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MAY 1943

BULLETIN

JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN



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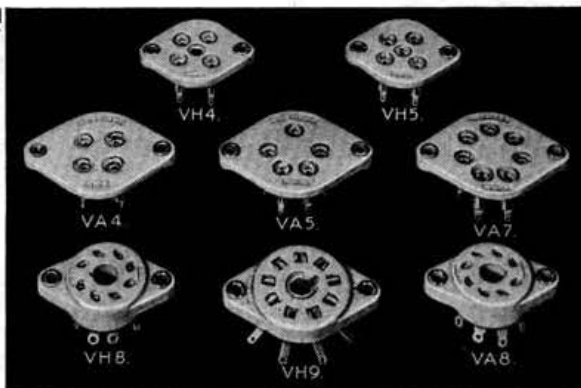
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THE CALL OF YOUTH

THE excellent work being performed by members in connection with the training of Air, Army and Sea Cadets is too well-known to call for special mention at the present time, but when thinking of these officially recognised pre-entry Service organisations as many will be doing on Empire Youth Sunday, we should not lose sight of the fact that other sections of the youth movement are seeking the aid of qualified instructors.

In London and other large cities steps have been taken to form troops of Air Scouts, and already much success has been achieved. These troops, from which the Air Training Corps will eventually draw most of its recruits, need radio and Morse instructors, and whilst it is appreciated that the majority of our members are already busy in many directions there may be some who are in a position to lend a hand. The badge system, around which the Scout Movement gravitates, demands the assistance of qualified instructors. Who are more competent than radio amateurs to prepare Air Scouts for their Signaller or Wireless Badge?

During recent months a considerable number of young men between the ages of 16 and 17 have been elected to membership of our Society. Few have had practical experience of amateur radio, but the fact that they are now members indicates their interest in the science of radio communication. We commend to

such members this opportunity of improving their own knowledge of the Morse Code and of basic radio principles by offering their services to a local troop of Air Scouts.

Youth Clubs (and there are many hundreds of them up and down the country), although not an integral part of the pre-entry Service scheme, need the help of technical people who are prepared to give an occasional lecture on scientific subjects. The enthusiastic radio amateur will find his offer of assistance gladly accepted by local Youth Centre organisers. Who knows but that his talk may awaken among his audience sparks of interest that have lain dormant since school day visits to the "chemy" lab?

Yet another youth organisation seeking technical assistance is the National Association of Girls Training Corps, of which the G.T.C. is perhaps the best known. Unlike its male counterparts, the G.T.C. receives no financial assistance from the Government, neither is it officially recognised as a pre-Service training organisation, yet in spite of these and other difficulties, it is putting up an excellent show. Technical progress is, however, being checked due to the lack of competent instructors and equipment.

Those members who are already assisting their local G.T.C. Company need no reminding that the modern girl is as keen to study technical subjects as is her brother, whilst her ability to learn Morse quickly has been recognised by all three Services, with the result that many thousands of girls have been, or are being, trained as wireless operators. By giving Morse instruction for an hour or two each week any member with the time to spare will find his efforts fully repaid and warmly appreciated.

Some may ask, but why should we assist youth movements? There are many good reasons, but two should be sufficient. First, by providing technical instruction for young men and women before they join up, their "ab initio" training is reduced to a minimum—that means a saving of public money. (It is estimated that the pre-entry training affected in A.T.C. Squadrons has already saved the country tens of thousands of pounds.) Secondly, every young man or woman who receives radio instruction from a qualified amateur is a potential "ham." When the war is over there will be hundreds of newcomers to our movement, and it is certain that many of them will owe their introduction to Amateur Radio to some enthusiastic amateur who laboured long hours during the war to explain the hidden mysteries of Dr. Ohm and Samuel Morse.

Those with the time to spare and the ability to teach will surely see to it that the call of youth is not left unanswered.

J.C.

FREQUENCY MODULATION*

By A. J. BAYLISS,† B.Sc. (G8PD)

PART I

The information given in this and the following article should enable the interested reader to prepare for the exploitation of Frequency Modulation when amateur experimental licences are restored.

AT first sight the system known as Frequency Modulation may appear to call for the use of complicated and expensive apparatus, difficult to adjust outside a laboratory. In point of fact, however, this is not the case, for as will be shown later, it is a comparatively simple matter to construct a F.M. transmitter and receiver using components of a type available to the amateur.

The first experiments with F.M. were carried out nearly 20 years ago, which disposes of the myth that it is a new invention. As F.M. is only one of several methods which are available of conveying intelligence by means of radio waves, it is proposed to consider briefly the systems in use, with a view to paving the way for a detailed description of F.M.

Continuous Wave Telegraphy

In this system a carrier wave at radio frequency is interrupted in a pre-determined manner by means of a key; different combinations of dots and dashes representing letters and numerals of the Morse Code. A pictorial representation of the Morse letter V is given in Fig. 1.

For the transmission of speech and music a carrier wave at radio frequency is again employed, but instead of interrupting it, as for the C.W. case, its amplitude, frequency or phase is varied in sympathy with audio frequency speech or music waves, thus giving rise to Amplitude, Frequency or Phase Modulation.

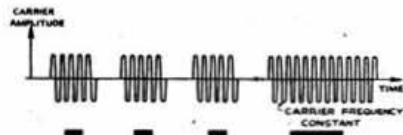


Fig. 1.

Pictorial representation of the transmission of the letter "V" using the Morse Code.

Amplitude Modulation

In this system a constant frequency carrier wave (at radio frequency) is used, its amplitude being varied, or modulated by the low frequency voltages produced at the microphone after suitable amplification. The change in amplitude of the carrier is made proportional to the instantaneous audio voltage, and the rate at which the amplitude is varied is equal to the frequency of the audio voltage.

It can be shown mathematically that an A.M. wave consists of a carrier frequency and a set of side-bands. A 7,000 kc/s. carrier, for example, when amplitude modulated by a single 5 kc/s. audio note, is equivalent to (1) a carrier at 7,000 kc/s., (2) an upper side-band at 7,005 kc/s., and (3) a lower side-band at 6,995 kc/s. Such a transmission thus takes up a total band-width of 10 kc/s. Fig. 2 shows the shape of an amplitude modulated wave and the positions occupied by the side-bands.

In the case of complicated modulating wave forms the side-band spectrum becomes very complex, although the side-bands themselves do not extend beyond the highest modulating frequency on either side of the carrier frequency.

Frequency Modulation

After the existence of side-bands had been established, in the A.M. case, it was anticipated that, by varying the carrier frequency in sympathy with the audio waves, the band-width required for the transmission of speech and music could be reduced. For example it was thought that by using a deviation of ± 500 c.p.s., a band-width of only 1,000 c.p.s. (1 kc/s.) would be required to transmit any audio frequency. In 1922; however, Carson showed mathematically that a frequency modulated wave was equivalent to a carrier plus an infinite number of side-bands, although in practice it is only the first few side-bands that are large, the remainder being negligible.

In the case of F.M. then we have a carrier wave at radio frequency whose deviation from the mean carrier frequency is made proportional to the instantaneous audio voltage. The rate at which the carrier frequency is deviated is equal to the audio modulating voltage.

Consider a numerical example. Suppose a 7,000 kc/s. carrier frequency is modulated by a pure 5 kc/s. tone to produce a peak deviation of ± 10 kc/s. then during 100 per cent. modulation the carrier will be deviated between 7,010 kc/s. and 6,990 kc/s. at a rate of 5 kc/s. The lower portion of Fig. 3 shows the side-band spectrum corresponding to this example, whilst the upper portion gives a pictorial representation of the frequency modulated wave.

The fact that a frequency modulated wave can be shown to consist of a carrier and an infinite set of side-bands, does not mean that in practice an indefinitely wide band-width is required to transmit F.M. signals. So long as the deviation ratio, i.e. the ratio of the peak deviation to the modulating frequency, is made greater than unity, then the side-bands outside the peak deviation become small enough to be neglected. This means that modulating

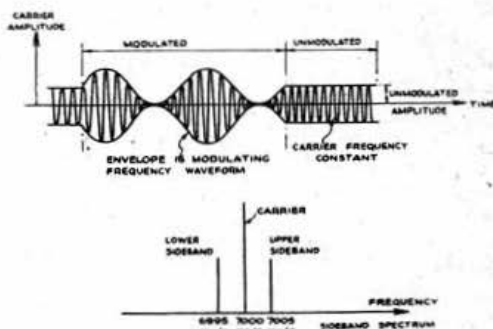


Fig. 2.

Amplitude modulated wave and side-band spectrum of example referred to in text.

* A Lecture delivered to the Society at the Institution of Electrical Engineers, London, on December 19, 1942.

† 90 Thurlby Road, Wembley, Middlesex

frequencies up to 5 kc/s. can be transmitted over a system having a pass band-width of ± 5 kc/s., without excessive distortion, although for a high quality service such as broadcasting, where a high signal-to-noise ratio is essential, a greater deviation ratio is required.

Phase Modulation

In this system the phase of the carrier wave is altered in sympathy with the audio modulating voltage. Phase Modulation is not, at present, used to any great extent as a means of communication but P.M. transmitters, with simple corrector networks in the L.F. stages, are used to produce pure frequency modulation. Such a scheme is used in the Armstrong system of F.M. transmission.

There is a great similarity between frequency and phase modulation, in fact a person listening to a fixed note on a F.M. receiver would be unable to distinguish whether the transmission was frequency or phase modulated.

The relationship between frequency and phase modulation is very simple and is expressed as:—

$$\delta f = n \phi$$

where δf = frequency deviation in c.p.s.

n = modulating frequency in c.p.s.

ϕ = phase deviation in radians

$$(180^\circ = 3.14 \text{ radians})$$

Expressed in words this means that phase modulation is merely a form of frequency modulation in which the deviation is proportional to the modulating frequency.

Suppose we have a P.M. transmitter with a constant deviation of ± 5 radians ($5 \times 360/2\pi^\circ$), then if the modulating frequency were 1,000 c.p.s. the equivalent frequency deviation would be ± 5 kc/s. If the audio frequency were raised to 3,000 c.p.s. the equivalent frequency deviation would then be ± 15 kc/s.

Fig. 4 shows the graphical relationship between equivalent frequency deviation and modulation frequency, for a constant phase deviation of 5 radians.

Having briefly surveyed the different methods of modulation, it is now proposed to discuss the advantages and disadvantages of the F.M. system.

Advantages

- (1) The great reduction of set and impulse noise which can be achieved.

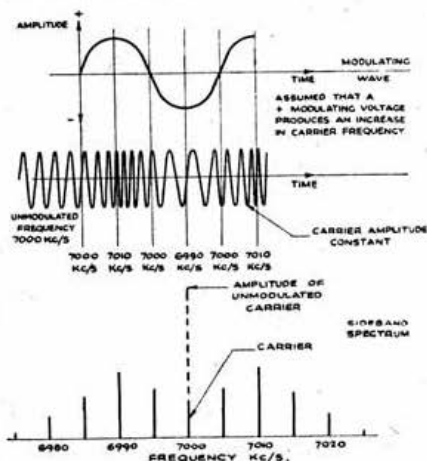


Fig. 3.

