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OPEN FORUM

THE correspondence columns of every periodical should reflect current thought. That our own Journal is not failing in this respect will be apparent to every reader of this issue wherein are published letters on a wide variety of subjects ranging from further views on our suggestion to establish Experimental Workshop Centres, to a defence of the word "amateur" as opposed to "experimenter."

Unfortunately few of the letters which we publish to-day are original in their theme. But this has not always been the case for in past years the views of members, as expressed in "Letters to the Editor," frequently made useful contributions to existing technical knowledge. Others, and there were many in this class, led to first rate arguments.

We should like to make it clear to every member that the columns of THE BULLETIN are at all times available for a free exchange of opinion, provided it is not political nor deliberately provocative. There are innumerable subjects open for discussion extending from domestic policy to recent non-secret technical developments.

The Council, with an eye to the future, always welcomes concrete suggestions aimed at improving the status of the Society, but it must be remembered that however bright the idea may be, it cannot be carried into effect immediately, if it conflicts with the terms of the Memorandum and Articles of Association. The present Articles date back many years and without doubt many are now in need of revision, but until the war is over and full consideration can be given to any proposed modification, the Society must continue to act and abide by its existing Rules.

Matters relating to post-war Representation have already exercised the minds of war-time Councils, and tentative schemes have been prepared, but no scheme, however carefully it has been planned, can succeed unless it receives the whole-hearted support of all whom it is intended to assist. In past years the membership frequently failed in its duty by neglecting the opportunity to vote at elections for local as well as National representatives.

When the times comes, we hope to publish the views of many members now serving overseas, who have had previous experience of our domestic affairs, and who desire to place that experience at the disposal of the membership in general, and the Council in particular. In the meantime our correspondence columns are open to any member who wishes to put forward suggestions designed to assist the Council in its task of ensuring that the membership is adequately represented in post-war years.

Technical subjects, provided they are kept within the limits imposed by the Censorship authorities, should at the present time provide many readers with an opportunity for a first-rate "scrap on paper." The field is wide, the scope almost unlimited.

Where are the present-day descendants of those who fought wordy battles over the virtues of Goyder Lock, as opposed to the Driven Amplifier, or of the low power enthusiasts who made every *milli-watt* do a job of work and laughed derisively at the "poor saps" who required 100 watts to work the States? What has happened to the "Phone on Forty" addicts? Are they still convinced that Morse has no place in their world?

Those old friendly scraps kept "ham radio" alive, for once started in THE BULLETIN, they continued with renewed vigour wherever and whenever a few enthusiasts met together.

Much that has happened recently in the field of radio communication must, for the time remain shrouded in mystery, but no harm can be done by the expression of an opinion concerning, for example, the type of amateur equipment we shall need after the war to transmit a reliable micro-wave signal to say Birmingham from London.

What about frequency measuring gear and the ubiquitous cathode ray tube? Can we expect big improvements after the war or has development marked time? Has the wave-guide completely superseded the earlier methods of radiating centimetre waves? Shall we ever go back to fixed aerials for 14 and 28 Mc/s work? Can we expect greatly improved results from post-war valves? Has the dream of one past President, that we shall eventually employ a valve embodying the functions of crystal oscillator, doubler and power amplifier in one envelope, come any nearer to fruition? These are some of the questions we should like to see discussed and answered through our Correspondence columns.

Then finally, what about the future of International Amateur Radio? Prior to the war most of our DX contacts were impersonal affairs, but to-day everything has changed. Hundreds of G's (and that included the GL's, GM's and the GW's) have visited distant lands, whilst many thousands of overseas amateurs have come to our shores. Surely this exchange of thought, ideas and ideals, must be leading to a much wider appreciation of the meaning of International Amateur Radio.

What do our British Empire and United States members now in great Britain think about the future of Amateur Radio? How best can the International Amateur Radio Union serve them and ourselves in

(Continued on page 48)

NEGATIVE FEEDBACK IN TRANSMITTERS AND RECEIVERS *

By H. A. M. CLARK, B.Sc.(Eng.), A.M.I.E.E.

PART III

Negative Feedback in Receivers

ALL the uses of feedback in amplifiers which have been described in Parts I and II are applicable to the design of both receivers and transmitters alike. Most use for such circuits is to be found in the audio frequency section of receivers, including the output stages, and in the microphone or modulation amplifiers of the transmitter.

Some circuits of more specific application to receivers will now be considered.

There are two developments of the cathode follower circuit which have been dealt with very fully elsewhere, ⁽¹⁵⁾ but which will be referred to briefly in passing for the sake of completeness.

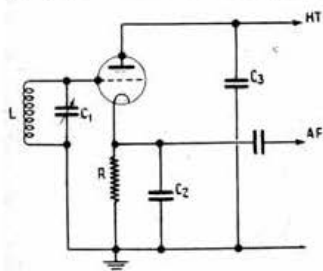


Fig. 12.
The Infinite Impedance Detector.

The Infinite Impedance Detector

The basic circuit is shown in Fig. 12. The grid of the valve is fed from the tuned circuit $L C_1$, whilst in the cathode circuit is a resistance R in shunt with a R.F. by-pass condenser C_2 . The cathode resistance is made high so that the valve is working near its cut-off and hence will rectify on its anode current curve. The audio output is taken from the cathode through a blocking condenser the anode being by-passed to earth by C_3 .

The resemblance to the cathode follower is readily apparent. The valve is fully fed back which gives it a low output impedance and the ability to handle large inputs without distortion. The input impedance is much higher than that of most detectors which

enables the tuned circuit to operate with only its own inherent damping.

Cathode coupled R.F. Amplifiers

A cathode follower can be used with advantage as the buffer stage which is commonly employed in front of the regenerative detector of straight receivers. Fig. 13 shows two possible arrangements. In Fig. 13A the cathode coupled stage is seen with the tuned circuit $L_3 C_3$ in the cathode circuit. At the resonant frequency this has a high dynamic impedance which causes the valve to operate as a cathode follower, the amplification from grid to cathode being substantially equal to one. The grid circuit $L_2 C_1$ will have no damping from the valve. Fig. 13B shows an aperiodic aerial circuit as frequently used with such a buffer stage.

Since the cathode impedance of the valve is very low (equal to $1/g$) a step-up transformer can be used instead of the simple tuned circuit in the cathode. In such a case the stage will have a voltage amplification substantially equal to the step-up ratio of the transformer.

While it is not thought that this type of R.F. amplifier has universal application, the features just described make it of interest for the purposes suggested.

Automatic Gain Control

The use of A.G.C. in a receiver is an example of the special form of negative feedback. Instead of feeding back the signal wave-form itself, the signal is rectified and the smoothed mean value of its variation is fed back into the grid circuits of the R.F. and I.F. stages, the gain of which are reduced as the signal input becomes greater. Although this form of negative feedback may not seem very obviously related to the preceding forms which have been discussed, nevertheless its operation can be studied along similar lines. The only point which will be referred to here is that of stability. If the phase of the fed back voltage is shifted too far, as, for example, by the smoothing circuits following the A.G.C. rectifier, then oscillations may be set up. These are generally of a very low frequency in the form of "motor-boating." The conditions to be met to avoid this trouble are the same as those required to keep an ordinary feedback amplifier stable.

Controllable Audio Selectivity ⁽¹⁶⁾ ⁽¹⁷⁾

Although it cannot be regarded as a complete substitute for high I.F. selectivity, such as a crystal gate, audio frequency selectivity can be of great value in a receiver for C.W. telegraphy. Particularly is this so in long-wave sets. A highly selective audio stage has its uses, however, even when a crystal gate is already employed.

To obtain great selectivity by means of resonant circuits requires values of Q which are difficult to obtain with ordinary components at audio frequencies. Fig. 14B shows a scheme in which no tuned circuits are used at all, yet selectivities corresponding to pass bands of only a few cycles are readily obtainable.

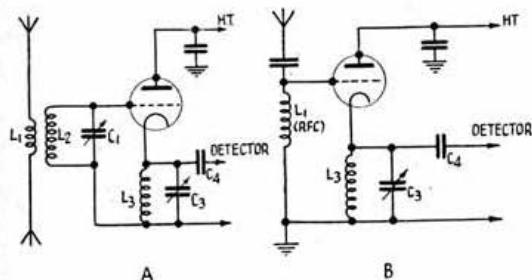


Fig. 13.

Cathode coupled R.F. amplifiers. The use of a tuned-circuit in the cathode circuit of the amplifier removes the valve damping from the aerial circuit and reduces distortion such as cross-modulation.

* A paper read to the membership at a meeting of the Society held on April 29th, 1944, at the Institution of Electrical Engineers, London.

A three-stage resistance coupled amplifier of orthodox design is shown. For best results it is necessary to keep the stage gain low, and hence phase-shift at both low and high frequencies, as low as possible. Negative feedback is introduced from the output anode to the input grid circuit, but in the feedback circuit is connected the network $R_1C_1R_2C_2$. This type of network is known as a "twin-T network" from the obvious arrangement of the components. Such a network has the property of rejecting a narrow band of frequencies centred about a frequency determined by the choice of component values. As a result, the feedback reduces the gain of the amplifier at all frequencies except where the twin-T network "tunes." At the exact rejection frequency of the network there is no feedback at all and the amplifier has its full gain.

As a result the characteristics given in Fig. 14B are obtained. With three stages in the amplifier an effective Q in the order of 100 is obtainable. By connecting the lower end of the input transformer to the slider of the potentiometer connected across the output of the feedback network, the selectivity can be controlled to have any desired value between the two extremes shown.

The values of components in the "twin-T" network shown in Fig. 14 produce a peak response at about 800 c/s. If desired this frequency can be made variable by using a three-gang potentiometer for the three resistance in the "twin-T" network.

To obtain the sharpest selectivity the "twin-T" network components should be calculated as follows:

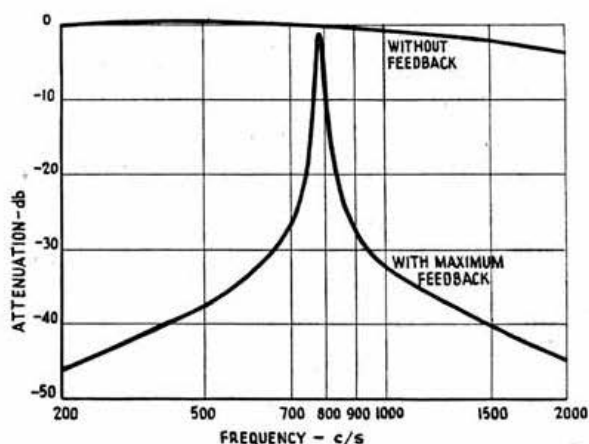
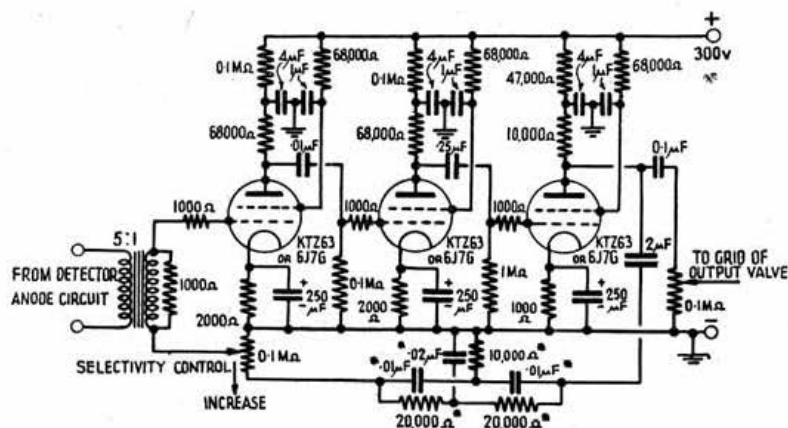


Fig. 14A.

The circuit shown has the characteristics given in Fig. 14B and may form the audio-frequency amplifier of a receiver. A step-down transformer is shown from the detector. Since the full gain of the amplifier is obtained at the peak of the curve a step-down ratio is advisable which may need to be even greater than the 5 to 1 indicated if the detector output is high enough to operate an output valve direct. Alternatively the first grid might be tapped down the secondary resistance. A simple pentode output stage is connected to the potentiometer shown in the diagram. It is advisable to use close tolerance (preferably ± 2 per cent.) values for the components marked with an asterisk.

Fig. 14B.

