.30 p.m. on Fridays, May 18 and June 15, 1956.
Telephone table reservations to HOL 7373 prior to day of luncheon. Visiting amateurs especially welcome.

Book Review

THE RADIO AMATEUR'S HANDBOOK. (Thirty-third edition, 1956), by the Headquarters Staff of the A.R.R.L. 608 pages, fully illustrated. Obtainable from R.S.G.B., price 32/- post free. Immediate delivery.

There have been alterations and additions of two sorts: one, includes the expected new circuits and gear, and the other gives new information and handier design methods. Both occur in generous measure, but only a few examples can be mentioned in a short review. One notices the charts for the rapid calculation of inductance, time-constants, and reactance, and the new material on resonant cavities and microwave tubes. A new chapter on semi-conductor devices is timely, and the "product detector" will interest many. The amendments in the a.v.c. and selectivity sections include details of a squelch circuit for cutting off receiver output when no signal is present. As well as the usual receiver types, there is a new 2-band 3-valve superhet, and a series of converters for 7, 14, 21 and 28 Mc/s. There is a new 75 watt novice transmitter, and a new paralleled 807 amplifier. The beat-frequency exciter has been omitted, but there is an interesting 75–300 watt transmitter with v.f.o. control. Some useful tables have been added to the data on power supplies, and a selenium rectifier table displays the characteristics of six makes. There is an attractive monitoring oscillator and keyer called "Little Oskey," which blanks the receiver output and injects sidetone into the headphones when the key is pressed.

The phasing-type s.s.b. is now represented by the Junior type of circuit and network, and there is a grounded-grid linear amplifier using four 1625 valves.

A new chapter on wave propagation, a 1-element rotary for 21 Mc/s, matching circuits with multi-band tuners and s.w.r. bridges, simple converters for 21, 28, 50, 144 and 220 Mc/s, a transistorized field-strength meter, and a redesigned amplifier for 144 Mc/s, are a few more items in an excellent production. -T. P. A.

Representation

THE following are additions to the list of County Representatives published in the December, 1954, issue:—

Region 2—Yorkshire East
W. R. Metcalfe (G3DQ), Carr Farm, Flamborough.
Yorkshire West
R. M. Strickland (G8KB), 733 Worrall Road, Worrall.

The following are additions to the list of Town Representatives published in the December, 1955, issue:—

Region 2—Yorkshire West
Pontefract
W. Farrar (G3ESP), 6 Hemsworth Road, Ackworth.

Region 3—Worcestershire
Redditch
S. Avery (G4PR), 81 Bromfield Road.

Region 5—Suffolk
Lowestoft & Beccles
P. Hayward (G3JMX), 58 Edgerton Road, Lowestoft.

New Members

Corporate Members, Home (Licensed)