Frequency modulated wave and side-band spectrum of example referred to in text, showing that the spacing between side-bands is equal to the audio frequency, namely 5 kc/s.

The former includes circuit and valve noise emanating from the H.F. stage of the receiver. Impulse noise includes motor car ignition and other forms of man-made static as well as certain types of atmospherics. As noise reduction takes place in the receiver it will be considered more fully in a later section.

- (2) The saving of space and power in the transmitter.

In a frequency modulated transmitter, modulation is performed at low level in the master-oscillator stage, consequently a valve of the receiving R.F. pentode type is sufficient to modulate the largest transmitter. Expensive high power audio equipment and power supplies are thus dispensed with—the saving in cost being more marked as the transmitter power is increased.

- (3) More output is available from a given type of valve.

Since the amplitude of the frequency modulated wave is constant, the output stage can be run under Class C telegraphic conditions. No voltage peaks occur during modulation as is the case with amplitude modulated transmissions. Thus for a given type of output valve more output power is available. Conversely for a given output power, smaller valves and tuning condensers are required than would be the case for an equivalent amplitude modulated transmitter. The net result of these economies is that a F.M. transmitter can be made approximately half the size of a high-level plate-modulated transmitter using A.M. and the same carrier power.

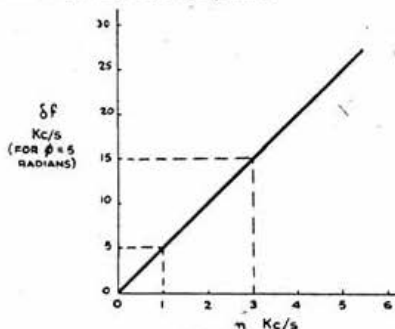


Fig. 4.

Graph showing relationship between equivalent frequency deviation and modulating frequency, for a constant phase deviation of 5 radians.

Disadvantages

- (1) The difficulty of keeping the mean frequency of the carrier constant in order not to interfere with transmitters working on neighbouring channels.

This disadvantage was gradually overcome as the technique developed. The difficulty of the problem becomes apparent when it is realised that the carrier frequency has to be capable of rapid frequency variation in order to transmit the intelligence, yet at the same time the mean carrier frequency must be held constant. The methods used to-day for obtaining this condition of stability are discussed in Part II.

- (2) The larger band-width required to provide a high signal-to-noise ratio service.

This disadvantage has been overcome by using and developing the frequency spectrum above 30 Mc/s. At these high frequencies many wide-band transmitters can operate without mutual interference.

In America, where a standard deviation of ± 75 kc/s. is allowed the F.M. broadcast band falls around 43 Mc/s., each station being allocated a channel width of 200 kc/s. At lower frequencies (3 Mc/s. to 30 Mc/s.), where very high quality is generally not so essential, the highest audio frequency which need be transmitted is 3,000 c.p.s. On this basis, using a

deviation ratio of unity, F.M. should be a practical proposition, as it will provide a better signal-to-noise ratio (particularly with weak signals) than an A.M. system using the same band-width. For example, using a deviation ratio of 1 and a highest audio frequency of 3,000 c.p.s. a band-width of only ± 3 kc/s. would be required, which is not much greater than is required for A.M.

Methods of Producing F.M. Transmissions

As has already been stated F.M. is no new idea, in fact, the old arc transmitters were in effect frequency modulated when the frequency was changed from "mark" to "space" during keying. Attempts were even made to frequency modulate arc transmitters with speech, but nothing came of the experiments, probably because the receiving apparatus was unsuitable.

With the introduction of the thermionic valve further attempts were made to modulate oscillators by methods such as that of connecting a condenser microphone across the tuned circuit of a self-excited oscillator. Again the experiments proved abortive and the doom of frequency modulation seemed to be sealed, when in 1922 Carson expounded his side-band theory.

During 1935 Major Armstrong, in the U.S.A., conducted some experiments, using frequency modulation, with a view to reducing noise on radio transmissions. A year later he published his famous paper in the Proc. I.R.E., since when interest in F.M. both for broadcast and communication purposes has increased by leaps and bounds.

The most popular forms of F.M. transmitter in use to-day are :-

- those which use the Reactance Valve Modulator method, and
- those which use the Armstrong Phase Modulator, with a correcting network to convert the phase modulation into frequency modulation.

These methods will be considered in Part II.

(To be continued)

SOME "HETROFIL" SNAGS AND THEIR SOLUTION

By F. DEARLOVE (G2QO)

NO doubt many members have constructed the "Hetrofil" so well described in the June, 1941, issue of the BULLETIN, and if the writer's experience is anything to go by some will have found results not quite as satisfactory as they had hoped. Perhaps these few notes will assist those who have found the "snags."

In the first place the "Hetrofil" will virtually eliminate any single audio frequency if properly constructed, but it cannot be expected to deal with an unsteady note nor one heavily modulated. Given a really steady unmodulated frequency, it can and will eliminate it.

Those who have found that a balance cannot be obtained will be interested to know that the most likely cause of the trouble is in the ganged resistors, in fact if one considers it for a moment it would have been rather surprising if these items had tracked accurately. In practice they seldom do. Even supposing one had obtained a satisfactory pair, there would still be a slight variation in the capacities of the condensers to be reckoned with. By the addition of one further component the difficulty is overcome. This consists of a potentiometer of 1,000 ohms connected in such a manner that when moved in either direction from its central position, it adds resistance in one leg at the same time subtracting it from the other. A little thought will show that failure of the ganged potentiometers to track, plus discrepancies in the values of the two condensers, are thereby compensated for. The accompanying diagrams show the method of connection.

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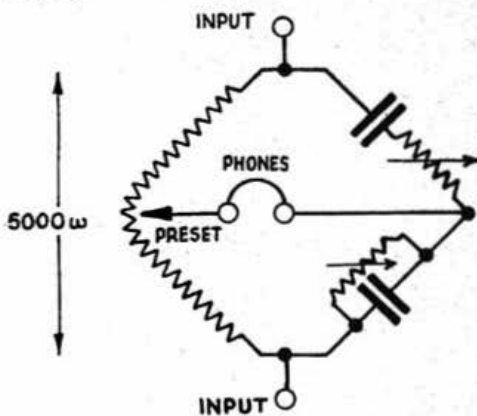


Fig. 1.
Basic circuit.

It will be noticed that two fixed resistors of 2,000 ohms and a 1,000 ohm potentiometer have been substituted for the 5,000 ohm potentiometer in the basic circuit. This does not affect the operation in the slightest. The items were the only ones available.

A further cause of failure to obtain a balance was found to be a difference in the power factor of the two condensers, and this was especially noticeable on strong signals. This trouble was cleared up by the addition of the compensating potentiometer.

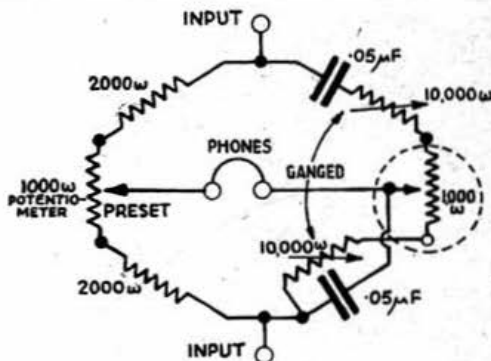


Fig. 2.
Circuit with compensator added.

Without doubt this little gadget will find an important place in the shack after the war, and in this connection experiments are being conducted with a view to including it in the input circuit of a tuned audio stage; if successful it will be the subject of further notes.

British Standards Institution

The following new or revised British Standard Specifications have been issued :-

No. 205. Part I (1943): Glossary of terms used in Electrical Engineering. Section 1: General. Price 2s.

No. 205. Part II, Section 2: Machines and Transformers. Price 2s.

No. 205. Part III, Section 3: Switch-gear. Section 4: Meters and Measuring Instruments. Price 2s.

The following War Emergency B.S.S. have been issued :-

No. 1106. The use of Radio Valves in Equipment. Price 1s.

No. 1107. Paper-Insulated Cables for Electricity Supply. Price 2s.

The specifications are obtainable from the B.S.I., 28 Victoria Street, London, S.W.1.

CALIBRATING THE OSCILLOSCOPE

By "TIME BASE."

ONE use to which an oscilloscope is often put is that of measuring audio frequencies. The normal method is to apply the unknown frequency to the "Y" plates (those controlling the vertical movement of the electron beam), and the output of a calibrated variable frequency audio oscillator to the "X" plates, the electrodes effecting the horizontal movement of the beam.

The resulting figures produced on the screen are observed, and by varying the frequency of the calibrated oscillator one endeavours to arrive at a figure having some resemblance to a circle, an ellipse, or a straight line. This indicates that the two frequencies are equal, and the unknown frequency is the same as that shown on the A.F. standard. Which one of the three figures mentioned is obtained, depends upon the phase relationship of the two frequencies.

It is possible to assess the unknown frequency (other than by direct comparison) with the same frequency as produced by the standard, by making use of other static patterns that will be produced when the two frequencies bear certain relationships one to the other. The interpretation of such patterns, known as "Lissajou Figures," is, however, covered adequately in most books dealing with the use and practise of oscilloscopes, and will not, therefore, be dealt with here, except to give one simple example for reference in later paragraphs.

Figure 1 shows the trace produced on the oscilloscope screen when two frequencies having the ratio 2:1 are applied, the lower of the two frequencies being that fed to the "X" plates.

This ratio is arrived at by taking the number of loops horizontally (2), and the number vertically (1). The shape of the trace will vary somewhat with differing phase between the two frequencies concerned, but the general form (that of a figure 8 on its side) will remain constant. Other and more complex figures are read in similar fashion.

Calibrating the Time Base

The normal oscilloscope is fitted with a time base adjustable over a range of some 10 to 20,000 sweeps per second or even greater, the speed usually being controlled from the front panel of the instrument by a coarse and a fine adjustment. If these controls are calibrated in sweep speeds, it becomes only a matter of moments to measure any incoming audio frequency, and if a standard A.F. generator is available this calibration can, of course, be undertaken.

Good A.F. generators are, however, all too rare, and it is proposed in the following paragraphs to show how a calibration of considerable accuracy may be carried out with nothing more than the 50-cycle A.C. mains as a standard.

The first consideration is to prepare a dial, with pointer (if this is not already provided) for the "fine" frequency adjustment on the oscilloscope. The divisions on the dial merely serve as reference points which may be logged and the dial reset to them when required. They are therefore purely arbitrary. It is customary for the coarse adjustment to take the form of a rotary switch, and the various positions of this should be numbered. The completed log should then read something like this:

Time-base Speed	Control Setting
10 c.p.s.	1/43
25 "	1/64
50 "	2/43
100 "	2/59

and so on. The first figure represents the switch contact on which the coarse control was set, and the figures following the oblique stroke the setting of the fine adjustment dial.

The calibration source, as previously mentioned, is the 50-cycle mains, and as this supply is controlled to a high state of accuracy in nearly all parts of the country, it will provide a standard which could only be bettered by something very special in the way of A.F. generators.