Measured characteristics of the circuit of Fig. 14A. The peak response is at 780 c/s. The attenuation is given in decibels relative to the response at 780 c/s. without feedback. Any intermediate curve can be obtained by means of the selectivity control potentiometer.

$$\begin{aligned} \text{Make } C_2 &= \frac{2}{1} C_1 \\ \text{and } R_2 &= \frac{2}{1} R_1 \\ \text{then } f &= \frac{1}{4\pi R_1 C_1} \end{aligned}$$

where f is the frequency of balance in cycles per second, R_1 and R_2 are in ohms, C_1 and C_2 are in farads.

An alternative arrangement is shown in Fig. 15 (a). The first valve has a tuned circuit as an anode load. The object of the remaining two valves is to increase the effective Q of the circuit. Regeneration, or positive feedback is applied to the tuned circuit from the output through the resistance R_1 . Such a method is, of course, well known. Unfortunately if any appreciable amount of regeneration is used the circuit tends to become unstable and the setting of the potentiometer shown in the third anode circuit is very critical, being influenced considerably by small changes in H.T., etc. To stabilise the circuit, negative feedback is also supplied to the cathode of the second valve by means of R_2 and R_3 . By this means stable regeneration can be obtained which will increase the effective Q of the tuned circuit to a considerable extent. Selectivities of the order shown in Fig. 15 (b) are claimed.

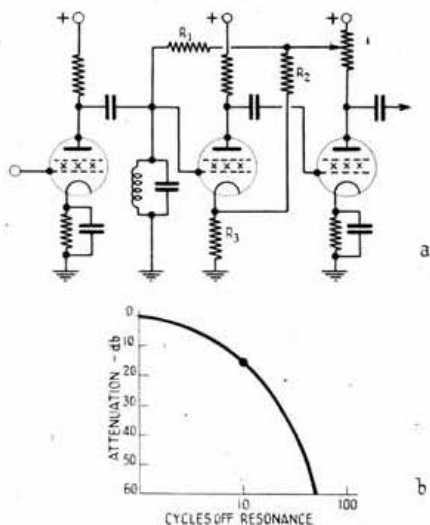


Fig. 15.

The use of negative feedback to stabilise the regeneration applied to a tuned circuit to increase its selectivity. The selectivity is controlled by means of the potentiometer.

Negative Feedback in Transmitters

Apart from the general use of negative feedback in amplifiers used in transmitters, both audio and radio frequency, there are one or two particular cases of interest.

Neutralised R.F. Amplifiers

The method of neutralising a triode R.F. amplifier is too well known to require description here, but it may not be recognised as a case of negative feedback. The interelectrode capacity existing between grid and anode can be considered as taking the place of the resistance R_2 in Fig. 4 (b) while R_1 can be taken as representing the resonant impedance of the tuned grid circuit. Since the reactance of the grid anode capacity is probably large compared with R_1 the voltage fed back to the grid from the anode will lead the anode voltage by 90° . This would not cause instability on its own account but the anode load will normally be a tuned circuit, and at some frequency slightly lower

than the true resonant frequency there will be a phase advance of 90° of the anode volts, thus making up the total of 180° required to turn the feedback into a positive or regenerative type, which causes uncontrollable oscillation.

The remedy is to feedback a similar voltage to that produced by the interelectrode capacity but from the opposite end of a centre-tapped tuned circuit in the anode circuit. In this way the negative feedback exactly counteracts the positive feedback. The total feedback is thus zero and the amplifier is stable.

Reduction of Modulation Distortion by Negative Feedback

Negative feedback can be used to reduce the distortion occurring in modulating systems with considerable advantage since it is usual to find most of the total distortion in a transmitter located at this point. The technique differs somewhat from that in a straightforward amplifier since the output is at radio frequency, whilst the input where the feedback has to be introduced is at modulation frequency.

The basic principle of the commonest system is shown in Fig. 16 (a). This is a block schematic diagram representing an R.F. oscillator driving the P.A. which is to be modulated. The modulator and the audio amplifier are shown in an orthodox form. The scheme is applicable to any of the usual types of modulator. Connected to the aerial circuit is a rectifying detector, from the output of which is available a replica of the audio input voltage, together with the distortion products of the modulator. This rectified output is connected to the input to the audio amplifier as well as the speech input using any one of the circuit arrangements already described in detail. The polarity of the audio output from the detector must be made opposite to that of the input in order to make the feedback negative.

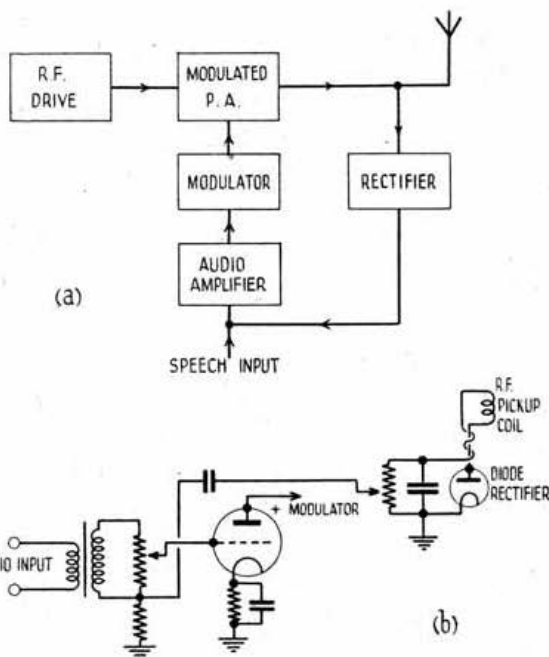


Fig. 16.

The reduction of transmitter modulation distortion by means of negative feedback.

The arrangement is shown in greater detail in Fig. 16 (b). A pick-up loop from the R.F. output circuit feeds the diode rectifier, and a potentiometer controls the amount of audio feedback voltage, which is introduced into the grid circuit of the triode amplifier shown driving the modulator. If the number of stages in the system is such that positive feedback is obtained with consequent "howl" or audio oscillation, the phase of the feedback can be reversed by reversing the connections to the anode and cathode of the diode.

The result of this feedback is to reduce the harmonic distortion introduced during modulation and also any hum introduced from the H.T. supply or from the A.C. heating of filaments. The use of A.C. heating has become possible in some large transmitters only by the use of negative feedback in this manner.

The same precautions must be observed to avoid instability as in ordinary feedback amplifiers. When assessing the phase-shift in the system the phase-shift of the modulation frequencies is taken as that of the corresponding side-band frequency through the R.F. coupling circuits.

It should be pointed out that negative feedback cannot correct the distortion due to over-modulation, any more than it can reduce the distortion in an ordinary amplifier, if it is overloaded sufficiently to cut-off the anode current.

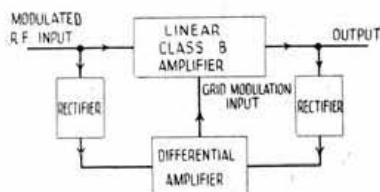


Fig. 17.

Correction of distortion in linear Class B R.F. amplifier by "remodulation." The input and output are rectified and the difference between them, representing the distortion of the Class B amplifier, is fed back into the latter in such a phase as to reduce the distortion.

Reduction of Distortion in Linear Class B Amplifiers

Any of the R.F. amplifying stages of a transmitter which are subsequent to the modulator must operate in a linear fashion if distortion is to be avoided. This is generally achieved by the use of what is termed a "linear Class B" amplifier. Distortion is difficult to keep low even when care is taken to operate the valve under the best conditions. A method of reducing the distortion in such stages by means of negative feedback has been described by Terman and Buss.

In Fig. 17 the linear amplifier is shown with two rectifiers coupled to the modulated R.F. input and to the amplified output respectively. These rectifiers are similar to that used in the arrangement shown in Fig. 16. The outputs of both these rectifiers will be at audio frequency, but that connected to the output as it includes the distortion introduced by the Class B amplifier. The rectifier outputs are connected to a differential amplifier, the function of which is to subtract the rectified input from the rectified output. The result will be the distortion of the class B stage. An amplifier similar to that of Fig. 8 (a) is suitable for this purpose, the rectifiers being connected to the two grids, the output being taken, push-pull, from the two anodes.

The distortion products from the differential amplifier are fed back into the grid circuit of the Class B

amplifier in such a way as to grid-modulate the stage. The phase of this modulation voltage is arranged so that this "re-modulation" opposes the distortion in the stage and cancels it out. For further details of this ingenious scheme reference should be made to the original paper. (18)

The Stabilisation of Supply Voltages

In both transmitters and receivers the design sometimes calls for D.C. supply voltages which are stable and invariant with mains supply and load current. This implies the reduction of ripple voltage and regulation impedance to negligible quantities. Such D.C. supplies are of immense value in the operation of stable oscillators, high gain microphone amplifiers, bias and anode supplies for Class B stages, etc.

The design of circuits for this purpose could easily form the subject of a separate paper, but it is of interest to examine briefly one or two circuits to see how negative feedback has been used in this field.

The simplest form of electronic stabiliser consists of a single valve, e.g. a triode, arranged as a cathode follower with its anode connected to the positive terminal of the D.C. supply (say a normal power pack) which is to be stabilised. The grid is connected to a fixed source of the same voltage as that required out of the stabiliser. The stabilised output is taken from the cathode. No current will be taken from the fixed voltage which may therefore be a dry battery or possibly a small neon stabiliser valve operated from the unstable supply voltage. Such neon stabilisers are very satisfactory when a voltage supply only is required from them and they need only draw a few milliamps from the supply.

The maximum output current must be within the rating of the triode, and the supply voltage must exceed the output voltage required by enough to obtain this current from the valve with a negative grid bias of more than, say, 1 volt, at which grid current would start to flow.

The cathode, i.e. the output voltage terminal, will then remain at substantially the voltage of the grid, even although there may be variations of input voltage and a moderate variation of output current. As already seen, the output impedance will be equal to $1/g$, i.e. in the order of 100 ohms if a high slope valve is used.

If better regulation still is required the feedback can be increased by inserting a D.C. amplifier in the feedback path. A typical but simple arrangement is shown in Fig. 18. V_1 is arranged in a similar manner to the cathode follower circuit described above, and must meet the same requirements. In order to supply sufficient output current, several similar valves may be used in parallel for V_1 . Instead of applying the voltage from the neon (V_3) directly to the grid of the output

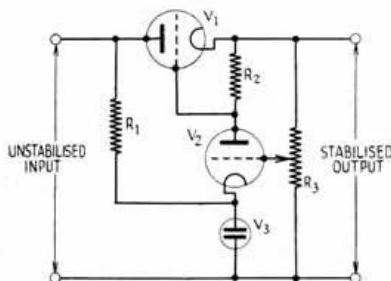


Fig. 18.

Voltage stabilising circuit. The variations in output voltage are amplified by V_2 and fed back to the grid of V_1 .

valve, however, an amplifying stage V_2 is used with the neon in its cathode circuit. A resistance R_1 to the input voltage is desirable to supply the neon with sufficient current when the current through V_2 gets small. The grid of V_1 is fed from the anode of V_2 of which R_2 forms the anode load. The grid of V_2 is connected to the slider of a potentiometer across the output. The circuit operates as follows:—

Imagine the output voltage to fall slightly due to an increased load current. The grid voltage of V_2 will tend to fall, resulting in a reduction of its anode current. This will reduce the drop across R_2 and so raise the grid voltage of V_1 . This causes it to pass the extra output current required and so tend to restore the output voltage to its original value. The degree of stabilisation will be improved over that of the simple cathode follower arrangement by a factor equal to the effective amplification of V_2 . Similarly it may be shown that the output impedance, or regulation at the output terminals, is equal to the cathode impedance of V_1 divided by the effective amplification of V_2 . The regulation can be reduced to a few ohms only by this means, which will enable the output voltage to remain constant to a very high degree with varying load currents, as long as the circuit is so designed that over-loading of the valves is avoided.

This type of circuit has been elaborated still further, but reference should be made to the articles given in the bibliography for further details. (19) (20)

* * *

In attempting to review the field of application of this valuable tool in circuit design, the author is aware that he may have conveyed the impression that it is a panacea, easily capable of curing all the ills that valve circuits are wont to suffer.