G3AAV †G. N. Glover, 166 Otley Road, Leeds, 16, Yorks.
G3AGW †H. E. Edwards, 61 Birchfield Way, Yew Tree Estate, Walsall, Staffs.
G3BQT E. Hulme, 4 Heaplands, Greenmount, Bury, Lancs.
G3CSP E. Brown, 89 Tideswell Road, Sheffield, 5, Yorks.
G3EOH D. W. Furby, 54 Oakhurst Road, Enfield, Middlesex.
G3HEH †P. L. E. Bennett, 15 Linden Avenue, Herne Bay, Kent.
G3IQP †P. A. Charlton, 61 Russell Close, Bexleyheath, Kent.
G3JBA G. H. Maddox, 4 Pitt Crescent, Wimbledon Park, London, S.W.19.
G3JCB E. Newton, 52 South Row, Bedlington Station, Northumberland.
G3KEE R. E. Barker, Keldgate Farm, Eppleworth Road, Cottingham, E. Yorks.
G3KGL J. Tickner, Rear Flat, 996 Wimborne Road, Moordown, Bournemouth, Hants.
G3KIT T. A. Richardson, 36 Low Edge Crescent, Greenhill, Sheffield, 8, Yorks.
G3JRL F. J. Armstrong, 84 Rosemary Crescent West, Goldthorn Park, Wolverhampton, Staffs.
G3JTO F. E. Gell, 17 Lincoln Street, Old Basford, Nottingham, Notts
G3JWN F. D. Walker, 32 Highfield Road, Rastrick, Brighouse, Yorks.
G3KJV N. W. Collins 91 Abbeville Road, Clapham, London, S.W.4.
G3KKF J. Court, 85 Clarendon Street, Dover, Kent.
G3KLT I. J. Eamus, Lawnside, Long Lane, Blackheath, Birmingham, Warwicks.
G3KMT R. J. Thomas, 108 Compton Road, Wolverhampton, Staffs.
G3KNJ R. J. Wyatt, 43 Bransgrove Road, Edgware, Middlesex.
G3KPE G. J. Lambert, 8 Valentine Grove, Aintree Village, Liverpool, 10, Lancs.
G3KPX/T R. S. Howard, The Lodge, Maidenhead Court, Maidenhead, Berks.
G3KQC G. A. Piper, 46 St. Peter's Square, Hammersmith, London, W.6.
G3KQL J. L. Weatherley, 12 J.S.T.U., The De Havilland Propeller Co., Hatfield, Herts.
G3KQX E. A. Adams, 36 Fotheringham Road, Enfield, Middlesex.
G3KQY R. J. Disley, 35 Stanley Place, Fishergate Hill, Preston, Lancs.
G3KRE *C. Pouncey, 186 Enfield Street, Pemberton, Wigan, Lancs.
G3KRI M. Israel, 34 Brooke Road, London, N.16.
G3KSK J. J. Phillips, 3 Queen's Road, Oldfield Park, Westbury, Wilts.
G3KSO E. T. White, 137 Lewis Trust Flats, Lisgar Terrace, London, W.14.
G3KSR R. E. Edwards, 14 Leaside Way, Southampton, Hants.
G3KSU A. R. Williams, Brooklands, London Road, Chelmsford, Essex.
G3KTA P. G. Munt, 9 Glanville House, Atkins Road, Balham, London, S.W.12.
G3KTJ *G. P. Rigby, 32 Pimbo Lane, Upholland, nr. Wigan, Lancs.
G3KTL M. K. Dunn, 178 Wrenthorpe Road, Wrenthorpe, nr. Wakefield, Yorks.
G3KTP E. E. West, 21 Westfield Avenue, Marlpool, Heanor, Derbys.
G3KTR A. D. J. Rock, 583 Harrow Road, Wembley, Middlesex.
G3KTU J. T. A. Ault, " Lill-Kurk ", Clare Hill, Esher, Surrey.
G3KTX J. V. Tomlinson, 60 Elms Park, Ruddington, Nottingham, Notts.
G3KUL D. Stephenson, 4 Dean Street, Bedminster, Bristol, 3.
G3KUQ *A. M. Gurney, 2 Dollis Hill Lane, Neasden, London, N.W.2.
G3KVD D. M. Jones, 19 Oyster Street, Old Portsmouth, Hants.
G8CB †H. H. Crewe, 14 Uplands Avenue, Clayton Heights, Queensbury, Bradford, Yorks.
GI3KOT G. A. Meaney, 115 Henderson Avenue, Cavehill Road, Belfast, N.I.
GM3CUJ †J. W. Sime, 43 Colinton Mains Green, Edinburgh, 13.
GM3HVT †J. K. Smith, 50 Castle Crescent, Kennoway, Fife.
GM3JLD R. Mathew, 39 Devon Street, Grangemouth, Stirlingshire.
GM3KSJ S. Bungard, 37 Cairnlea Gardens, Motherwell Road, Bellshill, Lanarks.
GM3KUA J. Rae, 53 Richmond Street, Aberdeen.
GW3KSQ C. T. Jay, 40 Abbots Close, Margam, Port Talbot, South Wales.