Two articles which have appeared in recent issues of this Journal dealt quite fully with the internal



FIG. 1

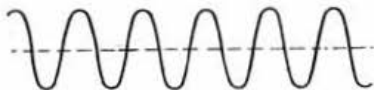


FIG. 2

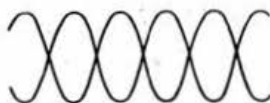


FIG. 3

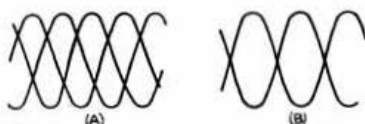


FIG. 4



FIG. 5

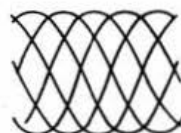


FIG. 6

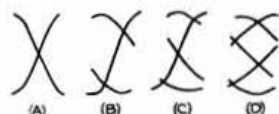


FIG. 7

Fig. 1: Trace given by a 2:1 ratio of frequencies (both sine waves). Fig. 2: The trace produced by 50-cycle A.C. on the "Y" plates, and a 10 c.p.s. time base. Fig. 3: A ratio of 5:2 or a 50-cycle input with a 20 c.p.s. time base. Fig. 4: (A) shows a ratio of 5:3, and (B) a ratio of 3:2. Fig. 5: Form of trace given when the input frequency is the same as the time base. Fig. 6: Type of trace produced when the ratio of frequencies is 5:6. Fig. 7: Traces given by ratios of (A) 1:2 (B) 1:3, (C) 1:4, and (D) 1:5.

economy of the cathode ray tube oscilloscope⁽¹⁾ and with varieties of time base⁽²⁾ in common use. For this reason it is not proposed to cover again such aspects as the production on the screen of simple A.C. waveforms; it is assumed that readers are sufficiently familiar with the handling of the instrument for this information to be omitted from the present article.

A small 50-cycle alternating voltage will be required for purposes of calibration. On most oscilloscopes a terminal is provided for this purpose, marked either "Cal" (Calibrate) or "50 \sim ". (On an oscilloscope of American origin this is likely to be designated "60 \sim ", but this has no significance when it is operated on 50-cycle mains). If no such terminal is provided, then an external transformer, having a low voltage secondary (such as a mains transformer with an L.T. winding) can be used instead, and its voltage applied to the "Y" plate input terminals.

The voltage required will depend upon whether the oscilloscope has a "Y plate" amplifier or not. If it has, 2 volts A.C. should be ample, but if no amplifier is fitted it will be necessary to know the sensitivity of the tube in use, i.e., how many volts per inch deflection are required at the "Y plate" input terminals. Tubes vary in sensitivity, but a figure of 20 to 25 volts R.M.S. per inch is normal.

Having obtained a vertical deflection of the beam by the applied A.C., the time base is switched on, adjusted to its lowest speed, and the number of "humps" either above or below the imaginary centre line of the trace counted. Suppose there are five, as is shown in Fig. 2. This indicates that the applied A.C. has had time to complete five cycles during the time taken by the spot to cross the screen horizontally, and as it is known that the A.C. has a frequency of 50 c.p.s., then the time base speed must be 50/5, or 10 c.p.s.

The time base is now speeded up, and the positions of 4, 3, 2 and 1 cycle ascertained, and the settings of the controls logged against the corresponding speeds of 12½, 16⅔, 25 and 50.

Before dealing with the patterns produced by time base speeds in excess of the standard, it will be shown how to find other calibration points between those mentioned above. Somewhere between the settings for 16⅔ and 25 c.p.s., a trace resembling Fig. 3 will be found. This has four complete loops at the top and bottom, plus two half-loops, and two "prongs" at either end. The two half-loops are taken as being equal to one loop, making a total of five in all, and from this, and the fact that there are two "prongs," is derived the simple calculation $50 \times 2/5 = 20$, which is the time base speed in question.

Should there have been produced upon the tube a trace such as Fig. 4 (A), having five loops and three "prongs," or Fig. 4 (B) with three and two, then the corresponding time base speeds would have been 30 and 33½ respectively.

It will be seen that whereas two sine waves produce a closed figure as in Fig. 1, the combination of a sine wave input with a saw-toothed waveform from the time base give open figures, i.e., ones having "prongs" at each end. Apart from this there is no difference in reading the results.

The time base controls should now be set to give a single sine wave on the tube (Fig. 5), which of course corresponds to a time base speed of 50 c.p.s. On increasing this speed somewhat, a trace resembling Fig. 6 will be found. This has six "prongs" and five loops (again counting two half-loops as one complete loop), so the calculation is $6/5 \times 50 = 60$ c.p.s. It will be noted that the number of "prongs" is

always divided by the number of loops. At the frequency of the standard, both are equal (one of each), at speeds less than the standard the loops always outnumber the "prongs," while at frequencies greater than the standard the "prongs" are always greater in number than the loops. Check points at 70, 75, 80 and 90 c.p.s. can readily be found by this method.

The trace given by the combination of a 50-cycle input and a 100 c.p.s. time base is shown in Fig. 7 (A), and should be compared with Fig. 1 which also represents a 2:1 ratio, but with sine waves on both "X" and "Y plates." It also shows clearly the "open" pattern, using the time base, in contrast to the "closed" pattern of two sine waves. This trace can, of course, be read according to the aforementioned "law"; one loop (made up of two half-loops) and two "prongs": $2/1 \times 50 = 100$.

Figs. 7 (B), 7 (C) and 7 (D) show the traces produced with time base speeds of 150, 200 and 250 c.p.s. It will be seen that the "Y" input frequency (50), multiplied by the number of "prongs," equals the time base speed in cycles per second, and it should be possible on a tube of reasonable diameter (say four or five inches) to distinguish and count such "prongs" up to at least 20 in number, corresponding to a time base speed of 1,000 c.p.s. There will be a check point every 50 cycles up to this frequency, which should enable any incoming and unknown A.F. to be determined to sufficient accuracy for all ordinary purposes.

It is suggested that intermediate points corresponding to frequencies of 125, 175, 225 and 275 c.p.s. be ascertained by the "prongs over loops times 50" formula and inserted in the log. At frequencies above 300 c.p.s. counting the "prongs" becomes somewhat difficult, and it is best to rely on the 50-cycle points only.

Measuring an Unknown Audio Frequency

Now that the time base is calibrated up to at least 1,000 c.p.s., we are in a position to measure an unknown A.F. This should be applied to the "Y plates" in place of the previous 50-cycle input, and the time base adjusted until one or more complete waves appear on the screen. Note the number of waves, and consult the log. Suppose there are 7 waves, and that the setting of the controls indicates a time base speed of 750, then the unknown A.F. is $750 \times 7 = 5,250$ c.p.s.

A handy source of "unknown A.F." for testing purposes can be obtained from a receiver fitted with a B.F.O. Tune in a steady, unmodulated carrier, preferably on a fairly low frequency where receiver drift is at a minimum, heterodyne it with the B.F.O., and feed the resulting signal to the "Y plates" of the oscilloscope. Provided that the receiver is reasonably stable, such an A.F. beat note should remain steady over a period long enough for its frequency to be measured, but if the drift is too great, a simple audio oscillator, such as is generally used for Morse practise, could be used instead.

OUR FRONT COVER

THIS photograph of a representative group of Mullard Valves emphasizes the wide range now available to the designer, and the great diversity of the applications of the thermionic valve in a variety of fields of activity.

From the battle areas to the home; from the hospital to the factory; in commerce and in industry, radio valves are transmitting, receiving, and amplifying signals of all frequencies radiated in space, or sent over conductors.

It is the aim of the makers of Mullard Valves that there should be at each stage of progress a Mullard Valve for every purpose.

(1) "Cathode Ray Oscilloscopes: Their Principles and Uses." By J. D. Morris (2DRR). January and February, 1942.

(2) "Time Bases." By 2HMN. April, 1942.

AN AUSTERITY PRE-SELECTOR

By R. G. KITCHEN,* Grad.I.E.E., Assoc. Brit. I.R.E., (G3SK).

THE pre-selector to be described—designed and constructed in pre-war days—was originally intended for use only on the 14 Mc/s. band, to provide a better measure of sensitivity and freedom from second channel interference than was possible with the writer's normal receiver. By the provision of extra coils, however, the unit has proved its use as a general coverage instrument. As the title of this article suggests, it was built around existing parts and a meagre pocket, yet, on test it proved to be comparable with a two-stage unit.

The pre-selector has its own power supply, the H.T. of about 200 volts being obtained via a small half-wave metal rectifier and normal filter circuit. No trouble was experienced from mains hum at any setting of the regeneration control.

Construction

It is possibly the unique construction of the unit which contributes most to its good performance. As will be seen from the photograph, Fig. 2, the 6J7 is mounted horizontally beneath the coil tray, so that its

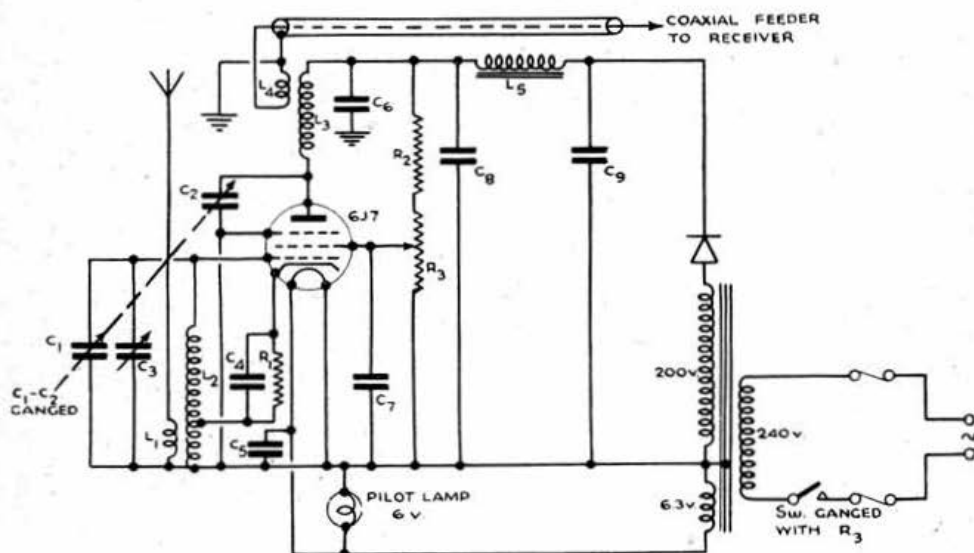


Fig. 1.
Circuit Diagram of One Valve Pre-Selector.

R1 400 ohms.
R2 10,000 ohms.
R3 50,000 ohms.
C1, C2 160 μ F each.

C3 1 Rotor, 1 stator.
C4-C7 0.1 μ F.
C8, C9 8 μ F electrolytic.
L5 30H L.F. choke.

Range.
3.2-7.4 Mc/s.
7.2-1.8 Mc/s.

Coil Data.
L1 and L4.
31.5 turns.
12 turns.

L2 and L3
6 turns close wound
2.5 turns spaced.

No. 24 s.w.g. enam. wire used. The "earthy" ends of L1 and L2 are brought out to a common pin, the "top" ends and cathode tap are taken to the remaining pins.