The limitations of the methods and the essential precautions to be observed for success have been referred to in Part I of the paper, and it is well to conclude on a cautionary note. Unless these precautions are observed failure will undoubtedly be met. The position is aptly summarised in the opening paragraph to a paper by H. W. Bode. (21)

"The engineer who embarks upon the design of a feedback amplifier must be a creature of mixed emotions. On the one hand, he can rejoice in the improvements in the characteristics of the structure which feedback promises to secure him. On the other hand, he knows that unless he can finally adjust the phase and attenuation characteristics around the feedback loop so the amplifier will not spontaneously burst into uncontrollable singing, none of the advantages can actually be realised. The emotional situation is much like that of an impecunious young man who has impetuously invited the lady of his heart to see a play, unmindful, for the moment, of the limitations of the £2.65 in his pockets. The rapturous comments of the girl on the way to the theater would be very pleasant if they were not shadowed by his private speculation about cost of the tickets."

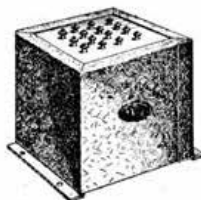
It is generally agreed that the benefits accruing from the many uses of negative feedback are very well worth the price paid for them. Nevertheless, the subject is one in which further developments are still possible, and the amateur experimenter could do worse than spend some of his time in an attempt to reduce the price paid for these benefits to the minimum.

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EXPERIMENTAL RESISTANCE-CAPACITY BOX

By F. J. FORBES (2BFC)*

MOST experimenters have at some time or another lost patience when trying to hold a component in position, either it slips off the contacts or the fingers get in the way thus adding capacity to the circuit. The Resistance-Capacity Box to be described overcomes these difficulties, and makes for a smooth running experiment with many alternatives.

Simple Circuit

The original circuit used by the Author and shown in Fig. 1, was built into a cigar box—its resemblance to the backbone of a fish earning for it the title of "The Kipper"! The main drawbacks to the arrangement were (1) the smallness of the box, which made it difficult to accommodate all the components needed, (2) the use of a common bus bar, which meant that only one component could be used at a time, (3) too many terminals were exposed, thus increasing hum pick-up.

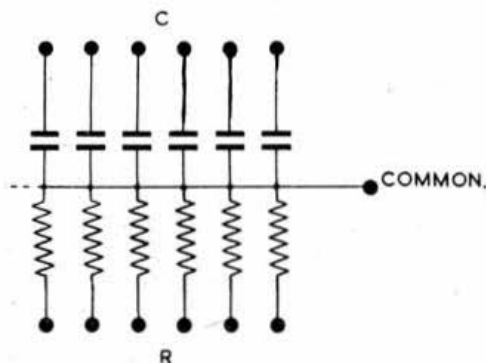


Fig. 1.

The original circuit. Altogether about twenty components were used.

With these points in mind, the writer decided to construct a unit which permitted (1) rapid value selection, (2) means for switching C and R as separate but simultaneous components, with the same switch used to parallel, or series, C and R, (3) the use of a screened box of reasonable size.

Final Circuit

The final circuit is shown in Fig. 2. On the left are the resistances, and on the right the capacity ranges.

All switches are of the Yaxley type. In the drawing each wafer has an outside ring representing the supporting frame for the contacts, the latter being shown as dots. The inner ring is the main rotor busbar and the rotating contact is indicated by a line joining the rotor busbar to a contact. Switches S_1 , S_2 and S_3 , are a triple gang wafer for resistor selection. Switches S_4 , S_5 and S_6 are similar, but for the capacity ranges. Switches S_7 and S_8 , are R and C range selectors. All switches so far mentioned are shown set up to give a short circuit across the test leads. In order to avoid the confusion that would result if the full total of 61 were illustrated, only one resistor and condenser are shown on each wafer.

The circuit selector switch S_9 is a two-pole, five-way type, although only three contacts are at present used

on each pole. The spare contacts provide for future development. With the contacts in the position shown, and the test leads connected to C and/or R, these may be used as separate but simultaneous components. For C and R in parallel or series, the leads are shifted to the inside terminals, and S_9 adjusted accordingly.

As electrolytic condensers are used for the highest capacity ranges, the input terminals to C are labelled with the polarity of the condenser lead connected to them. The positive terminal shown in Fig. 2 will also hold good for the series and parallel circuits.

Both the resistance and capacity circuits have terminals marked "series" and "parallel," thereby enabling extra components to be brought into circuit. The series terminals have a switch across them to complete the circuit when not required. Table 1 shows the values and switch positions used.

On the capacity side, a two-gang condenser of $0.0005 \mu\text{F}$ per section is fitted. This condenser can be used as a capacity of $0.00025 \mu\text{F}$ by employing the C' and C'' connections, thereby placing the two sections in series. A capacity of $0.001 \mu\text{F}$ can be obtained by joining C' and C'' together as one terminal, and using E as the other. The two terminals C are used to bring the ganged condensers into parallel with the main capacity ranges.

Construction

After the fixing holes had been drilled in the plain aluminium panel (which measures 12 in. \times 6 in. \times $\frac{1}{16}$ in. thick) the switch position marks were cut with a small cold chisel. The panel was then scratched with glass paper fixed in a small electric drill. With this running, the glass paper was moved over the panel to produce a complicated and pleasing design.

Before the components were mounted on the front panel the switch position lines were filled with Indian ink, and the lettering, etc., sign written with a mapping pen. When the ink was thoroughly dry, a coat of eggshell varnish was brushed over the panel (this has to be done lightly or the ink marks will brush off). The varnish preserves the switch lines, figures, etc., and keeps the panel bright.

The larger condensers are fixed to the floor of the box which measures $\frac{1}{2}$ in. thick \times 4 in. deep. The length and width allow the panel to be recessed in to the top. Both the sides and the plywood floor are covered with stout tin obtained from a biscuit box. This screen is joined to the panel, which is provided with a terminal for an external earth connection if required. No other component connection is earthed.

On one side of the box, which is made of mahogany, two brass bars are mounted at either end, these measure $3\frac{1}{2}$ in. \times 1 in. \times $\frac{1}{8}$ in., one end being drilled for a $\frac{1}{8}$ -in. hole, while the other is fixed to the box with a spring washer and wing nut. These screw on to a 4BA bolt fixed through the wall of the box. The 4BA bolt can be made to earth the bars automatically by making contact with the internal screen. This type of fixing allows the brackets to be swung up above the panel, whilst variable condensers, potentiometers, etc., can be held in them when connected to the main circuit. A round two ounce tobacco tin makes an excellent screen for volume controls, if a hole is made in the bottom for the fixing bush.

* 78, West Hill, East Grinstead, Sussex.

General

In order to reduce internal capacity, all wiring should be well spaced and kept as short as possible. Although ordinary values of resistance can be used it is desirable to obtain those which are within 5 per cent. of the nominal value. If this is not possible they should be

A list of resistor ratings, and condenser working voltages, should be prepared. In the former case some values will probably have to be made up with two resistors in parallel. The lower values up to 1,000 ohms may well be two watt types, or greater. A condenser list is important, as condensers of the same

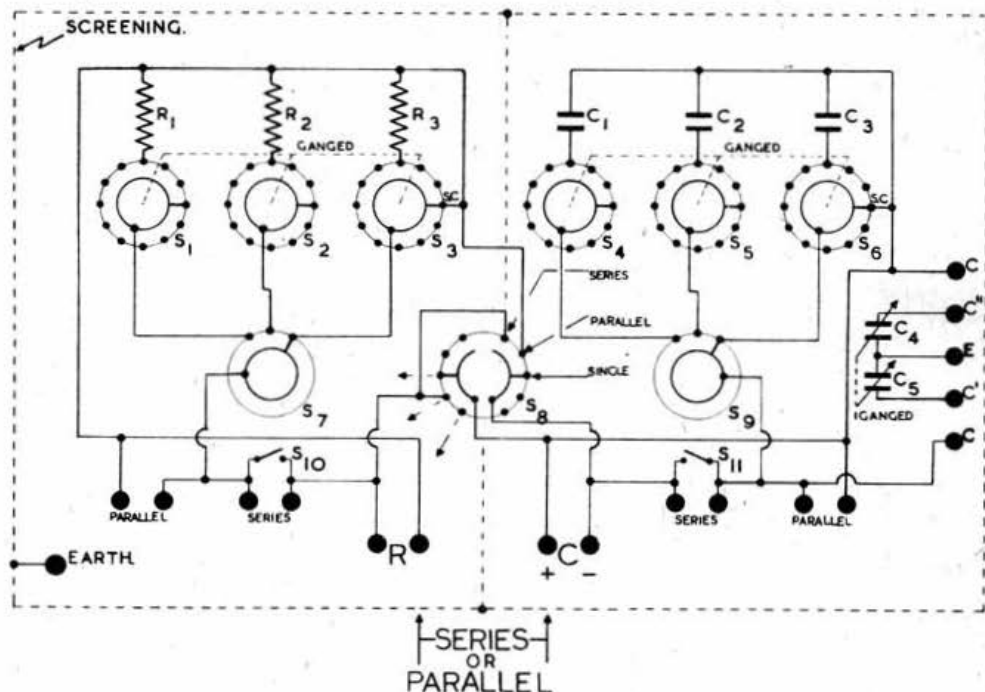


Fig. 2.

Final circuit. The contacts on S_3 and S_4 marked S.C. are used to switch-in a short circuit across the test leads.

checked on an ohmmeter and selected to have a value which is a little lower than that required; they can then be filed to the approximate value. This slightly reduces the original current-carrying capacity, but is of no great importance. The spot that has been filed should be painted over with shellac or wax.

The condensers are more difficult, but if a capacity bridge is available they should be selected for 10 per cent. tolerance. If a bridge is not available they should at least be checked for short circuits.

capacity may not have the same working voltage, i.e. 16 μ F and 24 μ F condensers can be either 150, 200, 450 or 500 volts working. The working voltages of condensers of these types can be marked at the switch points. Also a 25 μ F bias type condenser of 25 or 50 volts working, may easily be mistaken for a 24 μ F 450 volts working; to avoid this, "LV" has been sign written at the appropriate switch points. A positive sign should be placed against the elec-

TABLE 2.—CAPACITY.

Selector Switch	Range Switch (C)		
	1	2	3
	Micro-Farads	Micro-Farads	Micro-Farads
1	0.0001	0.0002	0.0003
2	0.0005	0.0006	0.0008
3	0.001	0.002	0.003
4	0.005	0.006	0.01
5	0.02	0.03	0.04
6	0.05	0.1	0.25
7	0.5	1.0	2.0
8	4.0*	8.0*	16.0*
9	—	24.0*	LV25.0*
10	—	—	LV50.0*
11	—	—	Short Circuit
12	—	—	—

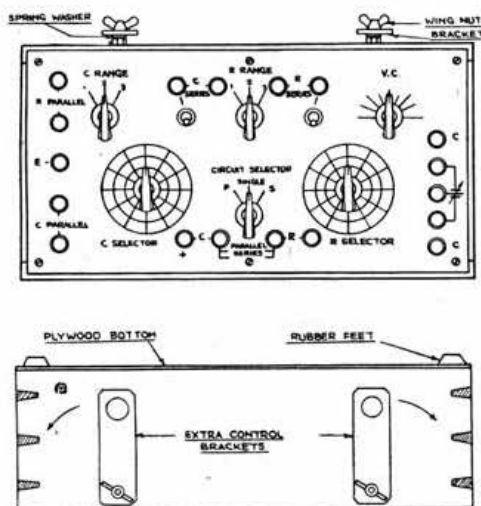
* Denotes Electrolytic type condensers.

TABLE 1.—RESISTANCE.

Selector Switch	Range Switch (R)		
	1	2	3
	Ohms	Ohms	Ohms
1	50	70	100
2	140	150	200
3	250	300	350
4	400	500	1,000
5	2,000	2,500	3,000
6	4,000	5,000	6,000
7	8,000	10,000	15,000
8	20,000	25,000	30,000
9	40,000	50,000	60,000
10	75,000	80,000	100,000
11	250,000	500,000	1,000,000
12	2,000,000	4,000,000	Short Circuit

tolytic values, as a reminder to check the test lead connections for polarity.

It is also useful to sketch out the single, series, and parallel circuits in skeleton form, *i.e.* without switches, (Fig. 3.) This enables the operator to see at a glance the exact layout of the terminals and positions in the circuit.



Front and underside views of Resistance Capacity box.

If the C and R terminal tops are removed, and replaced with valve-top screw adaptors, then screened valve-caps can be plugged on. These together with screened leads and crocodile clips are very useful, and quick, for many applications.