Corporate Members, Overseas (Licensed)

DL9FN W. J. Karg, 31 Max-Josephstrasse, Manheim, Germany.
HB9ED Werner Kuenther, D.Sc., Kuerbergstrasse 40, Zurich 10, Switzerland.
VP8BC E. Roberts, Box 117, Stanley, Falkland Islands.
VQ2JB N. J. Burrows, P.O. Box 558, Broken Hill, Northern Rhodesia.
VQ2LB Mrs. L. D. Burrows, P.O. Box 558, Broken Hill, Northern Rhodesia.
VS2EV J. Kong Keng Cho, 120 Belfield Street, Ipoh, Perak, Malaya.
VS1HA Sgt. W. S. Jayasinghe, No. 1 Sgts. Mess, R.A.F. Station, Seletar, Singapore 28, F.E.A.F.
VU2AS P. A. McGrath, E.S.D., P.O. Arjunpur Dist., Burdwan, West Bengal, India.
W3MUV W. F. Stuebgen, State Street, Box 73, Saxonburg (Butler County), Pennsylvania, U.S.A.
W5IFP J. R. Hargrave, 6951st R.S.M. Chicksands, R.A.F. Station, Shefford, Beds.
W6WLY L. H. White, Volga, Iowa, U.S.A.
W9AJA M. B. Swan, 4645 Lincoln Street, Gary, Indiana, U.S.A.
W9FKC Myron Hexter, Box 73, Ravinia, Ill., U.S.A.
W9LZ T. G. Seese, 4423 N. Laporte Avenue, Chicago 30, Ill., U.S.A.
W9IOP L. LeKashman, 1719 N. Wilber Street, South Bend 28, Indiana, U.S.A.
ZD3A E. B. Smart, P.O. Box 285, Bathhurst, Gambia, British West Africa.

* * *

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OZ5UF Leo Andersen, Hyldevej 14, Fredericia, Denmark.
VQ2HH H. B. Helm, Box 184, Kitwe, Northern Rhodesia.
VR2BJ †F. M. Gray, c/o 72 King's Drive, Pagham, Bognor Regis, Sussex.
VU2DE E. Dalby, Barnagore Jute Factory Co., Ltd., Alambazar, Calcutta 35, India.
W3HXE G. E. Schellhas, 726 Grantley Street, Baltimore 29, Md., U.S.A.
W7NRB F. J. King, Box 488, Kirkland, Washington, U.S.A.
W9FID D. W. Wulf, 1004 Wisconsin Avenue, Mendota, Ill., U.S.A.
ZD4BV T. C. M. Wigg, P.O. Box 208, Takoradi, Gold Coast.