Circuit

A 6J7 valve (metal) was used as a regenerative R.F. amplifier, in a conventional cathode-tap circuit with regeneration controlled by varying the screen-grid voltage. A tuned-anode circuit was used in preference to a choke output, and coupling to the receiver was provided by a link and short length of concentric feeder.

Band-setting is effected by means of a twin-gang 160 μ F condenser, as shown in Fig. 1, and band-spreading with the aid of a single, 1-rotor, 1-stator condenser (C3) in parallel with the grid band-set condenser (C1). It was found that the addition of another band-spread condenser across the anode "band-set" had no appreciable effect upon the gain of the stage. This was probably due to the fact that whilst the input circuit had very sharp tuning, due to regeneration, the anode condenser tuned very flatly. The use of a twin-gang band-spread condenser was therefore not felt to be justified.

grid cap is almost touching its corresponding pin on the grid coil-holder, and the length of the anode lead to its coil pin is about $\frac{1}{2}$ in.

The coils themselves are wound on 4-pin valve bases. Chassis-mounting 4-pin valve-holders, mounted in opposite corners of the square coil tray, are used as sockets. A diagonal screen runs across the tray, and the positions of the sockets are such that a maximum distance exists between the coils and screening. To complete the screening, a metal lid fits over the top of the tray. It will be seen from Fig. 3 that the vertical screen separating the amplifier from the power supply also serves as a mounting for all power supply components, except the mains transformer. Two separate 8 μ F electrolytic units are mounted at the top of the screen, one on either side of the smoothing choke, while the small half-wave rectifier is mounted horizontally beneath.

The mains transformer, choke and rectifier were removed from an ancient two-valve commercial B.C. set, but as the L.T. winding of the transformer only produced 4 volts, turns had to be added until a

voltage of 6.3 was obtained across a load equivalent to the heater of the 6J7 in parallel with a 6-volt pilot light. A small bakelite tag strip was fitted to the "new" transformer, and labelled.

As no centre tap was available on the L.T. winding of the transformer, the "hot" side of the heater winding was tied down to earth via a .01 μ F condenser at the valve-holder.

All earth returns for the stage were taken to the No. 1 pin of the octal valve base to ensure that no loops existed in the earth circuit.

The connection from the grid cap of the 6J7 to the coil pin was made with one "leg" of a brass paper fastener. The small brass strip so obtained being bent to the size of the grid cap. This was found to have sufficient "spring" in it to hold the latter quite tightly. The straight "tail" of the clip was taken to the coil socket and soldered. As the "tail" made a rigid connection, this part of the assembly had to be done with the valve *in situ*, and did not of course, allow the valve to be removed unless the grid cap were unsoldered from the coil socket.

This, however, was not considered to be a great disadvantage, as it was hoped that removal of the valve would not be required for some considerable time!

It will be noticed from Fig. 4 that a circular hole has been cut in the base of the chassis. This was found necessary in order to allow the 2-gang condenser to attain full open mesh. The rotors would otherwise have fouled the base.

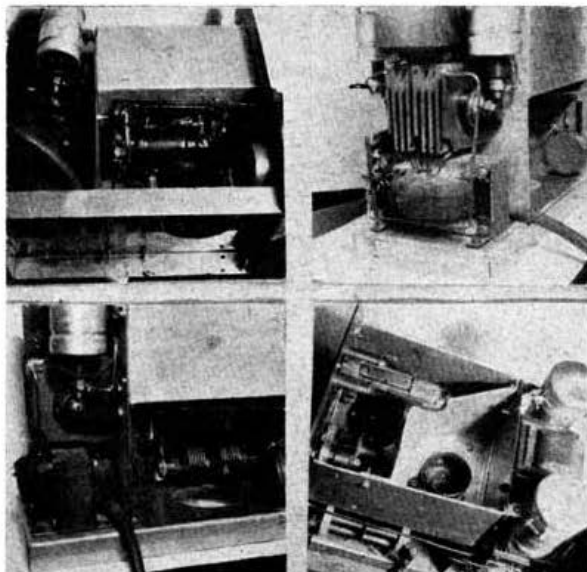
The small band-spread condenser will be seen mounted on the panel (Fig. 5) in the same compartment as the grid coil. The long component mounted centrally at the top of the panel, and seen jutting

back over the coil compartment, is the holder for the pilot light.

In mounting the components it was found best first to attach the coil-sockets to the tray. The valve holder was then mounted vertically on the underside of the tray with two small metal brackets.

All point-to-point wiring between the valveholder and coil sockets was then carried out. Leads from these components to the gang condenser, power unit, and regeneration control are left of sufficient length and labelled, so that they may be connected easily after assembly.

In case the photographs do not show the method of construction sufficiently clearly, a sketch of the chassis is given in Fig. 6. The sections were held together with round-head brass bolts and nuts.



FOUR VIEWS OF THE PRE-SELECTOR.

Fig. 2.—Top left. Shows horizontal mounting of 6J7 under coil tray. Cathode bias resistors and by-pass condenser are above valve and to left of coil socket. Fig. 3.—Top right. The power unit. Regenerative potentiometer can be seen on front panel. Fig. 4. Bottom left. Power unit to left. Note twin gang main tuning condenser with clearance hole in base. Fig. 5.—Bottom right. Band-spread condenser to left and power supply unit to right.

Substitute Chassis

Now that it is almost impossible to obtain sheet metal for making chassis, a satisfactory substitute can be effected by using a plywood box lined with zinc perforated gauze. The edges of the box should be strengthened

with $\frac{3}{4}$ in. square, wooden or metal strips. Curtain rails are often obtainable for this purpose. If the plywood box is inverted, and the exterior stained and polished the result is often more pleasing than a metal chassis. Furthermore, components can usually be attached more easily through plywood than through sheet metal. Where components under the chassis run warm, air holes should be made in the side and top, leaving the gauze lining for protection. G8LN

(The General-Editor will be pleased to receive further technical hints similar to the one published above.)

Historical R.A.F. Equipment required for Exhibition

The Chief Instructor at an R.A.F. Radio School is planning an exhibition of historical R.A.F. radio equipment. Already many unique items have been collected, but more are required. Included in his "wants list," are the following:—Mark III Star Tuner, Station Testers No. 1 and No. 2, C Mark IV Amplifier, A26 Amplifier with Robinson Tuner Box, A33 Amplifier, T23 and T25 Transmitters, early types of valves. Members who are in a position to donate, loan or sell any of these items are invited to communicate with the General Secretary who will pass on all letters to the interested party.

Appreciations

Mr. C. L. Waywell, 4413, records his thanks to all members who wrote to him in regard to his request for a copy of the Z Code. He received so many replies that it was impossible to answer them all. The Z Code was published in our last issue.

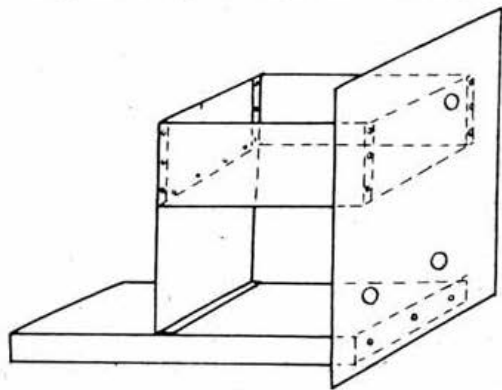


Fig. 6.

Sketch showing construction of chassis.

● CHANGES OF PERMANENT ADDRESS SHOULD BE NOTIFIED TO HEADQUARTERS IMMEDIATELY

Khaki and Blue

● "Chem" now F.O. A. N. le Cheminant, known to the fraternity under a variety of call signs including **G6AC**, is now Resident Inspector R.C.A.F. at an aircraft factory in Nova Scotia. He wishes to be remembered to all old friends and invites any member who finds himself in the Halifax area to telephone him on 6-2481 No. 9. "Chem" is engaged to a Newfoundland lass and expects to take the final plunge very soon.

● C.Q.M.S. Harry Caunce, **G6KS**, pre-war T.R. for Liverpool, in a letter dated January 10 from the Falkland Isles asks that his greetings be conveyed to all old friends. He tells of a strange coincidence. Recently one of his lads tried to make a microphone and to help him someone had given him an old and much thumbed copy of QST—1938 vintage. Harry spotted it and made a mental note that his evening would be devoted to reading it from cover to cover. During the course of the same day he had to handle a civilian R./T. set which necessitated tracing out the circuit. Evening came and the issue of QST was bagged. On the first page he opened at he saw the magic letters **G6KS** listing the owner as having been awarded the W.A.C. A moment later Harry had the "pleasure" of reading a full description of the very transmitter he had been working on all day and of seeing spread out before him a neatly drawn copy of the circuit. He is still wondering who built the set!

● Each month Cfm. Richard Jeremy, **2CMJ**, receives a typed copy of the "Khaki and Blue" section notes extracted from the current issue sent to his home. The latest news sheet to reach him contained a reference to G. H. Fisher, 4639, who, it will be remembered, rose from Private to Staff Sergeant in 12 months. Hardly had **2CMJ** finished reading this paragraph when his new N.C.O. arrived; it was S./Sgt. Fisher! As Jeremy is awaiting reclassification with a view to subsequent recommendation for a S./Sgt. Course he has pledged himself to beat 4639's record by 6 months!

● A.C.I. M. A. Newman, **G3DZ**, writes from B.N.A. to report fit and well. He is now in the Marine Craft Section of the R.A.F. and finds the work very interesting. He wishes to be remembered to Bernard Wynn, **G8TB**, and all other Early Birds and also to old friends in the Malden, Kingston area. (Can anyone provide H.Q.'s with **G8TB**'s whereabouts as **BULLS** have been returned from his Purley address.)

● Also from N. Africa comes news of S./Ldr. Cecil Page, **G6PA**, one-time Experimental Section Manager. As O.C. of an M.S.S.U. he is fast becoming an expert in the construction of incinerators, cookhouses and the like! Pip Ack sends greetings to all old friends.

● In a further letter from Rejkjavik, Iceland, Ldg. Radio Meeh. J. H. Brazzill, **G3WP**, reports having met **2BUV**, **2CMW**, **W2HJA**, **WSNEB** and **W9KKJ**. The last two mentioned were contacted in strange circumstances. **3WP** was returning to camp in one of the local buses when he heard two passengers talking "radio." On inquiry they revealed their identities. Jack is anxious to get in touch with other amateurs stationed in TF but does not know how to find them. We suggest he displays QSL cards and notices in Services clubs. Headquarters will be pleased to pass on addresses.

● Members who were at Cranwell last summer will be glad to hear that "Bob" Hope, **LA2UA**, is now the father of a junior op. born in Iceland last January. Bob — now flying with a Sunderland squadron somewhere in the North of Scotland, wishes to be remembered to all old friends.

● S./Ldr. Royce Wilkinson, O.B.E., D.F.M., **G4FW**, now back in the Folkestone area, would like to contact local members—civilian or Service. His QRA can be obtained from H.Q.

● No. 1 R.S. friends of W. D. Day, **5571**, will be glad to hear that he has been granted a commission (rank P.O.) and is now a Signals Officer in Fighter Command.