Conclusion

Any values of C and R can be used in place of those given, but capacity values lower than 0.0001 μF are not to be recommended, as the overall capacity is relatively higher. The positions of the series and

parallel terminals may be placed in the circuit to suit the constructor. Many ways of saving parts will suggest themselves, such as replacing S_{10} and S_{11} with a shorting bar across each pair of terminals.

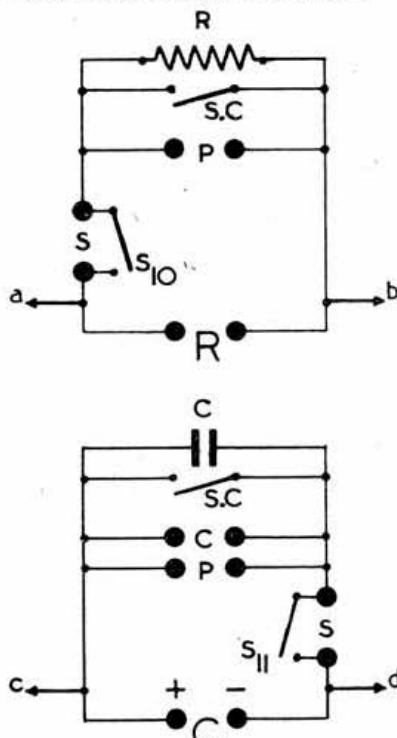


Fig. 3.

The circuit of Fig. 2 when switched for "Single" circuits, and shown without range or selector switches.

Both the parallel and series circuits should be drawn and gummed on the bottom of the box. If this circuit is slightly rearranged in position and the arrows a-c and b-d connected, the parallel circuit will be clarified. For the series case the arrows a-d only are joined.

Book Review

HEAVISIDE'S OPERATIONAL CALCULUS MADE EASY. By T. H. Turney, Ph.D., M.Brit.I.R.E. Published by Chapman & Hall. Price 10s. 6d.

Here is a book describing the "operational" methods of calculus due to Oliver Heaviside and their application to the solution of electrical engineering problems, in particular the type of problem often encountered by the radio engineer dealing with waves and impulses in circuits and cables.

Dr. Turney approaches the subject in an easy conversational style which should appeal to those who find the more formal mathematical treatises heavy going. He develops his theme with the aid of quite simple algebra only and applies his results to practical engineering problems, showing how Heaviside's methods tend to the simplification of classical solutions.

The relationship between current and voltage in inductive and capacitive circuits, and then damped oscillations are studied with the aid of Heaviside's operator. The reader's mathematical knowledge is then widened by a chapter on the expansion theorem, after which follow two chapters dealing with transmission over cables.

The latter part of the book is concerned with Fourier analysis and Heaviside's method of dealing with pulses in electrical circuits. This subject is of great importance to television engineers and others who are more concerned with pulses rather than the continuous sine waves of ordinary communication engineering.

Dr. Turney is to be congratulated on tackling this subject in what might almost be described as a light-hearted manner. Aside from "S.P.T.'s" well-known little book on "Calculus Made Easy," few authors have dared to treat advanced mathematical subjects in a conversational (almost anecdotal) manner.

It is unfortunate that misprints are fairly frequent in the book, no doubt due to the hurry in which many war-time publications have to be produced. These are rarely likely to mislead the reader, however, and will no doubt be removed in future printings.

H.A.M.C.

Ten Wakes Up

Mr. L. C. B. Blanchard, **BRS3003**, reports that after a long period of silence the 28 Mc/s. band has become alive, at any rate for European short-skip signals. During the evenings of August 12 and 13, 1944, and also on several evenings of the following week, mostly between 1900 and 2030 GMT, a number of stations were heard calling CQ TEN at varying strengths (average RST 334 with QSB). Calls heard included D3ATW4, D3DAP, D3DSR, D3JMS, D3JWW, D3QMM and D4WYF5. On the 13th at 1903 GMT D4YNF was heard in QSO with D3DSR. A few harmonics of European commercials have also been heard, including EAM2 (29.3 Mc/s.), EAZ2 (?), SDM4 (28.1 Mc/s.) and GBA2 (27.9 Mc/s.).

It is interesting to hear even short-skip signals on this band so soon after passing the Supspot Minimum year. Had times been normal, no doubt, amateurs from other countries in Europe would also have been heard.

* * *

Mr. Harold Merriman, **G6GM**, Featherlands, Holsworthy, Devon, reports the reception on July 13, 1944, of the following German stations working on 28 Mc/s.:—D4UJW, D3DSR, D4WY, D4BLD, D4FBS, D4JHF, D4DAP, D4ZX and D3JWW. Reception was between 1725 and 1905 GMT. A French-speaking station was heard at 1930 GMT on approximately 32 Mc/s.

OUR FRONT COVER

OUR front cover shows a typical Mullard all-glass valve with the metal "can" removed, so that the all-glass construction can be clearly seen. This new technique overcomes many of the problems of maintaining efficient valve operation at high radio frequencies.

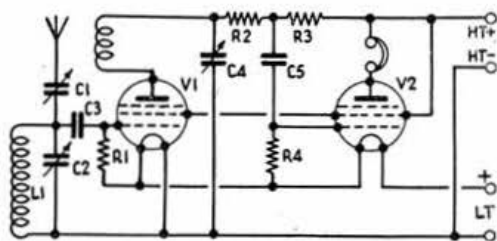
A COMPACT BROADCAST RECEIVER

By A. G. DUNN (G3PL)*

SOME time ago *Wireless World* published two short articles on the subject of small portable receivers, employing very low H.T. voltages. The writer completed a set built on lines suggested in our contemporary, which may be of interest to readers. The circuit used is a modification of the original designs, except that the chief feature is retained, namely the use of a very high L/C ratio tuned circuit in the detector stage. This provides the maximum possible signal at the valve grid. A low-loss tuning condenser is used and the frequency range is only about one-third of that covered by sets of more normal design.

General Circuit Features

The valves are type 1C5G or N14; with their filaments connected in series and operated from a 3-volts dry battery. The detector circuit is of the standard leaky-grid type with series Reinartz reaction. No R.F. choke is used, as the 5,000 ohms resistor (R2) was found to be quite satisfactory. The anode coupling resistor may seem somewhat small, but if a value greater than about 20,000 ohms is used, the voltage on the detector anode will be too small for stable reaction to be obtained.



CIRCUIT OF PORTABLE TWO-VALVE RECEIVER.

C1 "Postage-stamp" type trimmer.	R1 1.5 megohms, $\frac{1}{2}$ watt.
C2 100 μ F low loss.	R2 5,000 ohms, $\frac{1}{2}$ watt.
C3 50 μ F mica.	R3 20,000 ohms, $\frac{1}{2}$ watt.
C4 500 μ F solid dielectric.	R4 0.5 megohm, $\frac{1}{2}$ watt.
C5 .01 μ F tubular.	V1 & 2 1C5G, 1C5G, or N14.

For details of coils see text.

No grid bias is used for the A.F. stage because of the low anode voltage. The grid resistor should be connected to the negative side of the output valve filament; if it is taken straight to earth, $1\frac{1}{2}$ volts negative bias will be applied to the valve grid which will prevent the stage from working at all.

Constructional Details

The set is built into a small tin box, sold before the war by one of the multiple stores as a "Home Filing Cabinet." This box is about the same size as a No. 2 box camera, and has a hinged lid. The tuning condenser and solid dielectric reaction condenser are mounted on the front, together with a small Igranite phones jack. The valves are mounted in Amphenol octal holders in the rear corners of the box, the holders being supported on distance pieces (consisting of the coloured sleeves from defunct banana plugs) and secured by means of 4 B.A. bolts fitted through the bottom of the box. To save space, and reduce the risk of short-circuits, the unused contacts were removed from the valve-holders, an operation that

can be carried out quite simply by straightening the solder-tags with pliers, after which the whole contact can be pushed out of its slot in the moulded body.

The tuning coil is mounted vertically between the valves and is fastened to the bottom of the box by a U-shaped strip of brass, the two legs being fastened to the coil-former by 6 B.A. bolts. A 4 B.A. bolt passes through the bottom of the U and the box. All necessary connections must be made to the valve-holders before fixing them in position. Battery leads are taken through a rubber grommet in the back of the box, whilst the aerial and earth sockets are mounted at the right hand end of the box, the aerial series trimmer being easily accessible.

A second box contains a 9-volts grid bias battery and a 3-volts cycle lamp battery, for H.T. and L.T. respectively. A single-pole *Bulgin* toggle switch breaks the positive L.T. lead, and a 150 ohm resistor is included in the H.T. + lead to safeguard against a mistake with the battery plugs, which would lead to damaged valves.

The Coil

The tuning coil consists of 150 turns of 30 S.W.G. enamelled wire wound on a $1\frac{1}{2}$ in. ebonite former. After the ends have been anchored, a second (reaction) winding of 50 turns, is wound over one end of the first winding, with a layer of insulating tape between. About 40 turns had to be removed from the grid winding to enable the General Forces Programme on 877 kc/s. to be received at the H.F. end of the tuning range. It is not advisable to remove too many turns, as this will lower the L/C ratio necessary for optimum results. In areas where the 877 kc/s. programme is not well received, it will be necessary to arrange for the H.F. end of the band to fall just above the other Forces Programme on 1,013 kc/s., which will result in a slight falling-off of signal strength, especially on the Home Service frequency (668 kc/s.).

Results

With a good outdoor aerial, the aerial trimmer will have to be unscrewed, otherwise selectivity will suffer and the detector will probably overload. With a short indoor aerial, the trimmer should be screwed down tight, or alternatively the aerial may be tapped directly on to the top end of the tuned circuit, although in that case the high capacity to earth of the average indoor aerial will probably make it impossible to tune to the Forces Programme.

With a good aerial in use, loud headphone signals are obtained from the local Home, Forces, and European Service stations. A few foreign stations can also be received in daylight, and several after dark, although the set was not meant for DX. With a 10-ft. indoor aerial, good results were obtained in the London area on both Home and Forces programmes.

Battery Consumption

The valve filaments are each rated at 1.4 volts, 0.1 amp., and with the two in series, the actual measured current was 95 mA at 2.8 volts. Total H.T. current was only 400 microamps at 9 volts. Experiments were conducted to discover how low the voltages could drop without affecting results and these showed that with only 1.3 volts on the filaments, results were nearly as good as with the full 3 volts L.T., but a rapid falling off occurs below 1.3 volts. The current at 1.3 volts was 55 mA. Using an ordinary

(Continued on page 48)

* 79 Hayton Grove, Hull, Yorks.

DISTRICT NOTES AND NEWS

DISTRICT 1 (North Western)

D.R.: H. W. Stacey (G6CX), "Sandreas," Eddisbury Road, West Kirby, Cheshire. Hoylelake 337.

Liverpool.—A meeting has been arranged for Saturday, September 30, at the Stork Hotel, Queens Square, Liverpool, commencing at 3 p.m., and it is hoped that this will be as well attended as those held before the holiday period intervened. Post-war hopes and plans seem the order of the day and there should be much of interest to discuss. G6CX.

DISTRICT 2 (North Eastern)

D.R.: C. A. Sharp (G6KU), 50 Moore Avenue, Wibsey, Bradford. Bfd. 10772. Scribe: H. Beadle (G8UO), 13 Chandos Street, Keighley, Yorks.

Bradford.—G6KU is designing gear for post-war use including a multi-range modulation transformer. 4CL has removed the snags from his mod. amp. and it now works well. His attempts to arrange a meeting met with no success. 3HA (B.N.A.F.) comments on the quick arrival of THE BULLETIN; he also finds good reading in the Handbook and Supplement he recently received. He seeks news of 2SU, 4GJ and 4JB.

Morley.—G6NP is home again and feeling much better. 5893 is building a multi-range test meter. 6709 has taken interest in

thank Mr. W. E. Hunt in advance for his kind permission in allowing us this privilege. Tea will follow at the Beston Lads Club, for which we shall again be indebted to Mr. C. Williams. The charge for tea is 1s. and G8DZ would like those who intend to be present to drop him a line or call. BRS4172 is still enjoying life out in B.N.A.F., whilst BRS4330 is in Iceland. G8DZ.

DISTRICT 6 (South Western)

D.R.: W. B. Sydenham, B.Sc. (G5SY), Sherrington, Cleveland Road, Torquay. Torquay 2097.