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20934 *W. J. Hills, 18A Errol Gardens, New Malden, Surrey.
20935 *J. A. Dorling, 50 Kirby Rise, Barham, Ipswich, Suffolk.
20936 *D. Barrie, 4 St. Matthew Street, Dundee, Angus, Scotland.
20937 *D. R. E. Whiting, 233 Ashcroft Road, Stopsley, Luton, Beds.
20938 J. Sterritt, 1 Downshire Road, Cregagh, Belfast, Northern Ireland.
20939 J. E. Hales, 56 West Street, Berwick-on-Tweed, Scotland.
20940 P. R. Nash, R.M.C. Home, Leamington Spa, Warwicks.
20941 B. E. Dean, 48 Dragon Parade, Harrogate, Yorks.
20942 G. J. Cordwell, 133 Upper Sheffield Road, Barnsley, Yorks.
20943 R. J. Drew, 295 Marsh Hill, Erdington, Birmingham, 23, Warwicks.
20944 G. H. Jones, 18 Queensway, Shotton, nr. Chester, Ches.
20945 W. Wheeler, 46 Hewett Road, North End, Portsmouth, Hants.
20946 B. J. Watts, 67 Swainson Road, West Humberstone, Leicester, Leics.
20947 P. N. Dolan, Heronsgate, Abbotsbrook, Bourne End, Bucks.
20948 L. A. Hood, 45 Diana Gardens, Deal, Kent.
20949 A. G. Bennett, A.M.I.M.E., 13 Benomley Drive, Almondbury, Huddersfield, Yorks.
20950 H. Leeming, 419 Haslingden Road, Guide, Blackburn, Lancs.
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20952 B. Wilkins, 271 Upper Rainham Road, Hornchurch, Essex.
20953 M. A. Niman, 9 Montgomery Drive, Unsworth, Bury, Lancs.
20954 L. Wilson, 44 Kaye Lane, Almondbury, Huddersfield, Yorks.
20955 P. W. Robinson, 52 Manvers Road, West Bridgford, Nottingham, Notts.
20956 J. H. Twisaday, Glasgoed, Valley Road, Llanfairfechan, Caerns, N. Wales.
20957 M. S. Coom, The Retreat, Doncaster Road, Gunness, Scunthorpe, Lincs.
20958 †W. J. Bond, 9 Clinton Road, Barnstaple, Devon.
20,959 F. F. Johns, 140 Joel Street, Northwood, Middlesex.
20960 J. R. Bridgwater, 2 Coney Green, Stourbridge, Worcs.
20961 M. A. O'Connor, 63 Thurlow Gardens, Hainault, Ilford, Essex.
20962 D. R. Revell, 26A Oakfield Road, Ilford, Essex.
20963 A. Whetstone, 32 Spencer Road, North Wembley, Middlesex.
20964 J. M. Milne, Fire Station, Saunders Street, Stockbridge, Edinburgh, 3.
20965 M. B. Drinkwater, c/o 603 Newmarket Road, Cambridge, Cambs.
20966 M. E. Mattinson, 35 Marryat Road, Wimbledon, London, S.W.19.
20967 K. W. Guy, 2 Brockhurst Crescent, Walsall, Staffs.
20968 R. V. Bennett, 110 St. James Park, Tunbridge Wells, Kent.
20969 Cpl. H. Rogers, D. Flight, R.A.F. Bassingbourn, nr. Royston, Herts.
20970 M. King, 57 The Avenue, Ealing, London, W.13.
20971 P. Bradley, Southlands, Central Drive, Wingerworth Park, Chesterfield, Derbys.
20972 A. Crighton, 77 Myers Road West, Great Crosby, Liverpool, 23, Lancs.
20973 W. R. Jenner, 27 Buchan Road, London, S.E.15.
20974 D. R. Bowman, 3 The Crescent, St. Bees, Cumberland
20975 K. Day, 27 Clough Road, Birkby, Huddersfield, Yorks.
20976 J. Nottingham, 84 York Road, Haxby, Yorks.
20977 *J. G. Barlow, Westward Ho, Lambley Lane, Gedling, Notts.
20978 *R. H. Ivory, 96 Braemar Road, Worcester Park, Surrey.
20979 *J. F. H. Binns, c/o 8 Galleywood Road, Chelmsford, Essex.
4071 †H. C. Murfitt, 12 Heather Drive, Dartford, Kent.
9571 †E. L. Whalley, 103 Mary Slessor Street, Willenhall, Coventry, Warwicks.
10090 †J. K. Shaw, Green Hill, Haxley, Doncaster, Yorks.
11710 †C. L. Robinson, 56 Avondale Avenue, Bury, Lancs.
12109 †H. W. Fensom, 34 The Highway, Stanmore, Middlesex.
16837 †W. G. Wainwright, 124 Belvoir Road, Coalville, nr. Leicester.
17603 †A. F. Proops, 52 Tottenham Court Road, London, W.1.
17604 †S. Proops, 52 Tottenham Court Road, London, W.1.
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**Denotes transfer from Associate Grade.*
†Denotes re-elected.

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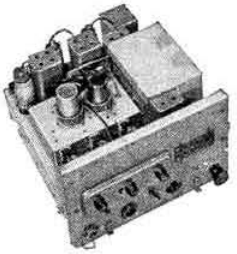
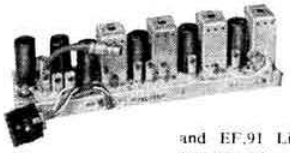
ADMIRALTY RESPONSER UNIT : Type W4790



This receiver tunes from 160-182 megs. Valve line up: VR.136 RF, VR.92 Mixer, VR.137 OSC, VR.65s in 5 I.F. Stages, VR.92 DET. Output. Modification details available to tune over approx. 80-100 Mc/s.