● Sgt. E. W. J. Wood, **5476**, and P.O. F. Young, **G8VM** now Navigators W./T. at an R.A.F. station on Prince Edward Island, Canada, send 73 to **G3WX**, **2CKB** and all old friends. **THE BULL** is in great demand when it arrives.

In a letter from Malta to **G3YY**, Sgt. H. Williams, **G3LK**, states that he is endeavouring to form a ham club on the island, but conditions are difficult for meetings. He is in daily contact with **G8AC** and has met **G5PA** and **ZB1E**. **VP4A** is being trailed. **SU1RD**—good scout that he is—"came through with a parcel of **BCLLS**, which revived happy memories." **G3LK** sends special greetings to **G2HIV**, **2ZV**, **3JF** and **6CJ**. Those who wish to write should address their letter, 905093 Sgt. Williams, H.G.P., 1CWT, H.Q., R.A.F., Malta.

● Old Cranwellians will be pleased to hear that P.O. Norman Davis, **G6TV** (one time Hon. Secretary, R.A.F.A.R.S.) reports fit and well from Bathurst, West Africa. He has met **G3PS** and sends greetings to friends at home and abroad.

● F.O. Solder, **G5FA**, F.O. Stophor, **G5GF**, F.O. Claricoats, **G6CL** and F.O. Pond, **G8WO**, who are among a party of 30 Officers and Instructors attending a special A.T.C. Signals Course on Tuesday and Thursday evenings at No. 7 Radio School, will be glad to make the acquaintance of any member attached to the School as instructor or trainee.

● Members who were at No. 1 R.S. last year will be glad to learn that Nigel Anslow, **G4GD**, is now commissioned with the rank of Pilot Officer. He is engaged on installation and maintenance work in the west of England and South Wales.

● P.O. Tel. R. Foster, **GW4LK**, who receives our congrats upon his recent marriage, reports having met Mr. and Mrs. W. E. Lane, **VQ4CRH** and Mr. and Mrs. Reider, **Z5IT** during the three years and three months he was abroad. He is at present serving at Plymouth.

● Bill Hamer, **G3WT**, now an A./P.O. Radio Mechanic at a R.N. W./T. station in Fife, laments the absence of news from his home town. Bill's address is now 71 Portelet Road, Liverpool, 13, at which address he will be pleased to receive letters from old friends. He is working with J. Brown, **G3PI**.

● Lt. Colonel Fred Elser, **W6GVU/ANM**, who was warmly welcomed at a recent London meeting, is now serving with the U.S. Signal Corps in North West Africa, from which theatre of war he sends greetings to all old friends at home and abroad.

● Lt. T. Simpson, **2761**, R. Signals, will be pleased to receive visits from members located in the Edinburgh area. He can be contacted at High School Yards, Edinburgh, 1.

● Will **G5KA**, or anyone who has news of him, please write to **G2LT**, 11a Welwyn Close, Intake, Sheffield?

● Sgt. T. Neville (R.A.), **BR55040**, of Liverpool, in a letter written on the high seas asks that his greetings be sent to all old friends.

● Lt. John Brynildsen, **LA9N**, in a letter to **2FQQ**, regrets that he has been unable to maintain contact with his London friends due to the fact that his military duties have taken him to GM.

● From Bone, N.A., comes news of Sgt. Strathan, **4600**, who reports that **GM2FY** and **2CJL** are still with him. **4600** asks that his 73 be passed to **G2MN** of Norwich.

● F./Lt. "Jack" Pyke, **G6PK**, who, incidentally was with Sgt. Strathan at the opening of the Tunisian campaign is now at Phillippeville. He states in a recent airgraph that the experience gained during R.S.G.B. field days has been invaluable to him—a view endorsed by many pre-war members who are now serving abroad.

Congrats

● To John Hunter, **G2ZQ**, and Bill Craig, **GM6JJ**, both of whom are now Wing Commanders.

● To Flying Officer C. B. Rathby, **G8GI**, of Faringdon, Berks, whose wife presented him with a daughter on March 18, 1943.

● To Wing Commander R. M. Bangay, **G3DW**, whose wife recently presented him with a second son—Jeremy. "Dick" is C.I. at a station in Gloucestershire.

● To old timer "Bill" Stirling, **GM6RV**, of Ardrossan on his recent marriage.

● To Mr. and Mrs. Peter Pennell, **G2PL**, of Wallington, on the birth of a daughter.

● To Mr. and Mrs. H. J. Barlow, **G4LQ**, of Longsight, Manchester, who are now the proud parents of a daughter born on April 15.

73.

G2WS (Beckenham), to **G5VU**, **6CW** and **8JV**.

G4BC (R. Sigs.), to **G3EF**, **VB**, **4BT**, **6HR**, **2DHH** and **2845**.

G4BY (R.A.F.), to **G2JB**, **30J**, **GW**, **BD**, **NQ**, **4FB**, **5CI**, **6AB** **2BIB** and **1295**.

G4CJ (Blackburn), to **G2PB**, **3PY**, **3VV**, **3ZC**, **4FD**, **4FJ**, **4JS**, **6BH**, **6WH**, **2FUC**.

G4LQ (Manchester), to **G2JC**, **3RY**, **QV**, **YB**, **8PW**, **PX**, and **GM8JW**.

G6QM (Hornsey), to **G3DT**, **JK**, **SH**, **5WW**, **SVD** and **G15TK**.

GBW (Aylesbury), to **G2NS**, **RX**, **3IP**, **4IJ**, **5UD**, **8BR**, **DU**, **KX**, **GM3PB** and **GW3CR**.

2AKK (R.A.F., B.N.A.F.), to **G2HW**, **3VV**, **4CJ**, **4HW** and all members in Blackburn.

BR5292 (Stratford), to **G3AI**, **MD**, **5TZ**, **6AH**, **ID** and **BR5665**.

BR55156 (F.A.A.), to **G6IF**, **4781** and **4782**.

BR55571 (R.A.F.), to **G8ON**, **2AZI**, **HJN**, **4169**, **5617** and **6149**.

ARE YOU AT

No. 1 R.S. or No. 8 R.S. ?

If so, you are invited to attend Meetings in Hut 165 (No. 1 R.S.). Details from Cpl. Chadwick (G8ON), Cpls. Club, East Camp.



MEMBERS ON ACTIVE SERVICE

Forty-fourth List

WE publish below our forty-fourth list of members on Active Service. Additional details and corrections should be advised to Headquarters as early as possible. The present list contains information received up to April 30, 1943.

Rank and Name	Regiment or Branch of Service	Pre-war Call or B.R.S.
P./O. S. G. Abbott	R.A.F.	G3JU
L.A.C. B. J. Baker	"	6223
P./O. D. Barnes	"	2CNT
L.A.C. J. G. Barnes	"	6253
L.A.C. W. E. Baugh	"	6210
P.O. B. A. Blackbee	R.N.	6209
Sgt. J. T. Bloomfield	R. Sigs.	6252
A.C.2. S. B. Bolt	R.A.F.	3782
Sgt. S. T. Bridle	"	6270
Cpl. G. Brownlow	"	6289
Sig. N. M. Button	R. Sigs.	G3BG
F./Sgt. L. F. Chubb	R.A.F.	6259
A.C.1 S. Clark	"	6258
C.Q.M.S. (F. of S.) W. Clegg	R. Sigs.	G8RP
Cfn. J. A. Collins	R.E.M.E.	4617
A.C.2 J. H. Collins	R.A.F.	4977
Sig. C. L. Cole	R. Sigs.	6268
P.O. Tel. R. H. Cook	R.N.	6196
A.C.2 L. F. Crosby	R.A.F.	4603
L.A.C. W. Couling	"	6229
Sgt. C. H. Craddock	"	6241
L.A.C. D. J. Davies	"	6271
P./O. N. Davis	"	G6TV
Sig. A. N. Duell	R. Sigs.	6243
Cpl. I. J. Early	R.A.F.	6195
Cpl. L. J. Edwards	"	6237
Cpl. F. Field	"	2CFD
L.A.C. W. H. Fitzsimons	"	6192
Sgt. R. E. Fletcher	R. Sigs.	6278
P./O. G. H. Ford	R.A.F.	6216
A./C.Q.M.S. (F. of S.) G. C. Fox	R. Sigs.	4166
A.C.1 K. Francis	R.A.F.	4995
Cfn. T. S. Fraser	R.E.M.E.	6249
P./O. J. E. Frith	R.A.F.	6204
A.C.2 E. F. Gadsden	"	4690
W./Sgt. J. F. Gardner	R.E.M.E.	6191
Cpl. J. R. Gatehouse	R.A.F.	6233
L.A.C. J. F. Gilder	"	6215
P./O. C. N. Grange	"	6205
A.C.1 R. J. W. Hadley	"	6230
Sig. E. H. Hammond	R. Sigs.	6211
Sgt. P. R. Harrison	R.A.F.	5070
L./Cpl. R. F. Harrison	R.E.M.E.	6267
Cpl. T. Harrison	R.A.F.	6264
P./O. P. M. Hedgeland	"	2DBA
Cpl. G. H. Heppel	Cameron Hdrs.	2DRB
A.M.2 C. L. D. Hider	R.N. (F.A.A.)	5156
Tel. P. Hoare	R.N.	6236
Cpl. R. J. Hughes	R.A.F.	4107
Ldg. Radio Mech. A. W. Ingleton	F.A.A.	6221
Cpl. A. G. Jakers	R.A.F.	6279
Cpl. J. D. G. Jenkins	R.E.M.E.	6262
Cpl. D. Lamb-Shine	R.A.F.	6213
A.C.2 R. J. Leworthy	"	2HGJ
Pte. F. Markotich	West Nova Scotia Regt.	BERS517
L.A.C. F. W. Marrs	R.A.F.	6280
Gnr. J. E. Mockridge	R.A.	4839
Cpl. A. R. M. McLean	R.A.F.	6276
S./Ldr. W. F. Nash	"	6266
L./Cpl. T. W. Nellist	R.E.M.E.	6260
Cfn. A. E. Newton	"	6246
Pte. M. O'Connor	Pioneer Corps	6208
Sig. T. Orr	R. Sigs.	G3IV
Sig. J. W. Park	"	3282
Cpl. D. A. Parker	R.A.F.	4973
A.C.1 S. C. Parkes	"	6214
L.A.C. J. Paterson	"	6244
P./O. P. A. Peach	"	6217
A.C. B. M. Pealling	"	4994
A./Q.M.S. T. O. I. Pick	R. Sigs.	G8GL
Cfn. F. A. Ridgway	R.E.M.E.	6285
L.A.C. T. Rutherford	R.A.F.	3611
Cfn. R. Shepherd	R.E.M.E.	6248
S./Lt. F. J. Shirley	R.N.V.R.	6226
L.A.C. J. G. Shirt	R.A.F.	6193
L.A.C. H. Skillington	"	6242
Cfn. J. G. Smith	R.E.M.E.	6292
L.A.C. K. C. Smith	R.A.F.	6245
L.A.C. R. T. Spencer	"	4982
A.C.2 K. P. Spray	"	6198
Tel. W. Stephenson	R.N. Subs.	6224
Gnr. F. G. Stroud	R.A.	4150
Sgt. W. H. Taylor	R. Sigs.	2AGX
A.C.2 E. H. R. Terraneau	R.A.F.	2FYO