Exeter.—There is little to report except that the last meeting was successful and well supported. The next meeting will be held on Saturday, September 23, at 2.30 p.m., in the Y.M.C.A., 4 Colleton Crescent, Exeter. It is hoped that there will again be a good attendance as a couple of pre-war N.F.D. films will be shown, and one or two interesting items of gear will be displayed. Charge, including tea, will be 2s.

Taunton.—There was an attendance of ten at the Y.M.C.A., Taunton, on August 10, when various topics were discussed. Later 2DRW gave a talk on receivers which proved interesting and instructive. The following were present at the meeting: G4OM, 4BN, 5AK, 5GT, 5LM, 5LY, 5KT, 2DRW, and two overseas amateurs. Contact has also been made with seven other allied amateurs. G5SY.

IMPORTANT
NOTICE

CLOSING DATE FOR OCTOBER ISSUE SEPTEMBER
30th. REPORTS SHOULD BE POSTED TO REACH
D.R.'s AND SCRIBES BY SEPTEMBER 23rd.

Cathode Ray apparatus and is looking for a tube. 2BM has a super amplifier using four 6L6's in the output stage. 8WP is now stationed at Huddersfield and gets home regularly. 2HHV has moved to Dewsbury. 5YV has at last obtained a C.R. Tube and Thyatron for the time base and hopes to have the gear in operation shortly. He would like to hear from 3NU, 5HB, 5ZB, 6MY, 6XT and 2FQH.

Halifax and Sowerby Bridge.—There was a very disappointing attendance on July 23 at the meeting arranged by Capt. Richards (BRS6642) at his home. 2DUX, 6806 and 6807 were the only members present. Thanks are extended to 6642 for his hospitality.

General.—2AQN Pte. C. Renshaw (R.A.S.C., C.M.F.), whose home town is Ossett, would welcome letters from anyone in the District. (Address from G8UO.) 4MC, who has acquired a YL is at present in Anglesey. 2VO recently met an early G who made the first electrical pick-up and first radio altimeter for aeroplanes. He has met a number of VE's and would like the address of 6ZN. 8UO was recently visited by 5834 (R.A.F.) and he himself visited 5QU at Redcar. G8UO.

DISTRICT 3 (West Midlands)

D.R.: V. Desmond (G5VM), "The Chestnuts," Hanley Castle, Worcester. Scribe: E. J. Wilson, 48 Westbourne Road, Olton, Birmingham.

Birmingham.—The Annual General meeting of M.A.R.S. will be held on October 17 at the Chamber of Commerce, New Street, at 6.30 p.m. 2FDR.

Cocventry.—A letter has been received from G2YS, with the C.M.F. He is with G5TY of South London and finds the work much to his liking. We congratulate 2LU on the arrival of a junior op. Congrats, also, to BRS7651 on passing his C. & G. Exam. G5GR.

DISTRICT 4 (East Midlands)

Deputy D.R.: Albert E. Clifton (GSDZ), 14 Epperstone Road, West Bridgford, Notts.

Leicester.—BRS5605 has built a new combined signal generator and monitor, range 70 kc/-8 Mc/s. using only 15v H.T.

A welcome is extended to G2FX, G8SH, BRS7861, 7951, 8069 and 8253. All local members are reminded that the T.R.'s address is 292 Gwendolen Road, Leicester. BRS5605.

Nottingham.—Although the attendance for our visit to the Rediffusion receiving station was no more than 11, due no doubt to a minor cloudburst we had that day, we had a very interesting afternoon, thanks to the engineers in charge. The chief item of interest was the Bellini-Tosi aerials which really "do their stuff," but unfortunately they are out of the question for the modern back garden. Another interesting item was a system of carrier injection, which is used on stations in the Forces network to reduce fading. Experience has shown that it is mostly the carrier that fades, consequently a local carrier is fed into the receiver to balance out the fading.

Local members are looking forward to their visit (arranged by GSDZ), to a works engaged in the manufacture of crystals. We

DISTRICT 7 (Southern)

D.R.: W. E. Russell (G5WP), "Milestones," Mayford, Woking, Surrey. Woking 1589.

Bournemouth.—Nine members attended the meeting on August 26, at which G2NS gave a very interesting talk on Relay Construction. Those present included 2ASV of Weybridge and new member 8430. Next meeting at 2HNO, September 30, 3 p.m. G2NH and 50H have been here recently. (via 2HNO.)

Coulson.—We were very sorry to hear of G5AN's bad luck in a recent raid. Welcome to 2DW and 2AYM who have come to live in the area, also to new members 7849, 7896, 8126 and 8141. (via BRS3003.)

Croydon.—BRS4095, with the B.L.A. in Normandy, in an eight-page letter to the T.R., told of the similarity of the countryside to parts of this country. As yet he has met none of the fraternity but is keeping a sharp look-out. 5BT and the T.R. enjoyed the contacts they made during their stay in Bournemouth. 2DP will be there again on September 23. See "Forthcoming Events" for details of the next meeting. (via G2DP.)

Guildford.—A meeting has been arranged to take place in the café of The Cinema, Woodbridge Road, Guildford, on Sunday, September 24, at 2.45 p.m. An interesting programme has been arranged and tea will be available. A talk on "Selectivity" will be given by G6NA. Please send a post-card to G5RS, 20 Hedge-way, Onslow Village, Guildford, immediately if you intend to come along.

Reading.—The most interesting talk given by Mr. J. Dee, 6957, on "Receiver Alignment" at the August Meeting was enjoyed by 20 members and friends. Amongst those present were 2IT, 2YI, 8KJ, 2BHS, 2BYZ, 2HIY, 5225, 8160 and 8254. It is encouraging that members are willing to travel some distance to these meetings whilst the active interest of some of the newer members is much appreciated. 2BYZ donated a pair of I.F. transformers to be raffled in aid of the P.O.W. Fund. For details of next meeting, see "Forthcoming Events." Members requiring window-bills to advertise the meeting are asked to get in touch with the T.R. (via BRS4573.)

Southampton.—The August meeting was our most successful to date. The attendance was good and among some of the older members were 3YI, 5LR, 611, 80V, and 2FSJ of Winchester. The lecture by Mr. Griffiths of the B.B.C. on "Frequency Modulation" was greatly appreciated. Details of future meetings can be obtained from the T.R., G8QW, 17 Calmore Gardens, Totton. (via G8QW.) G5WP.

DISTRICT 8 (Home Counties)

Deputy D.R.: L. W. Jones, 16 Leys Road, Cambridge.

Apart from visits from one or two members passing through the town, there is nothing to report as most of the locals have been on holiday.

The D.D.R. will be pleased to hear from anyone in the District who is interested in attending future meetings of the Wireless Section of the I.E.E., to be held in Cambridge. G5JO

DISTRICT 9 (East Anglia)

D.R.: H. W. Sadler (G2XS), The Warren Farm, South Wootton, King's Lynn, Norfolk. Castle Rising 233.

Norwich.—We offer congratulations to G2MN, who has been elected an A.M.I.E.E. Capt. G. Spurrell (Sheringham) sends an interesting account of life with the King's African Rifles: he much enjoys the technical articles in THE BULL. and is looking forward to an early QSO as soon as hostilities cease.

King's Lynn.—G5UD, writing from Yorkshire, appears to have nearly completed a Super-het for medium bands as well as one for the amateur bands. The D.R. during his recent visit to Nottingham had interesting contacts with G6MN, 6CW and 8DD. G2XS.

Forthcoming Events

- Sept. 17 District 4, 2.30 p.m. at 52 Regent Road, Leicester.
- Sept. 23 District 6, 2.30 p.m. in the Y.M.C.A., 4 Colleton Crescent, Exeter. Display of R.S.G.B. films and radio gear.
- Sept. 23 District 17, 2.30 p.m. Church House, Bull Ring, Grimsby (2 mins. Rail or Bus Station). Reservations for tea to 2BY5 or G5BD.
- Sept. 24 District 4 (Nottingham), 3 p.m. Visit to a crystal works at Beeston. Meet at The Beeston Lads' Club, Station Road.
- Sept. 24 District 12, 3 p.m. at BR3386, 22 Church Hill, Winchmore Hill (Bus 244 from Southgate Tube Station to Chase Side Tavern).
- Sept. 24 Scotland "A" District, 3 p.m. in the Royal Technical College, George Street, Glasgow. Enter by door in Montrose Street.
- Sept. 24 District 7 (Guildford Section), 2.45 p.m. in the café, The Cinema, Woodbridge Road, Guildford.
- Sept. 30 District 7 (Reading Section), 6.30 p.m. The Committee Room, Palmer Hall, West Street, Reading.
- Oct. 1 Combined meeting, Districts 7 and 13. 3 p.m. at the Y.M.C.A., North End, West Croydon.
- Oct. 1 District 10, 2.30 p.m. at 29 Ladysmith Road, off Penylan Hill, Roath Park, Cardiff.
- Oct. 1 District 12, 3 p.m. at BR3412, 18 Sandfield Road, St. Albans (turning off main Hatfield Road, near Cemetery bus stop).
- Oct. 4 City of Belfast Y.M.C.A. Radio Club. G16YM Annual General Meeting, 7.30 p.m. Third Floor, City Y.M.C.A. All amateurs welcome.
- Oct. 17 Midland Amateur Radio Society Annual General Meeting, 7 p.m., Chamber of Commerce, New Street, Birmingham. Followed by Presidential Address.

DISTRICT 10 (South Wales & Monmouthshire)

Deputy D.R.: H. H. Phillips (GW4KQ), 82 Cottrell Road, Roath Park, Cardiff. Cardiff 2697 during business hours.

Cardiff.—Post-war aims and developments again figured largely amongst topics discussed at the August meeting attended by 2UH, 4FW, 4KQ, 8AM, 8UH, 7114, 8553 and 7589: the latter journeying some distance to be present. Thanks are due to Mrs. 8UH for the kindly provision of refreshments.

The next meeting will be held at the home of GW8UH, 29 Ladysmith Road—off Penylan Hill—Roath Park, Cardiff, at 2.30 p.m. on Sunday, October 1, 1944, and a cordial invitation to be present is extended to all visiting and resident members.

No reports worthy of inclusion have been received during the past month. GW4KQ.

DISTRICT 11 (North Wales)

Deputy D.R.: C. Spillane (BR31060), "Woodside," Meliden Road, Prestatyn.

Mr. E. Trowell, 2HKU, while vacationing in the District, contacted 7529, but missed GW4CK. In consolation he bumped into ex-2AHG whilst climbing Snowdon. ZL2RI, who has been promoted to Corporal reports by airgraph from New Zealand that he is now receiving THE BULLETIN regularly. He sends 73 to GW3KY and all other old friends in the District. GW5YB (Bangor) has left to take up work in the Mediterranean area. We are pleased to welcome six new members to the District including two ladies who are at present at a local radio college. BR37914 reports via G2GZ from Gt. Malvern, where he is at present, with BR35832. Both are ex-members of the Cambridge University Wireless Society. 7914 is building a rack type quality communications receiver, which from his description will be a very fine job.

The writer and 2HIY hope to be on leave from September 11-20 and GW4CK from September 21-30. They will be pleased to receive visitors. A meeting having been arranged to take place in Prestatyn on September 17 at 3 p.m. it is hoped that everyone in the area will attend. As the venue had not been fixed at the

time these notes were prepared, members should call at the home of BR31060, for directions. GW4CK, GW3CF, G2GZ, 2HIY, 2731, 4444, etc., expect to be present. BR31060.

DISTRICT 12 (London North and Herts)

D.R.: S. Buckingham (G5QF), 41 Brunswick Park Road, New Southgate, N.11. Enterprise 3112.

North London.—The September meeting will be held at BR3386, when it is hoped there will be sufficient members present to discuss the programme for the winter meetings. Several suggestions have already been put forward but a few more will help considerably towards that end. We extend a welcome to the 24 new District 12 members listed last month and our congrats to F./Lt. P. R. Solder, G5FA, on his promotion to Commanding Officer of an A.T.C. Gliding School. Congrats, also to Mr. L. Saunders, BR35917, now proud father of a son and heir, Brian, born on August 28. Lt.-Com. "Bill" Bridgen, G6WU, has been home after 3 years' service abroad but his stay was short. He is now in the Ceylon area.