PRICE : **12/6.** Each fully valved. Postage and packing 7/6.



MINIATURE I.F. STRIPS

Size 10¼" x 10¼" x 3", frequency 9.72 Mc/s. 2 EF.92s and 1 EF.91 I.F. Amps, EB91 DET/AGC, EF.91 AGC Amp. and EF.91 Limiter. Circuit supplied.

PRICE: (Less valves) **8/-** each, Post Paid.

VALVE TESTERS Model 314

This model is of American manufacture and versatile, free-point return valve tester. Its design is such that it enables the user to test any type valves, regardless of its filament voltage or base wiring. Flexibility is attained by using individual lever switches of each valve element. Complete coverage of American Series including acorns.

PRICE: **£10**

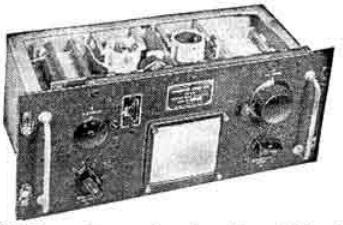
Plus 10/- Carriage.

MAINS POWER UNITS Type " 234 "

Double Smoothed 200-250V 505 Input. 240V 100 mA 6.3 at 6 amps with Volt Meter reading Input and Output Voltages. Size: 19" x 10" x 6½" Standard Rack Mounting.

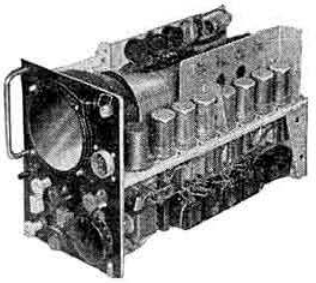
PRICE: **£4.10.0.** each, plus 7/6 carriage.

TUNING UNITS Type T.U.5B



This well-known Tuning Unit has a frequency of 1500-3000 kc/s with 2% accuracy. Micrometer Dial that provides 2,500 divisions over 180° rotation of the tuning shaft which gives plenty of mechanical band spread from 3.5 Mc/s through 28 Mc/s. In addition the unit has a High C Tank Circuit with temperature compensating coil. The above Tuning unit from the BC-375 Transmitter needs only a few additional small parts to convert into a stable Temperature-Compensated VFO which may be used to replace the Crystal in Crystal Controlled Transmitters. Conversion Details and Circuit Diagrams supplied FREE with unit. Price **15/-** each, less outer case. Packing and postage 4/- less outer case.

TYPE 62A INDICATORS



Ideal for conversion to oscilloscopes, T.V. units, etc. Containing V.C.R.97, 12 VR.91 (EF.50), 2 VR.54 (EB.34), 3 VR.92 (EF.50), 4 CV.118 (SP.61). Slow-motion dial, 13 Pots and scores of useful components. Size: 8½" x 11½" x 18". In wooden packing case.

PRICE: **£3.0.0** Carriage 7/6.

TRANSMITTER Type T1131-L

Frequency 100 to 156 Mc/s. Output 50W. Crystal controlled. 200-240V. 50 c.p.s. Power supply. Housed in 6' standard 19" rack. In new condition complete with valves.

Send for full details

R.F. UNITS

R.F.24 20-30 Mc/s. Switched Tuning. Valved **9/6** each.

R.F.25 40-50 Mc/s. Switched Tuning. Valved. **9/6** each.

R.F.26 50-65 Mc/s. Variable Tuning. Valved (New). **25/-** each.

Packing and postage **2/-** each.

BENDIX I.F. TRANSFORMERS

1.63 Mc/s complete in cans, set of two new and boxed. Size: 2" x 1½" x 3¼". **5/-**, p.p. 1/6.

INSULATION TAPE

Perfect condition. ½" wide 25 yd. Reels foiled, in tins, **1/3** each, p.p. 8d.