Rank and Name	Regiment or Branch of Service	Pre-war Call or B.R.S.
Sgt. M. J. Toole	R.A.F.	6206
Ldg. Radio Mech. F. Turner	R.N.A.S.	6212
Cfn. J. E. Walker	R.E.M.E.	6282
A.C.2 R. Walker	R.A.F.	G6QI
Cpl. E. Walmsley	"	6202
A.Art.S./Sgt. G. A. Walter	R.E.M.E.	6287
Cpl. S. S. Ward	R. Sigs.	6251
Cfn. R. L. Watson	R.E.M.E.	6247
Lt.-Col. C. M. Wells	R.E.	6269
L.A.C. C. C. White	R.A.F.	6227
P.O. H. M. Whitfield	R.N. (F.A.A.)	6232
P./O. T. Wilkinson	R.A.F.	21DSM
P.O. W. J. Wilson	R.N.	6272
F./Sgt. R. A. Woodward	R.A.F.	4816
A.C.2 E. Worman	"	4185
Tel. F. H. Wright	R.N.	4187
Ord./Tel. G. S. Wright	"	4674
Sig. D. Zeid	R. Sigs.	4685

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

DONATIONS.—The General Secretary acknowledges with thanks, on behalf of Council, receipt of donations from:—S. Little, 3069, £2; Mr. Babcock Snr., £2 2s.; F. A. Newell, 5754, 5s.; R. E. Rogers, G8LC, 2s. 6d.; Anon., 5s.; D. J. McDonald, G6MKH, £1 5s.; E. H. Lawrence, G2KJ, 10s.; H. Mackay, 5029, 5s.; E. F. Gadsden, 4690, £1; G. W. Reade, 5s.; D. Zeid, 4685, 5s.; N. G. Anslow, G4GD, 6s.; T. Arnold, VU2AN, £1 2s. 6d.; M. Shaw, G6OF, 2s. 6d.; A. N. le Cheminant, G6AC, 15s.; Bury Group per G8NL, £1 17s. 2d.; H. Bennett, G8PK, 5s.; District 7 (Croydon) £1; R. C. Wilkinson, G4HW, 5s.; Charles Kay (father of G3CO, P.O.W.), 10s.; District 4 (Nottingham) per G8DZ, £1; A. H. Magraw, 2BVA, 5s.

Receipts to date, £800 8s. 10d. Expenditure to date, £269 16s. 5d. Balance in hand as at April 30th, £530 12s. 5d.

PARCELS.—Invoices for March parcels had not been received up to the time of going to press. The usual parcels were sent in April.

KIT BAGS AND SUIT CASES.—Mr. Edwards is arranging to send a suit case and kit bag to all those entitled to receive parcels from the fund. Further details next month.

THANKS BURY.—Messrs. C. Turner, G8NL, and R. Lewer, G8QS, have donated the outstanding balance of the Bury Group funds (amounting to £1 17s. 2d.) to the P.O.W. Fund "in memory of happy days spent before September, 1939." In forwarding the donation Mr. Turner wrote "as the members of our group are now scattered in various parts of the world, G8QS and myself, as trustees, decided they would raise no objection to donating it to such a worthy cause."

THE "LITTLE" MORE.—Simon Little, 3069, of E'inburgh, after completing a small servicing job for some friends, passed "round the hat" for the P.O.W. Fund. To his surprise he found that the sum of £2 had been donated—a very generous gesture on the part of all concerned.

BULLETINS OFFERED.—P.O. Tel. R. Foster, G4WLK, offers 21 issues of THE BULLETIN (April, 1938-December, 1939) for sale to the member making the highest bid received at Headquarters by May 31. Proceeds to the P.O.W. Fund.

BOOKS WANTED.—There has been a marked falling off in books. Members are urged to make up parcels of light reading such as Lilliput, Men Only, London Opinion, Punch, etc., and send them direct to Mr. C. H. L. Edwards, "Speedway," St. Bartholomew Lane, Sudbury, Suffolk, who will arrange for their despatch direct to our members, who are in prison camps. Gifts of second-hand packs of cards and card games will also be appreciated as stocks of new cards and card games are now very low at the main stores.

A BRIGHT IDEA.—Instead of rattling a collection box at Belfast Y.M.C.A. Radio Club Meetings, Secretary Bob Holden, G15HU, hit on the bright idea of halloing an "unknown radio component" at each meeting. The donor of the component is allowed to compete but if he is the winner he has to offer it for re-ballot again at one penny less per ticket—the original price for a ticket being 3d. The components have to be in good condition and of practical use. Recent donations have included a Ferranti AF5, a Morse practice buzzer, a length of screened cable and a PX4. The success of this novel idea can be judged from the fact that £2 was collected in a few weeks.

News From the Kriegies

The following extracts from letters recently received by Mr. C. H. L. Edwards, G8TL (Hon. Administrator of the R.S.G.B. Prisoners of War Fund) will serve to illustrate how welcome are the parcels which the Society sends each month to members in P.O.W. camps.

"My son (Arthur Webb), has asked me to convey his warm thanks for the many parcels received."

"He (D. W. Carr), often says he has received a parcel from the R.S.G.B. and will I thank you and the hams on his behalf. In the last letter he said he had a parcel of four very good books for which he is most grateful."

"You will be pleased to learn that we heard from our son (F. E. Marshall) last week and he mentions receiving cigarettes and particularly asks me to thank the R.S.G.B. for the good work."

Denis Flower writes, "I was delighted to get another letter from you written on Boxing Day and I got your Xmas Card. Parcels come through very well. The books arrive in due course after censoring. Mike Quartermaine, Tony Lister and I would like to thank you very much indeed once again for all you are doing for us."

Percy Briscoe writes, "Thanks ever so much for cigarettes and book parcels of which I have received four to date (March 14). I am fit and well. Give my regards to Paacke (30.3) and Brazzil (3WP). The first parcel was a boon for I was quite low in smokes at the time. 73 to all."

Mrs. Frost writes, "Mark was on cod liver oil and malt when he last wrote so does not sound too good."

Members may like to know that GSTL is arranging to send Lt. Frost a liberal supply of Crookes halibut oil capsules.

News is to hand that L./Cpl. George Wakefield, G5WG, R. Signals, of Wraybury, Middlesex, is a prisoner of war in Italy. Arrangements are being made for him to receive parcels from the R.S.G.B. P.O.W. Fund. G5WG has been a member since 1934.

From *The Signal* (official organ of the Radio Officer's Union) we learn that Radio Officer G. M. Hindle, BR33692, was for some months a prisoner on board a German raider prior to being interned at Marlag and Milag, Nord, Germany.

Ham Hospitality

Norman Holden, GM4MF, 3 Hodge Street, Falkirk ('Phone, Falkirk 1252), will be pleased to extend hospitality to any member who is serving in the neighbourhood. A similar offer is made by Hugh McConnell, 2ACQ, of Shantarray, Alloway, Ayrshire, and by Mr. C. B. Boorman, BERS492, P.O. Box 347, Hamilton, Bermuda.

Belfast Y.M.C.A. Radio Club

At the Club meeting held on April 7, Mr. John Grutzius, W6FZ, delivered a very interesting lecture on the construction of jigs and templates used for the manufacture of coils for high power amateur transmitters. He also described how he winds and sets rigid his own coils, whilst blackboard diagrams were prepared to show the construction of his P.A.—which incidentally uses only about 10 inches of wire for the necessary connections.

At the conclusion of his talk numerous questions were asked and answered in fine style.

A vote of thanks to W6FZ was proposed by the President of the Club (Mr. J. Nickle, 2HCC) who had the support of G3PA, G1SHU, 6TK, 2DDI, 2DGU, 3883 and about 25 other members and visitors. G1SHU.

The Flat-Footed Brigade

The following members are serving in the Regular, War Reserve or Special Police Force.

Name	Call or B.R.S.	Force
Fish, C. J.	G4OM	Somerset (Regular)
Gilmour, W. D. . . .	G2VB	Metropolitan (Regular)
Gingell, J. S.	2AAM	Derbyshire (Special)
Hardwick, E. A. A. . .	1330	Somerset (Special)
Lovewell, S. S. . . .	3765	Swaffham
Thorne, E.	2FSJ	Hampshire (Regular)
Woodhead, P.	5751	Metropolitan (Regular)

Book Reviews

RADIO RECEIVER DESIGN—PART I. By K. R. Sturley. Chapman and Hall: 28s. 435pp.

In reviewing this new book it can be said at the outset that Dr. Sturley has presented what is probably the most comprehensive work dealing exclusively with receivers which we have yet seen. The complete work will be so large that the publishers have decided that it would be impossible, under war-time conditions, to issue it in one volume. The first volume, which is already available, deals with introductory considerations of modulation and valve theory, followed by a detailed account of receiving aerials and aerial coupling circuits, radio frequency amplifiers, frequency changers, intermediate frequency amplifiers, oscillators, and detectors. Volume two, which is in the press, will cover audio-frequency amplifiers, power supplies, measurements, television and frequency modulated receivers.

Such a complete review of receiver design must inevitably be classed as one for the advanced worker, being largely mathematical in character, although graphical representation of mathematical results is frequently employed.

Chapter I presents a general discussion on amplitude, frequency and phase modulation, showing possible circuit "line-ups" for typical receivers of each type.

Chapter II is concerned exclusively with the application of thermionic valves of all types to receiver design. The conception of anode load characteristics is clearly dealt with together with the various equivalent circuits of valves. The chapter concludes with an extensive analysis of the grid input admittance of valves, showing the complex effects which arise from the internal inter-electrode capacitances.

The third chapter deals with the various types of aerials which are usually associated with receivers. Aerial coupling circuits in great variety are examined with respect to the variation of

sensitivity and selectivity with frequency over the tuning range. Screened feeders and interference reducing aerials receive some attention, together with a few specialised problems such as motor car aerials, the matching of more than one receiver to one aerial, etc.

The design of radio frequency amplifiers forms the subject of the next chapter. Opening with a discussion on the properties of tuned circuits in general, it proceeds to the characteristics of inductance coils at radio frequencies. Although the theoretical effects of self-capacitance and screening upon the quality of tuning inductances are dealt with in some detail, it is thought that more space might have been allotted with advantage to the practical methods generally adopted to obtain high performance in receiver coils. There is, for example, very little information given on the use of iron dust cores. Neither are there included any details of variable condenser design.

Coupled circuits with the special case of the tunable bandpass filter are then described very completely.

The second half of this chapter covers the various aspects of the valve applied to R.F. stages, including distortion and cross-modulation, and a discussion on the causes of "noise" in such stages. Some of the particular problems of amplification at V.H.F. are also included.

Chapter V deals fully with the important subject of frequency changers for superhets. In addition to the functioning of various types of valve circuits for this purpose, such related subjects as the production of interference whistles, image suppression circuits and the measurement of conversion conductance, harmonic response and signal handling capacity receive attention. The following chapter is logically concerned with the various types of oscillators used in superhets. The theory of all the common oscillator circuits is given, with a great deal of useful information on tracking, frequency drift, parasitic and squegger oscillations. The use of the E.C.O. and the Franklin oscillator, together with temperature co-efficient correction of coils and condensers is included.