St. Albans.—At the second meeting of the new session (see "Forthcoming Events") 2BVH will give a talk followed by demonstration on "The use of the oscilloscope." The T.R. was pleased to receive a visit from 2CNC, who has now recovered from a bout of illness. He is looking forward to an early return to the Channel Islands. G5QF.

DISTRICT 13 (London South)

A.R. (South Eastern and Central), S. E. Langley (G3ST), 19, Elm Gardens, Mitcham, Surrey (Temporary Address).

South Eastern and Central Areas.—G2JB, 2JK, 2VA, 3ST, BR31545, 3003, 6894, 8417, were present at the last combined meeting of District 7 and 13. Owing to the usual interruptions the meeting was informal. Our thoughts during the meeting were with our many absent friends and we hope the day is near when they will return to participate in a renewal of the bumper meetings that we enjoyed in pre-war days at the Brotherhood Hall, Norwood. Members who have made personal DX tours will no doubt have some interesting stories to tell us when they return. Sig. A. H. Parker, R. Sigs., now with the C.M.F., in an airmail letter, provides confirmation to the above thought and sends greetings to all old friends including G2GZ, 2ND, 4DC, 6KP and 8GP. A collection for the Prisoners of War Fund taken at the last meeting, realised the sum of 7s. 6d. G3ST.

DISTRICT 14 (Eastern)

Scribe: L. J. Fuller (G6LB), 14 High Street, Walton-on-Naze, Essex. Business address daily, 85 High Street, Chelmsford. Telephone: Chelmsford 2079.

Members are asked to note the Scribe's new private address. He may be contacted at business if necessary, and correspondence may also be sent to that address. He will be pleased to meet any fellow amateurs in the Walton-on-Naze area.

Chelmsford.—Mr. F. E. Smith, BR33252, 40 Stewart Road, Bruce Grove, Chelmsford, has taken over local affairs *pro tem*. He can also be contacted at his radio shop, 13 Duke Street, Chelmsford. G6LB.

DISTRICT 15 (London West, Middlesex and Buckinghamshire)

D.R.: H. V. Wilkins (G6WN), 539 Oldfield Lane, Sudbury Hill, Greenford, Middlesex. Byron 3699.

As the result of raffles the recent District dinner and dance was a financial success. A profit of a few shillings was obtained for which we thank GSKZ and 2TJ who provided the prizes.

Four reports have come to hand, all from serving members. G8IH, aboard one of H.M. warships, is fed up with the sight of the Indian Ocean but has managed to meet a few amateurs in spite of it all. The censor cut out "G8PD," "gang" and "QSO" from 2BMY's airgraph but we managed to read it all the same! 2BMY has been acting in the film "Calling Blighly" but does not think he made a great success of it. BR37235 is probably in France. BR3750 (R.A.F.) is stationed in Ross-shire. He is a sergeant wireless operator air-gunner and has recently met 5QY and 8BA. In anticipation, G6WN has constructed and added a pre-selector to his Jones Super-Gainer.

District meetings have been temporarily suspended but due notice of their resumption will be published later under "Forthcoming Events." G6WN.

KILOCYCLES TO METRES

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DISTRICT 17 (Mid East)

D.R. : A. C. Simons (G5BD), Admiralty Road, Mablethorpe. (Tel. : 69.)

Arrangements have been made to hold a meeting in Grimsby on Saturday, September 23 (see "Forthcoming Events" for details). Those requiring tea must advise 2BY5, 15 Fairfield Road, Scartho, or the D.R. as early as possible, in order to reserve tables at a cafe.

During the past month the D.R. has received visits from G4BY, G5MT, 8353 and 7456. G2UK sends 73 from Normandy, where he is hoping to contact 2BQC. Having discovered some French science magazines of 1913 vintage 2UK no doubt now knows why F8 sigs. sounded like they did! 8094, writing from India, wants the Service address of Mr. Raspin, 5710. He has contacted G410 whilst on leave. 7851 (Boston) has just finished a two years' wireless course in N. Wales and is waiting for orders. 8562, who appears to be our first Louth member, is on H.G. signals as well as with the A.T.C. G2FT is bringing his receiver up to date for "Q" day. G8BQ had 38. worth of "rag chew" via land line with 5BD during his leave. No news is to hand from G5LL or G6GH; the latter is expected home shortly. Don't forget Grimsby on the 23rd. G5BD.

DISTRICT 18 (East Yorkshire)

District Scribe: S. Davidson (G6SO), 10 Sidney Street, Scarborough.

Hull.—2HAD after a silence of eighteen months sends an airgraph from the Sudan. 4209 reports from Redditch. 4530 spent a weekend in the town recently. 3PL has been visited by 6815 and would like to hear from any local member. (via G3PL.)

Scarborough.—Les. Tranmer, G6TG, looking fit and well, spent a holiday in the town recently. 680 had a visit from R. W. Batey, 8183, of Carlisle, during his short convalescent stay in the town. He is anxious to start meetings in his home town but finds difficulty in contacting other Carlisle and district members. A welcome is extended to all new members. G680.

Northern Ireland

D.R. : J. N. Smith (G15QX), 19 Hawthornden Drive, Belmont Belfast. Telephone : Belfast 63323.

Belfast.—At a recent meeting of the Belfast Y.M.C.A. Radio Club a cordial welcome was extended to C.P.O. T. W. Homewood, BR33623, of St. Andrews, Fifeshire. Among others present on that occasion were G15HU, 6TK, BR54196, 7637, 7720, 7930, 7937, 7938 and 8351. The Club has decided to organise a Radio Brain's Trust during the coming session. We are glad to hear that Mr. J. Nickle, 2HCC, President of the Club has now recovered from his illness.

Sympathies are extended to Mr. J. Johnson, BR57937, on his recent bereavement. (via G15HU.)

Londonderry.—Mr. R. Holden, G15HU (Belfast T.R.) was among several visitors welcomed at a recent meeting of the local Society held at the City Hotel. Other visitors included VE4ABE, BR55192 and 6141. At a later meeting Mr. J. Christophers, BR53051, delivered an interesting lecture on "Transmission Lines."

Local members were sorry to say "au revoir" to A. M. Baxter, VE5AJV, who has now returned to Canada. During his stay he was a staunch supporter of N.W.I.A.R.S. meetings. We wish him good luck and send him our thanks for his past co-operation. W9LEX has also left the area. (via 2DHB.) G15QX.

Scotland

Scottish Records Officer: J. Hunter (GM6ZV), 51 Camphill Avenue, Glasgow, S.1. Langside 237.

It is gratifying to note that "R" District has come to life again and we hope all members in that area will support the new series of meetings.

"A" District.—An attendance of 16 was present at the August meeting when GM6MD lectured on aerials. The talk led to an animated discussion afterwards.

"B" District.—As the result of a meeting attended by GM5JK, 61G, BR55857 and 6107, it is now hoped to hold regular meetings on the first Wednesday of each month. Details can be obtained by phoning Aberdeen 2676. All amateurs are invited, and that means you!

A letter has been received from new member BR57875 who is in Italy, and we extend to him a hearty welcome.

GM3YN's father writes to state that his son is now Squadron Leader in R.A.F. GM6ZV.

Stray

● Cpl. J. Shine, BR56709, 38 Cedra Court, Cazenove Road, N. 16, is anxious to learn something about the present state of radio and television development in Russia. As several members have visited the U.S.S.R. in recent years no doubt they can enlighten Cpl. Shine.

KHAKI and BLUE

● S./Ldr. H. Edge, G6GD, reports that the Duration DX'ers Club formed in New Delhi last year continues its activities. At the July meeting G6GD was elected Chairman while S./Ldr. Frank Adams, G2YN, celebrated his election to serve on the Committee by delivering a talk on "The Growth of Amateur Radio in the United Kingdom." Later in the evening Major Beech spoke on "Ionospheric Propagation."

● R.A.F. "Early Bird" Les Coupland, 2BQC, is back again in France in company with W.O. Baker, Sgts. Coleman, Williams and Thorogood. He says life is absolutely dead socially, but they have their moments in other directions. Beer is short—don't we know it!

● With reference to 2CMJ's claim, in the January BULLETIN to have been the first amateur to land on the mainland of Europe, old timer Capt. Hugh Ryan, G5BV, tells us that he also set foot on the beach at Salerno on the morning of September 9, 1943. He did not notice any obviously "ham" footprints in the sand that morning, but that was probably due to the fact that he was a bit preoccupied at the time!

Hugh was mentioned in despatches for his work in North Africa. He sends greetings to all old friends.

● Now that Sgt. L. Coupland, 2BQC, has gone overseas, Sgt. Muddell, 2AOY, has offered to act as liaison between H.Q. and the P.R. contingent. He reports that "Early Birds" Hammond, 4XL and Rayner, 6FZ, are still with him as are 2BHS, 2HLK and G4AD. Bernard Wynn, G8TB, another "Early Bird," has flown to pastures new.

● W.O. F. J. Ireland, 2FFX, wishes to be remembered to G3JR, 3VG, 5ZT and 8MD, whom he met and worked with whilst with the R.A.F. in the Azores.

● Sgt. Harry Collard, 2CVA, R.A.F., sends greetings from B.N.A. to G6IF, 2CMR and ON4FT. He has met I1FK from Turin, who is in the Pioneer Corps and also W7FDV from Wyoming.

Cairo Monthly Meetings

From Capt. Ken Ellis, G5KW, ex SU5KW, comes the news that regular monthly meetings are now being held in Cairo. By kind permission of the management of Messrs. J. Green & Co., the roof and auditorium of their premises at Sharia Muhammad Bey Farid, opposite St. Joseph's R.C. Cathedral, have been made available on the last Saturday of each month from 6 p.m. onwards for members of the Cairo Radio Club.

The first meeting held on July 29 saw an attendance of 14 including VE3AAA, G5WZ, 8KW and 2DKX. A gramophone recital by SU1CR started the meeting followed by two technical cine-sound films which were much appreciated.

The president of the Club, Mr. Waly, SU1MW, who is remembered for his excellent quality 28 Mc/s. transmissions, then addressed the meeting and welcomed the visitors. Refreshments, provided by the Club, were served later, after which the meeting broke into discussion groups. Photographs were taken by SU5KW.

At the August meeting SU1MW and SU1CR were scheduled to make some special recordings whilst SU5KW planned to organise a Radio Quiz.

* * *

News from the Kreigies

● From Sgt. Harold Baines, R.A.F., comes news of the formation of a "ham club" in his camp. Baines, although a non-member, seems to know a good deal about our activities. He writes, "with regard to our small and exclusive club we have formed in this country to carry on the old spirit, you may like to know that it includes nine licenced G's, four W's, some V's, Z's and an SP." Unfortunately no call signs are quoted in his letter, but if the information is correct, and we have no reason to doubt it, this coterie of hams must be the largest in any P.O.W. Camp. GSTL certainly has no knowledge of nine licenced G's being in the camp. Can any member provide a clue as to the identity of Sgt. Baines, who is a Wireless Operator?

He concludes his letter, one of the longest we have received from Germany, with a request for a few magazines. If any reader would like to answer his appeal, his full address is Sgt. Harold Baines, W./Op., R.A.F., No. 3 Lager der Luftwaffe Nr 3, Germany.

* * *

● Postcards are to hand from Cpl. Denis Carr, G8UC, who wishes to be remembered to all old friends, and from Sig. Frank Marshall, G2XQ, who seeks news of present-day activities of the Society. Both return thanks for parcels received from the R.S.G.B. Fund. Frank congratulates GSTL on the excellent brands of cigarettes which have been sent to him.

Congrats

● To A./P.O. E. G. Cocks, BR57412, who has been awarded a bar to his D.S.M. The original award was "for great courage, resolution and skill."

Letters to the Editor

Experimental Workshop Centres

DEAR SIR,—I have just read your Editorial on the above subject in the April BULLETIN. Whilst it is too early to criticise your suggestions the following views may help in the formation of a concrete plan.

It is well known that the average pre-war amateur had to do his experimenting in some out of the way corner. In my case the "lab" varied from a disused stable to an attic under the roof! It is, therefore, a sound suggestion that central experimental workshops be provided, but I feel that the best people to help are local education authorities.

As radio has for long been ignored in our schools, except, of course, in specialist establishments, it seems high time that the authorities provided accommodation and facilities for day-time instruction in the science in our elementary and secondary schools. As the majority of such schools are open in the evenings for adult courses of tuition, it should not be impractical to throw open the radio laboratories for those amateurs keen enough to avail themselves of the facilities thus provided. By so doing the education authorities would be filling a long felt want, besides showing appreciation of the work achieved by amateurs during the war.