BENDIX POTTED AUDIO OUTPUT TRANSFORMER

Complete with integral smoothing choke. Ratings 4½ watt 9,000 ohm Primary, 600 and 4,000 ohm Secondary. Size: 4" x 1¼" x 2". New and boxed, **4/6,** p.p. 1/6.

A SELECTION OF EX-GOV. SURPLUS VALVES

	Ea.		Ea.		Ea.		Ea.
VR.54	**2/-**	VR.91	**5/-**	12SH7.M	**3/-**	446A	**20/-**
VR.55	**6/-**	VR.150(OD3)	**6/-**	12SJ7.M	**3/-**	1616	**5/-**
VR.65	**3/6**	6K7	**4/9**	6C4	**5/-**	866A	**7/-**
				807USA	**5/-**		

FOR CALLERS ONLY !

RECEIVER TYPE R.1475 2-20 Mc/s at **£7.10.0** each.

NOTE: Carriage prices quoted apply only to England and Wales.

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AR77 good condition £21. TCS unmodified transmitter and receiver with cables £25. ZC1 Mk. 2 with microphone, key, leads, aerial, base, control unit £9 10s. Wolf Cub electric drill with bench clamp, vertical drill, saw and lathe sets £9; manuals for all above included. Universal Avominor just overhauled by makers £5. All perfect working order and carriage paid. Horrocks G2FLP, Biddulph Road, Congleton, Cheshire. Phone 258. (6

BC221AA Battery compartment separated otherwise perfect order, spare valves. B2 Transmitter, 4 coils no power supply. MCR1 all coil packs, power pack needs attention. Offers to Box 15, National Publicity Co. Ltd., 36/37 Upper Thames Street, London, E.C.4. (15

CR100 receiver for sale, £16. Also R.S.G.B. BULLETINS. G2DPD, 27 Gloucester Road, Whitton, Middlesex. (Tel.: POP 0557.) (16

FOR SALE AR88D £55. Wanted:—Instruction Book or circuit diagram of type 1131.L transmitter. J. C. Foster, G2JF, Wye College, Near Ashford, Kent. (10

3DP1 Tube with mu-metal and base, £1. 1224A, £2. Avo All-ways battery oscillator, £4. D.F. Test Oscillator, 1.2-23 Mc/s, £1. G.E.C. crystal 100 kc/s calibrator, £4 15s. Decca Portable Radiogram (230V a.c.), £5. Carriage extra. B.R.S.20925, 32 Abingdon Street, Derby. (11

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MORECAMBE holiday. Overlooking Bay and Lake district mountains, Ham Shack. Write brochure. G3AEP, "Ferncliffe," Drewton Avenue, Sandylands, Morecambe. (962

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QSLs and log book (P.M.G. approved). Samples free. State whether G or B.R.S. Atkinson Bros., Printers, Elland. (400

RECONDITIONED and modernised RME70 with two tuned circuit preselector, stabilised and improved r.f. oscillator, etc. Crystal calibrator incorporated. £25 o.n.o. G2PL, 122 Foresters Drive, Wallington, Surrey. Tel.: Wallington 1915. (921

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WANTED BC610 Hallicrafters, E.T.4336 transmitters, and spare parts for same. Best prices. P.C.A. Radio, Beavor Lane, Hammersmith, W.6. (626

WANTED: HRO coils, receivers, power packs, AR88Ds, AR88LFs, SX28s, BC348s, AR77s, and many other types, also laboratory test equipment and R54/APR4, TN17, TN18 and TN19 units. Details please to R. T. & I. Service, 254 Grove Green Road, Leytonstone, London, E.11 (LEY 4986).

WANTED Lattice tower and driving motors for beams, 28 Morgan Crescent. Theydon Bois, Epping, Essex. (12

WANTED urgently. One or more ATP35 valves or equivalent for 12 transmitter. G2BXA, T. Wills, 43 Tideswell Road, Firth Park, Sheffield, 5. (8

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