Intermediate frequency amplifier circuits are then described, including the use of variable selectivity arrangements and automatic selectivity control.

The last and longest chapter is a very complete description of detectors of all types. The performance and advantages and disadvantages of diodes, grid and anode detectors are compared, and there are sections on regeneration, full wave detectors and demodulation effects.

The book concludes with two appendices, one on the use of the "j" notation for complex quantities and the other on the Fourier analysis of wave forms. The latter is fully illustrated by numerous examples including that of an overloaded R.F. amplifier.

If any general criticism could be made of the book it is perhaps that a few aspects of receivers for purposes other than broadcast reception seem to be lacking. There is no description for example, of crystal gates, or crystal band-pass filters. Neither is there any mention of beat frequency oscillators for C.W. reception. The subject of automatic gain control would also seem worthy of more extensive treatment.

It is hoped that some of these points may receive attention in the second part of the work, the publication of which will be awaited with interest. H.A.M.C.

A COURSE IN RADIO FUNDAMENTALS. By George Grammer. 104 pages, including assignments, examination questions and answers, laboratory manual, and 40 lesson course outline. 107 illustrations. Published by The American Radio Relay League, Inc., West Hartford, Conn. (Obtainable through R.S.G.B. price 3s. 6d. three months delivery.)

This is a very useful little book: mainly of interest just now to students and teachers in Service courses, it would even be an excellent introductory scheme for State Bursars doing radio.

Teachers of Service courses are tightly tied to detailed syllabuses, and often to fifth-rate texts, which must give anyone—teacher or student—with modern educational and radio experience a feeling of frustration. This book should be studied by those officers who are responsible for the syllabuses of radio courses: it will, if available, probably be studied by the personnel, who are quick to look for a more gratifying text-book and find in amateur publications the satisfaction of a keen technical hunger.

The course is based on *The Handbook*. Reading assignments are given for the 40 lessons, questions asked, and experiments outlined with considerable detail. The emphasis is always on the practical side, and the depth of treatment is that of *The Handbook*—just what is wanted for the training of practical men.

The apparatus required for the experiments, which illustrate the lessons, is simple and hence will form a useful minimum on which to base more ambitious experiments.

Readers of QST will have seen much of the material published serially, and will realise its high quality, covering the whole field from electrostatics to directive aerials. It is timely and heartily recommended. T.P.A.

Technique questions

It has been suggested that we should endeavour to revive our popular pre-war Technical Questions feature. Members interested in the suggestion are asked to submit questions in concise form to the General Editor, who will arrange to publish a selection each month. Members will be invited to contribute replies, but these must be brief and, if possible, type-written. Not more than one question may be sent in by any one member.

BRITISH ISLES NOTES AND NEWS

District and Town Meetings

D.R.'s, T.R.'s and others are asked to arrange meetings at least seven days after BULLETIN publication date—nominally the 15th of the month. Due to distribution difficulties, coupled with the fact that a very large number of members living away from home have the BULLETIN redirected to a temporary address, some days may elapse before the current issue is received. If a meeting is fixed between the 15th and 22nd of a particular month a notice should appear in the previous month's issue.

Details of forthcoming meetings should be sent to reach Headquarters not later than the 28th of each month. The details should be set out on a separate slip of paper or on a postcard, and should be arranged exactly as shown in the panel published on page 173.

DISTRICT 1 (North Western)

Ashton-under-Lyne.—There was good attendance at a meeting of the local Radio Society held on Sunday, April 18, when a co-opted talk was given by BR54567 and 4681 on Bridge measurements. Demonstrations were carried out with a Wheatstone Bridge instrument, using a neon oscillator to supply the signal. The next meeting will be held at 2 p.m., Sunday, May 23, at 160 Katherine Street, Ashton-under-Lyne when a discussion on ultra-short waves will take place. Members are invited to bring their ultra-short wave receivers. Service members are assured of a warm welcome. *via G5PX.*

Bolton.—Six members supported the meeting held at 2BDA on April 4. As this represented a 100 per cent. improvement on the attendance at the previous two meetings, the T.R. hopes it will continue. The next meeting will be held at 2.30 p.m. on June 6, at 2DVQ, 32 Bromwich Street, Bolton. Service members will be cordially welcomed.

When 2BTO came on leave recently he brought with him as guest, 2CIW of District 15 who, we gather, had been anxious to ascertain whether all the wonderful tales he had heard about Bolton were really true. We hope he was not disappointed.

In a letter from the M.E. which took five months to arrive, Harry Willets, 2FPI, reports fit, but bemoans the fact that sand does not make a very efficient earth! *via 2DVQ.*

DISTRICT 2 (North Eastern)

D.R.: C. A. Sharp (G6KU), 316, Poplar Grove, Gt. Horton, Bradford, Bfd. 10772. Scribe: H. Beadle (G8UO), 13, Chandos St., Keighley.

As announced last month a provincial District meeting will be held in Leeds on May 23. Old members will need no further invitation but the D.R. cordially invites newer members to turn up in strength. Here is the chance of getting acquainted with members of H.Q. staff and with fellow District members.

G3HA (R.A.F.) who reports fit and well from North Africa has "found" an old French superhet and is building a short wave receiver from the bits and pieces. 1151 says the metal salvage campaign has benefited by the spring cleaning of his shack. **2BMC (R.A.F.)** is in District 10, where he has met a few VK's, VE's and W's. 4065, now at No. 1 R.S., hopes to attend meetings. 6084, who is disappointed to find that his home QRA is not in District 2, would like some dope on sound recording-disc or steel tape. 8TF is busy enrolling new members. 2AND is on his way overseas. 4976 has received several visits from 2FLW (R. Sigs.) of Blackburn who is stationed in his town. 3VP wishes to be remembered to 2AND, 8CD, 6RO and 5VD. 4095 and 4976 had a very enjoyable visit to 8TF. 2LT and 8UO recently met at York. 2LT has been visited by 3VY and would like to hear from 3RU. We welcome a new member in 6105. Letter budget No. 5 is on its rounds. Keep it moving please. *G8UO.*

DISTRICT 3 (West Midlands)

D.R.: V. Desmond (G5VM), The Chestnuts, Hanley Castle Worcester (Hanley Swan 41). Scribe: E. J. Wilson (2FDR) 48 Westbourne Road, Olton, Birmingham.

Birmingham.—At a meeting of M.A.R.S. held on April 11, Mr. George Brown, G5BJ, gave a most interesting talk on frequency measurement and receiver calibration. Twenty members were present. The next M.A.R.S./R.S.G.B. meeting will be held at 7 p.m., on Tuesday, June 8, at the "Hope and Anchor" Hotel, Edmund Street, Birmingham. *2FDR.*

DISTRICT 4 (East Midlands)

Nottingham.—The attendance at the April meeting was very poor, only four members being present despite the fine weather, and the attraction of a junk sale the later produced 20s. for the P.O.W. Fund.

The next meeting is to be held at 2A00, 78 Henry Road, West Bridgford on Sunday, May 23, at 6.30 p.m. when another junk sale will take place. As there will also be some interesting apparatus on show at the meeting, it is hoped that both old and new members will come along. There will be plenty of room for everybody. *via G8DZ.*

Derby.—The T.R., G2OU, 43 Kenilworth Avenue, reports receiving a visit from BR54751, who has joined the F.A.A. as a Wireless Mechanic as he could not get into the M.N. G2TL is now in the R.A.F.

DISTRICT 5 (Western)

D.R.: R. A. Bartlett (G6RB), 31, King's Drive, Bishopston, Bristol. Bristol 46960.

Bristol.—At the meeting held on April 18, an attendance of nine was recorded. Discussion took place as to future meetings, some members expressing the view that evening meetings would be preferable during the summer. Will all those who would prefer them in the evening please advise the T.R. or D.R., or attend the next meeting at 17 Colston Avenue on May 23 when a decision will be reached.

The D.R. was very pleased to receive a visit from G5JU when he was home on leave recently.

No reports have been received from any other part of the District. *G6RB.*

DISTRICT 7 (Southern)

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

Attention is drawn to the notice, elsewhere in this issue, of the meeting to be held in Salisbury on Sunday, June 6. It is some years since we had a Conventionette in this District and it is hoped that as many members as possible will attend. If you intend to be present don't forget that post-card to 8PP! The President, "Clarry," and several W's have promised to turn up.

Croydon.—The April meeting held at the Croydon Y.M.C.A. was attended by 23 members including: 2DP, 3DF, 3FK, 3RU, 3ST, 4NI, 5BT, 5JR, 5PY, 2FWA, 2HHD, 3003, 1545, 3188, 4313, 4814, 5317, 5552, 6064, 6131 and three prospective members. The meeting opened with a rag-chew, followed by tea and a Radio Quiz devised by 2DP, which was won by 3188 with 5552 second and 5BT third. The winner was presented with a copy of the Handbook by 2DP. The collection for the P.O.W. Fund raised 20/-. See-Forthcoming Events for details of next meeting.

4314 who has been home on leave, seems to be enjoying his course in the R.E.M.E. Welcome to 3RU who will be able to come to the Croydon meetings for a while. By the time these notes are in print 8ID will have left the District for somewhere down Zummerzet way. 4150, out in Africa, wishes he had his camera with him. (Must be some dusky beauties there!) *via G2DP.*

Coulston.—Congratulations to 2PL and his wife upon the safe arrival of a daughter earlier in the month. (Looks like there's gonna be a 24-hours service from station 2PL after the war with all the assistant ops. they are taking on the strength.) 5968, a comparatively new member, has built a straight receiver from a design in the Handbook and finds it works very well. Welcome to new member G. W. Morley, 6134, of Wallington. *via 3003.*

Newbury.—Excellent work in training lads in Morse and Radio Theory until they are old enough to join the A.T.C. has been done by Mr. Grover, 2FGK. The seventh and eighth groups soon commence instruction in the Newbury S.W. clubroom. Best of luck to 2FWB who leaves the District for a new QRA in Cornwall.

Farnborough.—A welcome letter from S./Sgt. James, 6XM, reveals that he is in the R.E.M.E. as Instructor at a W./T. School. When he is not chasing the rookies around he spends his time constructing a 21-valve communication receiver "with all the latest bits and pieces attached, p-p detection followed by p-p throughout. The audio section switched by relays to be used as pre-amplifier to the modulator." XM doesn't say if there is to be a built-in armchair for the operator. *G5WP.*

NORTH EASTERN PROVINCIAL
DISTRICT MEETING

to be held at

HOTEL METROPOLE, LEEDS
on Sunday, May 23rd, 1943

ASSEMBLE	-	-	-	2.0	p.m.
BUSINESS MEETING	-	-	-	3.0	p.m.
TEA AND BISCUITS	-	-	-	4.30	p.m.
INFORMAL DISCUSSIONS	-	-	-	5.0	p.m.