Some technical schools have in the past sponsored Radio Societies for day pupils, and have allowed the use of certain rooms and equipment for experiments. Could not this idea be extended so that local amateurs have an opportunity of using the equipment? In any case the majority of such equipment will already have been paid for by the ratepayers! If the appropriate authorities cannot provide free facilities (which they should do) I suggest that a small annual fee, of say 5s., be charged to cover general expenses.

Suggestions are not of much use unless they are backed up by offers of personal help. For my part I am willing and eager to assist in any way I can. How about trying the education authorities? You are nearer to them than I am.

Yours faithfully,

H. BARNETT (2AIQ).

B.N.A.F. July 1944.

[*Editorial Note.*—F./Lt. Barnett's suggestion is worthy of consideration. We should be pleased to hear from any member who is able to "sell" the idea to his local education authority.]

The Future of Civilian Wireless Reserves

DEAR SIR,—As a somewhat distant, but still very interested member, I am moved to make a few comments concerning the Civilian Wireless Reserve and the correspondence thereon in THE BULLETIN.

One of the most striking advantages in which the Reserve proved its worth at the beginning of this war was the unique team spirit in those units manned entirely by ex-C.W.R. personnel.

It is very clear now that the pre-war R.A.F. C.W.R. was a very good scheme and that the future should contain a reserve which is even better. I view your proposal to establish a communications network of new G.P. stations as being sound, but it is only a small part of the ideal. I consider that every reservist should aim to make himself worthy of the name of Wireless Operator Mechanic—not the war-time W.O.M., but the really sound operator, "happy" with his Morse and able to tackle unusual traffic or procedure without having a "flap," and also the really competent mechanic, handy with his Avo and screwdriver and also understanding the theory behind what he is doing.

Under peace-time training conditions, this is by no means impossible, in fact it is very practical. By all means let surplus sets, new G.P. or otherwise, be issued to reservists; but let the design and construction of amateur equipment be encouraged too, for therein lies the best way of training mechanics and the universal gateway to research.

The control, both national and regional, of a future C.W.R. could be much better, and I should very much like to see this unified through the R.S.G.B. There is much to be done. Even such humble things as the change in the phonetic alphabet from "Ack, Beer, Cork" to "Able, Baker, Charlie" with no obvious advantages. Procedure changes are always an inconvenience, therefore it would be a great achievement if those in charge of the new C.W.R. could be persuaded to standardise systematically all such things as this, thereby making all reserve operators as proficient as peace-time and Service needs may require.

Perhaps as an ex-W.E.M. I am prejudiced, but I think the old C.W.R. laid too much stress on "brass-pounding." Experience has proved that war-time entrants with no previous experience can be turned into quite good operators in a few months, but every R.A.F. Signals Officer knows that the really good mechanic springs only from the man who spent years at the game, either in the trade, in the Service, or as an amateur in peace-time.

At all times the Service needs a large supply of potential personnel, well-trained and well versed in the ways of the Signals Services. I hope to see a C.W.R. reformed to meet these needs, and to be a member of it.

Yours faithfully,

PETER SPARY (ex-2FVU). (C.W.R. Number 231).

[Editorial Note

In our original comments on this subject, published in the October, 1943, issue, we suggested that members of post-war Civilian Wireless Reserves should be given every opportunity of attending courses at Radio Schools in order to keep in touch with the newest types of Service equipment. Whilst it is true that the purpose of the original R.A.F. C.W.R. was to provide a pool of trained wireless operators in the event of an emergency, experience has shown that if such men are also keen amateurs their chief value to the Service lies in the field covered by such trades as those of the Wireless-Radar Mechanic.

It is unlikely that any post-war Civilian Wireless Reserve will be constituted without the active co-operation of the R.S.G.B.]

The "Ham" Wins

DEAR SIR,—I imagine that the vast majority of new members of this Society have no experience of amateur radio as we know it, and possibly had no knowledge of radio at all before they entered the Services. In this sense, then, they are only "amateurs" in so far as they have absorbed the atmosphere from THE BULL and QST. But more decidedly, as an equal number have had no scientific training, they cannot be called "experimenters," except in the sense that they are finding quite unoriginal truths for their own amusement. G6YN's letter in the July issue, therefore, is alarming in its solemn insistence on a new name for the "ham."

Last week I met two "hams," one a physicist, one an engineer, who wholeheartedly agreed with my point of view; the latter, incidentally, was working in a lab., surrounded by curves and figures on graph paper, and "conducting an investigation" if I may parody the ponderous English usually used by those who seem more impressed by technical play than by the excellent "ham spirit," which many of us enjoyed before the war.

Yours faithfully,

R. B. CONN, (Sub-Lieutenant, R.N.V.R.) BR57198.

A New Member Looks Ahead

DEAR SIR,—I have read the editorial in the July issue of THE BULLETIN, and also the article by G3ZI in the same issue, and they have prompted me to make a few comments which I hope will be of interest as coming from one of your newer members.

First, in connection with your editorial remarks, I should like to express my appreciation of the articles mentioned, particularly those on Centimetre Waves and the new series on Negative Feedback. The quality of the technical material is certainly high. In so far as I am concerned, and I am sure it is true for many others, you are right in supposing that many of the "younger members are thinking deeply about the more abstract aspects of the radio art." Personally, I hope to reach a technical standard not short of that of the professional, and it is with interest that I noted in the last Council Elections that many senior members are professionals as well as amateurs.

When reading the article by G3ZI, the first few paragraphs made me feel exceedingly out of touch with the views of the older members. My practical acquaintance with radio has been gained in the Army on Radar, and, of course, therefore, telegraphy and Morse have had no connection with my radio experience. As a result I am little moved to read the accounts of the pre-war joys of old-timers. Indeed I do not understand most of their terms as yet! The thought of making contacts round the world has not particularly enthused me, but the thought of experimenting with Wave-guides, F.M., 224 Mc/s. and Television does. It was with renewed pleasure, therefore, that I saw references to these subjects in the latter part of G3ZI's article.

My hope after the war is to be able to work on these problems, not as an individual, but as one of a group of members. In this way progress would be much quicker through the pooling of work and ideas, and, of course, expense. I hope it will be possible to form such groups in many districts.

Finally, I do not as yet know Morse, but I have vague hopes that a transmitting licence of some sort will be obtainable for experimental purposes one day without knowing it! For anyone who is thinking of working on the subjects I have mentioned a knowledge of Morse seems quite unnecessary. Perhaps shortly there will be further information available on post-war licensing matters.

I hope these remarks will be of some interest to readers.

Yours faithfully,

C. H. B. LOCKE (BR56428).

[*Editorial Note.*—The Radio Telecommunications Regulations require every licensed amateur-experimental station to be operated by a person capable of reading Morse sufficiently well to understand instructions which might be transmitted by a Government sending station.]

G3IM Bereaved

Sympathies are extended to Mr. C. H. Cox, G3IM, 17 Links Road, Blackpool, on the death of his wife, Gladys. Mrs. Cox was known to a wide circle of members.

HEADQUARTERS CALLING

COUNCIL 1944

President:

ERNEST LETT GARDINER, B.Sc., G6GR.

Executive Vice-President: S. K. Lewer, B.Sc., G6LJ.

Honorary Secretary: H. A. M. Clark, B.Sc., G6OT.

Honorary Treasurer: A. J. H. Watson, A.S.A.A., G2YD.

Honorary Editor: Arthur O. Milne, G2MI.

Immediate Past President: A. D. Gay, G6NF.

Members: F. Charman, G6CJ, D. N. Corfield, D.L.C.(Hons.), G5CD, Group Capt. G. R. Scott Farnie, GW5FI, F. Hoare, G2DP, Wing-Com. J. Hunter, G2ZQ, W. E. Russell, G5WP, H. W. Stacey, G6CX.

General Secretary: John Clarricoats, G6CL.

July Council Meeting

Resume of the Minutes of a Council Meeting held at the Kingsley Hotel, Holborn, London, W.C.1, at 6 p.m. on Monday, July 24, 1944.

Present.—Messrs. E. L. Gardiner (President), S. K. Lewer, A. E. Watts, H. A. M. Clark, A. J. H. Watson, A. O. Milne, D. N. Corfield, F. G. Hoare, W. E. Russell and J. Clarricoats (General Secretary).

Apologies were received from Messrs. A. D. Gay, F. Charman and H. W. Stacey.

(1) It was unanimously resolved to elect one Life Member (Mr. W. E. Marsh, SUIWM, Tanta, Egypt), 129 Corporate Members (97 proposed by Corporate Members, 32 supported by references), 7 Associates and 7 Junior Associates.

(2) It was announced that the total membership was 7,170 as at June 30, 1944, representing an increase of 1,300 in nine months.

(3) The Monthly Balance Sheet and Statement of Account was presented and adopted.

(4) Matters relating to advertising were discussed with particular reference to a small advertisement published recently in THE BULLETIN from a member who it was found had quoted a higher pre-war retail price for an American receiver than the agreed retail price. It having been reported that the matter had been brought to the notice of the member in question, it was agreed to take no further action, beyond advising him that it is the duty of the Council at all times to safeguard the interests of members when complaints of the nature referred to are brought to their notice.

(5) The Secretary read a letter from the Ashton-under-Lyne Radio Society protesting against the omission of their notes from the July issue of THE BULLETIN. The Secretary stated that as the notes were not received from Mr. Stacey (District 1 Representative) until July 7 (seven days after the issue had closed for press), it was impossible to include them. The Secretary read a letter which he had addressed to the Ashton Society pointing out the above facts. It was agreed to await a report from Mr. Stacey.

(6) The Secretary tabled a memo., prepared by Mr. W. H. Matthews, G2CD, summarising recent decisions and recommendations by the Board of Trade relating to the disposal of surplus Government material. It was agreed to prepare and maintain a special file of correspondence on this subject.

(7) The President stated that he had circulated a memo. to the G.P.O. Liaison Committee setting out a tentative list of headings under which past, present and future Council policy in regard to licences could be tabulated. After a lengthy discussion it was agreed that the G.P.O. Liaison Committee should be requested to examine the memo. with a view to preparing a comprehensive list of headings for the discussion of licence policy.

(8) In view of prevailing conditions, it was agreed to defer, until the next meeting, a decision regarding future I.E.E. meetings.

(9) With further reference to the suggestion that a meeting be arranged between the Society and representatives of the Radio Industry interested in the post-war amateur market, the Secretary reported that, a list showing those components, etc., which it was thought would prove useful to amateurs after the war had been circulated to members of Council. The suggestion was made that the list, prior to presentation to the radio industry should first be edited and then sent to D.R.'s with a request that they bring it to the notice of members, with a view to obtaining further suggestions. Mr. Lewer agreed to edit the list and present it to Council at the September meeting.

The meeting closed at 9.10 p.m.

Bulletin Honoraria

The Council has been pleased to award Honoraria to the following members who contributed articles to Volume XIX of the Society's Journal:—

J. H. Shankland, B.Sc., Grad. I.E.E. (GMSFM)—"Communications on Centimetre Waves"; R. H. Hamman (G2IG)—"The

Synthescope"; B. W. F. Mainprize, B.Sc. (Eng.) (G5MP)—"Valve Vade Mecum"; W. A. Scarr, M.A. (G2WS)—"Radio and its relationship to kindred Sciences"; F. J. Forbes (2BFC)—"Applied D.C."; H. V. Griffiths (ex-G6FF)—"Diversity Reception"; C. A. Simmonds (G3SV)—"Utility Valve Voltmeter"; R. Parsons, A.R.I.B.A. (G6RP)—"The Post-war Amateur Station"; R. G. Kitchenn, Grad. I.E.E. (G3SK)—"Power Amplification Explained"; S. R. Deards (G5PA)—"The Load Line"; E. H. Norman (BR86748)—"A Combined R.F. Oscillator and Heterodyne A.F. Oscillator"; W. G. Johnson (2BJY)—"A 4-Valve Communications Receiver"; I. B. Whitstable—"Theme and Variation on the D.S.H."; T. R. Nisbet (GM3SW)—"The Light Receiver."

The Council records its thanks to all who contributed to Volume XIX and offers congratulations to those who have been awarded honoraria.

Postal Delays

Every effort is being made by Headquarters and by our printers to publish THE BULLETIN on the 15th of the month, but postal delays frequently contribute to a particular issue arriving late in certain parts of the United Kingdom.

Members will appreciate that once an issue has been posted we have no further control over its delivery.

Subscriptions to "Radio"

Subscriptions to the American monthly publication *Radio* can now be accepted by Headquarters at the rate of 21s. per annum.

American Publications

The Society is in a position to accept orders for the following publications which are ordered individually from America:

"QST" (Official monthly publication of The American Radio Relay League). By subscription, per annum	17s. 6d.
"The Radio Amateur's Handbook" (A.R.R.L.)	10s. 6d.
"The Radio Amateur's Handbook"—Special Defence Edition (A.R.R.L.)	8s. 6d.
"The Antenna Handbook" (A.R.R.L.)	4s. 0d.
"A Course in Radio Fundamentals" (A.R.R.L.)	3s. 6d.
"The Radio Handbook" (Editors and Engineers Los Angeles)	12s. 0d.
"Radio" (Monthly publication of Radio Ltd.) per annum	21s. 0d.

Orders must be accompanied by a remittance made payable to the Society and rates and prices are subject to alteration without previous notice. Delivery can be expected in about 12 weeks from date of order. Service Addresses must not be used. Single copies of text books only may be ordered.

Members who change their address during the currency of a subscription to *QST* or *Radio* should advise the publishers direct.

R.S.G.B. Prisoners of War Fund

DONATIONS.—The General Secretary acknowledges with thanks, on behalf of Council, receipt of donations from:—Anon, 3s. 4d.; District 7 (Bournemouth), 10s.; L. R. Mahon, 512s. 5s.; District 7 (Reading), £1; G. A. Thomas, 541s. 5s.; R. E. Friend, G4NV, 4s.; E. W. Wisken, 5s.; S. Pearson, 2FJS, 4s.; W. J. Davie, G3OR, 5s.; P. Raban, 3581, 14s. 6d.; B. H. Underwood, BERS507, £5; J. C. Hallifax, 7512, 13s. 6d.; A. E. Ashfold, GW5AB, 5s.; G. Trotter, 4461, 5s.; R.A.F. W.D. (per C. H. Ranft, G5RF), 14s.; District 13, per G3ST, 7s. 6d.; F. Marshall (Father of G2XQ (P.O.W.)), £2; Mrs. D. Neale (widow of G6GZ), £1 1s.; S. Leith, GM4HX, 10s.; Masteradio per S. L. Robinson, £1 1s. 6d.; R. A. Archer, 2AXP, £1. Total receipts to date, £1338 10s. 10d. Expenditure to date 2867 5s. 10d. Balance in hand as at August 29th, 1944. European Fund, £141 5s. 0d. Far East Fund £330 0s. 0d.

Changes of Address

Members who change their permanent address are asked to note that at least one month must elapse before the change can become effective for BULLETIN despatch purposes.

The Society cannot, under existing conditions, send the BULLETIN direct to a Service address. Members on Active Service should arrange for re-direction from their home address. Provided re-direction is effected promptly, no additional postage is required.

Honours List

From the Colony of the Gambia Government Gazette, dated June 8, 1944, we learn that His Majesty the King has been graciously pleased to award the Medal of the Most Excellent Order of the British Empire to Mr. Isaac Nathaniel Davis. Mr. Davis, BERS468, became a member of the Society in August 1941, and is resident in Bathurst.

We offer him warm congratulations.

Technical Advice Offered

A Midlands member who is an engineer by profession, is prepared to give free confidential advice to members upon matters concerning Inspection, Gauging and Inter-changeability. Members seeking advice should write *via* the Society marking the envelope "Inspection" in the top left hand corner. A stamped addressed envelope, for reply, should be included.

Kilocycles to Metres

Headquarters are again in the position to supply the Kilocycle to Metres Conversion tables in vest-pocket booklet form bound in paper covers. Price 1s. 3d. each, post free.

Enemy Action

Sympathies are extended to all members who have lost their home as the result of enemy action. For security reasons, we are not permitted to publish details.

News from FA8IH

G2YL, G6YL and other old friends of Dr. Maurice Artigue, FA8IH, will be pleased to hear that he is in good health and still living in Algiers. He is the first liberated European amateur to rejoin the Society. We welcome him back to membership.

Can You Help?

Mr. H. R. Singh, BR86889, 166 Hamilton Road, Longsight, Manchester, 13, seeks the loan of the instructional booklet issued with the Taylor 47/S type Valve Tester.

Radio Equipment of the late C. A. Mackay, 2BMZ for Disposal

Mrs. C. A. Mackay, 35 Outmarsh Road, Radford, Coventry, would be glad to receive offers for the following equipment:

One National NCS1X Receiver with 12 in. B.T.H. R.K. P.M. Speaker.

One Avo Oscillator.

One Audio Frequency Oscillator (Wien) 50-12,000 c.p.s.

One 21 in. Cathode Ray Oscillograph.

Two P.M. Moving Coil Speakers (1-7 in., 1-9 in.).

EDITORIAL—(continued from page 33)

the years ahead? Would our European Allies welcome an association of European amateur societies now that the language difficulty has been largely overcome by long residence in English speaking countries? What plans can be made now to ensure that the I.A.R.U. delegates to the first post-war International Telecommunications Conference are fully conversant with the needs of every I.A.R.U. Society?

We do not profess to know the answer to all these questions but undoubtedly many members have given them serious consideration, and their views would make interesting reading.

We reiterate, the columns of this Journal are an "Open Forum," let us use them wisely and well.

J. C.

A COMPACT BROADCAST RECEIVER—

(continued from page 42)

2 volt accumulator, filament current was 70 mA and results were equal to those obtained at 3 volts.

The H.T. voltage can be reduced to 6 volts without serious loss of output, but results drop off quickly below that value. The whole set, including batteries and valves, can be built for about £2 10s., but the junk box will probably supply most of the parts.

If it is not necessary to build the set in such a small space, parallel-fed transformer coupling could be used with a consequent increase in gain. An R.F. choke could also be used if desired and this would probably give better results when the H.T. is lowered. None of the component values are at all critical; for instance, a 300 μ F reaction condenser would be quite large enough, and a 2 or 3 megohm grid leak might be better than the one specified.

A slow-motion dial could be fitted, but is not essential, as tuning is quite easy with direct drive. No provision has been made for long-wave reception, as the only station of interest on that band is the 200 kc/s. European Service.

Not the least of the advantages of this set is the very low cost of battery replacements, whilst it would be ideal for use as a stand-by receiver in case of mains failure.

Application of Ionic Medication to Dental Surgery

Mr. D. J. M. Buddery, BR82999, is the author of a series of articles on the above subject published in recent issues of the Journal of the Dental Students Society.

Members interested in Ionic Medication may borrow a copy of the articles on application to the General Secretary.

EXCHANGE & MART-ADVERTISEMENT RATES

MEMBERS' private advertisements 2d. per word, minimum 3s. TRADE advertisements 4d. per word, minimum 6s. Box Numbers: 6 words, plus 1s. TERMS: Cash with order. All copy and payments to be sent direct to Advertisement Managers, Parris Advertising Ltd., 121 Kingsway, London, W.C.2, by the 30th of the month for following month's issue.

ALL KINDS OF PRINT.—Send your enquiries to G6MN, Castlemount, Workop.

EDDYSTONE 358X Communication Receiver, mains operated, as new. Cost £74. What offers?—Write BM/ARTEE, London, W.C.1.

ELECTRIC record player, Columbia or similar, urgently required by member serving in very isolated unit. Please state price.—Box 419, PARRIS, 121 Kingsway, London, W.C.2.

FOR SALE.—New 1944 Taylor Model 65A All-wave Signal Generator, mains operated, £15 15s.; cost £16 10s.—ELMER, 307 Hood House, Dolphin Square, London, S.W.1. Phone: Vic 3800, ext'n Hood 307, after 6.30 p.m.

MONOMARK service.—Permanent London address. Letters redirected. Confidential. 5s. p.a. Royal patronage. Key tag 9d.—Write BM/MONOT7A, W.C.1.

MCELROY Bug Key for Sale. Perfect condition, little used.—WADE, 29 Clarendon Road, Leeds, 2.

OFFERS invited.—78 QST, 1932-38: 30 "Bulls," 1936-38: 32 "Wireless Engineer," 1932-34: 9 "Radio," 1938-39: Newnes' "Practical Electrical Engineering," complete (40 parts). Valves: EBL1, PM24A, MH4, X41C, E66, 6F5 (Met)—all new. Slightly used: T20, MS4B, FC2A, AC/TP, 78. Further details S.A.E. Offers, all or part, to G3FN, 19 Stradbroke Road, Sheffield, 9.

RIDERS "Automatic Record changers and recorders," just received from States, £2 5s.—BM/DGL, London, W.C.1.

SALE.—12-valve Prototype Communication Receiver, not quite completed. Frequency range 1 to 30 megacycles, R.F., separate Osc., 3 L.F.'s, 1,600 kc/s., noise limiter, A.V.C., 2 L.F.'s, novel band set device, "National" P.O.W. dial. Eddystone coils and formers, B.F.O., "S" meter, separate power unit, both units housed in black crackled metal cabinets. L.S. and phones. May be heard working by appointment, £30.—Write: BR85087, 13 Braeside Road, Southampton.

TAYLOR Signal Generator A.C. mains, All-wave, new condition, Model 65A, £13. Haybeard Charger, 18 cells at 1 amp, steel case, ammeter, new, £8. Both carriage paid. "Bulls," March, 1941, to date, 1s. each. "Practical Mechanics" to date, 6d. each.—HOBSON, BR84157, 51 Warden Street, Canklow, Rotherham, Yorks.

THE BULLETIN, complete January, 1934, to December, 1943. Offers?—BR81330, Providence Cottage, Misterton, Somerset.

VALVES.—AC/IL, 84/624, 6Q7G, 6K7G, 76, 6J5G, EF6, EZ2, X65, 8s. 6d. each. Meter Rectifier, 5mA, 15s.; 1mA, £1. Switches: 4p-2w, 3s. 6d. 1p-18w, 5s. Resistors assorted, 100 for £1. Condensers, 50 for £1.—Box 421, PARRIS, 121 Kingsway, London, W.C.2.

WANTED.—100 or 1,000 kc/s. Crystal, 3Q5G, Electronics and Television, February, 1941. Electronic Engineering, June, 1941.—MURFITT, 17 Ravenscourt Drive, Chaddesden, Derby.

WANTED.—Short-wave Twin-gang Condenser, capacity .00016 or .0002 μ F. No slow motion.—BR85319, 41 Innerbridge Street, Guardbridge, Fife, Scotland.

WANTED.—H.M.V. Hyper-sensitive Needle Armature Pick-up.—G3LB, 25 Clothholme Road, Ripon, Yorks.

WANTED.—Descriptive booklets, catalogues, etc., of communication receivers (Evrizon and U.S.A.) also "Bulls," for January, February, 1943.—BR88183, "Fairhaven," 17 Dummall Drive, Carlisle.

WANTED urgently.—Valves: 12B8GT, 25A7G, also radiogram cabinet. Valves: 6K8, 6N7, 6SK7, 12SK7, 6J5, 1H5GT, unused in sealed cartons. What offers?—Box 423, PARRIS, 121 Kingsway, London, W.C.2.

WANTED.—2-v. S.W. Receiver with headphones. All in working order. Full details and price to Box 425, PARRIS, 121 Kingsway, London, W.C.2.

WANTED.—Bug Key or "Vibroplex." Name own price if in good working condition. Details.—HUNT, BR86577, 9 Tennyson Road, Cowes, I.O.W.

WANTED.—Electric Gramophone Motor and Turntable (no pick-up), 200/240 volts, also Rola G12 P.M. speaker.—Box 101, R.S.G.B., New Ruskin House, Little Russell Street, W.C.1.

WELL-KNOWN amateur has for disposal large number receiving and transmitting components materials, etc. Finest makes. Much unused. No cheap junk. State specific wants. S.A.E.—BM/GAA, London, W.C.1.

PATENTS AND TRADE MARKS

KING'S Patent Agency Ltd. (B.T. King, G5TA, Mem. R.S.G.B., Reg. Pat. Agent), 146a Queen Victoria Street, London, E.C.4, Handbook and Advice on Patents and Trade Marks free. Phone: City 6161. 50 years' refs.