Inclusive charge 2/- a head

Mr. A. D. Gay, G6NF (President) and Mr. John Clarricoats, G6CL (General Secretary), will be present. Reservations by postcard to Mr. C. A. Sharp (G6KU), 316, Poplar Grove, Gt. Horton, Bradford, not later than May 20th.

DISTRICT 8 (Home Counties)

Deputy D.R.: L. W. Jones (G5JO), 16 Leys Road, Cambridge. Tel.: Cambridge 3406.

Few members have reported this month. G4BW is welcomed to the District. 5PA, who is now in Malta, passes his best wishes via the D.R. to the lads in the Bedford area. There are rumours that a certain Cambridge gentleman is spending a considerable amount of time getting his shack ready again and is in the process of clearing out and disposing of quantities of gear.

It is hoped to be able to announce the date of another Cambridge Meeting in the next issue.

The next Luton meeting will be held on May 22 at 3 p.m. at the "Bizzie Bee" Cafe, Bury Park Road, when a talk on A.F. Oscillators will be given by Sgt. S. J. Buckley. All local members are asked to attend. G5JO.

Forthcoming Events

- | | |
|--------|---|
| May 22 | District 15, 6 p.m. at G6WN, 539 Oldfield Lane, Sudbury Hill, Greenford, Middlesex. Piccadilly Railway or 18C bus. |
| " 23 | North Eastern Provincial District Meeting, 2 p.m. at Hotel Metropole, Leeds (see separate announcement). |
| " 23 | District 5, 3 p.m. at 17 Colston Avenue, Centre, Bristol. |
| " 23 | District 14 (Chingford section), 3 p.m. at G8DG, 8 Bosgrove, The Ridgeway, North Chingford. No. 38 bus. |
| " 23 | District 15 (High Wycombe section), 2.30 p.m. at G6JK, 17 New Drive, Totteridge. Bus 363 from Frogmore to Second Crescent. (A postcard if attending.) |
| " 28 | District 12, Informal Meeting, 7.30 p.m. at The Cock, Cockfosters (see District 12 notes). |
| " 29 | London Meeting, 2.30 p.m. at I.E.E. Lecture demonstration "The 358 Receiver." By Mr. Rex Heatley, G5OH, Technical Manager, Stratton & Co., Ltd., Birmingham. |
| " 30 | Scotland "A" District at 3 p.m. in the Royal Technical College, George Street, Glasgow (enter by Montrose Street). Lecture by J. S. Tait, Esq., B.Sc., A.R.T.C., A.M.I.E.E., on "Quality Sound Reproduction." |
| " 30 | Scotland "C" District, at 2.30 p.m. in Dundee Wireless College, 7 Airlie Place, Dundee. Lecture by J. Gouck on "Valves" (Part 2). |
| June 6 | Services Meeting, 2 p.m. at Cathedral Hotel, Salisbury (see special announcement). |
| " 6 | District 7 (Croydon Area) and District 13 (South London, Central and Eastern Areas), 3 p.m. at Croydon Y.M.C.A., North End, West Croydon. |

DISTRICT 11 (North Wales)

Deputy D.R.: C. Spillane (BRS1060), "Woodside," Meliden Road, Prestatyn.

As the April meeting coincided with the leave period of several local members, the attendance showed an improvement: GW3CF, 4CK, 1060, 2731, 3044, 4762, 5837 and 6278, all being present. The latter described a typical modern transmitter, whilst GW3CF displayed his new home-built bug—a fine job mounted on a solid marble base. 2731 auctioned a few items of junk following which a discussion took place on various subjects. The next meeting will be held on Sunday, May 23, at Vale View, Prestatyn, from 3 p.m.

G3IR (R. Sigs.), is now reported to be in GI. 2DAH is in the C.M.P. and is attached to the same station as GM6IW. G2GZ, although known to be in the District, has not so far contacted the locals. 4410 returned to the District but has now left us again to join an airborne unit. 4444 has had another spell in hospital. VE4YG, writing from India, reports meeting Flight-Sgt. Wells, 4020, in Calcutta. They send 73 to District 11 members. GW4CK reports meeting G8CK, 8J1, 2RD, 5757 (R. Sigs.) at an R.A.F. station in Wilts. 4CK also contacted 5566 (ex G5HS) through noticing his BULLETIN arriving through the post. BRS1060.

DISTRICT 12 (London North and Herts)

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

North London.—The attendance at the April meeting held at 2DHF, Southgate, was below average, but "the faithful few" enjoyed the ragchew as well as the refreshments kindly provided by Mr. and Mrs. Stevens. Discussion ranged from pre-war

56 Mc/s. field days to the use of rhodium for radio purposes. G6LI was a welcomed visitor.

The D.R. made a journey to St. Albans recently with a view to arranging a venue for a summer meeting, but found himself confronted with catering and travelling difficulties. G4DC is making enquiries in the Hertford area.

No formal meeting has been arranged for May, but the D.R. will be at The Cock, Cockfosters on Friday, May 28 from 7.30 p.m. when it is hoped that a goodly number will join him in the lounge for a yarn. Those who would like to take the set evening meal (the price is 5s. a head) should notify him by the 24th so that he can book a table. The Cock is at the terminus of one of the 29 bus routes from town and only five minutes walk from Cockfosters tube station.

St. Albans.—C. E. Adams, 3412, of 18 Sandfield Road, St. Albans, who has taken over the job of T.R., asks that all members living within an area of four miles of the town should get in touch with him at once. He is anxious to arrange meetings and compile a list of members. G5QF.

DISTRICT 14 (Eastern)

Chelmsford.—There is very little to report this month except that the usual local meeting was well attended by the faithful nucleus. Special mention is due to GZC who makes a very long and inconvenient journey each month to attend. Congrats to 2SA, who has just received his second "pip" in the H.G. 5RV leaves the district this month to take up an appointment elsewhere and will be unable to continue his duties as D.R. With Council's approval, it is proposed to hand over to our old friend Mr. L. Fuller, 6LB, who has consented to act as Deputy D.R. until such time as your scribe can resume.

Chingford.—G2HR, was the only member to attend the meeting held on April 18, at G8DG, due presumably to the fact that the meeting was fixed too close to publication date for the April issue. There will be another meeting at 8 Bosgrove, The Ridgeway, North Chingford, on May 23, at 3 p.m.

Congrats are offered to B. C. Leece, G5XI, of Leigh-on-Sea, who has been granted an R.N.V.R. commission. G8DG reports visiting 4215 who has an interesting valve voltmeter under construction. G5RV.

DISTRICT 15 (London West, Middlesex and Buckinghamshire)

D.R.: H. V. Wilkins (G6WN), 539 Oldfield Lane, Sudbury Hill, Greenford, Middlesex. Byron 3369.

West London.—It is regretted that owing to unforeseen difficulties we are, at present, unable to arrange meetings at the Excelsior Hotel. If the D.R. is still available, and not called up, he will take the May meeting. A postcard or telephone call, please.

2DZN writes again, this time from the Middle East, 4AQ is a Sgt. signals' instructor in the Home Guard and hopes to be on the air again soon. 2VU and 6VB send 73 to all old friends, 3XD is working twelve hours a day, 6WN almost the same, 4LS has been unwell recently. 3UQ reports that 8VM has passed out as an R.A.F. navigator and is on Prince Edward Island undergoing a gunnery course. (Congrats, O. M., D.R.). 6CO is now a C.Q.M.S. in R. Sigs. SPIQA sent the D.R. an Easter card from Yorkshire. Our best wishes to him.

Aplebury.—Unfortunately, 8BW was late with his report last month, consequently it missed the boat. 2FSR, who is stationed near the town, signified his intention of attending any meeting there. 6025 has left for Slough and 6024 for Woking—both will be missed. 6019 is busy with the Signals section of Home Guard and engaged in F.M. reception. 6020 is studying for I.E.E. exam., 6018 is making a valve tester and is interested in details of suppression for automatic keying on C.W. 6014 is busy with test gear. 8BW has heard from GM3PM and 2FSR and sends 73

SERVICES MEETING

Sunday, June 6th, 1943, at
CATHEDRAL HOTEL, SALISBURY

Assemble 2 p.m.

The Meeting will be addressed by Mr. A. D. Gay, G6NF (President) and Mr. John Clarricoats, G6CL (General Secretary).

To assist the hotel management (who will endeavour to provide tea and biscuits) members desirous of attending must notify the organiser, Sgt. L. Parnell (G8PP), 96 Brown Street, Salisbury, not later than May 31. Civilian members are cordially invited to support this meeting.

to both and also to his Bournemouth friends. SBW would like to hear from all new local members to whom he extends a welcome.

High Wycombe.—Members present at the last meeting included G2RL, 61F, 6JK, 4750, 4781, 5592, 5666, 5688, 6018, 6020, 6022, 8BW (the T.R. for Aylesbury) and three of his colleagues. 5688 was home on leave. 4781 has had letters from 5881 and 5867 both of whom are in the R.A.F., the former is in VE and likes it. (Good luck to you both). 2RL produced a photo of his shack as it was in 1922 and displayed his present receiver and remaining gear. There was a discussion on Morse, QSL cards and photos. Our thanks to Mr. and Mrs. G2RL for their hospitality which was appreciated by all present. G6WN.

DISTRICT 16 (South Eastern)

Deputy D.R.: W. A. Scarr, M.A. (G2WS), 8 Beckenham Grove, Shortlands, Bromley, Kent. Beckenham 1131.

The Deputy D.R. has received an interesting letter from Cpl. Lane, (G3GW), who is with the R.A.F. in Canada. He is anxious to contact old friends. Letters may be sent c/o Miss F. Callum, New Hamburg, Ontario. He has made many VE and W contacts. The only other report received this month comes from 2HKU (Sheerness), who has also heard from 3GW. He is working with 4721 in H.G. Signals and informs us that G88S of Queensborough is reported a P.O.W. in Java after being missing for many months. (Details please—Ed.) G2WS.

★ LONDON MEETING ★

Mr. REX HEATLEY (G5OH)

Technical Sales Manager, Stratton and Co.
Ltd. Birmingham, will deliver a demonstration lecture entitled

THE 358 TYPE RECEIVER

at the Meeting to be held on
SATURDAY, MAY 29th, 1943

at

The Institution of Electrical Engineers
SAVOY PLACE, VICTORIA EMBANKMENT
LONDON, W.C.2

COMMENCE AT 2.30 P.M.

DISTRICT 18 (East Yorkshire)

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

York.—Will any member willing to act as town representative please write to G6SO?

Hull.—After serving with the R.W.A.F.F. in West Africa 4590 is now transferred to A.A. artillery and is stationed in the district. He manages to visit the town once a fortnight. G5MN (R.A.F.) was also on a short leave recently. 1948, still stationed at Saffron Walden, is expected on a week's leave sometime in May. 2HAD, now serving overseas, reports meeting a number of hams while on the "outward journey." 3PL has had visits from 4530 (R.A.F.) who has now volunteered for flying after becoming "browned off" with ground duties. 2BRY, now a staff sergeant in the R.E.M.E. and W. F. Dove, 6104 (R.A.F.), a new Beverley member who appears to be very keen. He is a sergeant wireless instructor stationed on the Isle of Man. G6SO.

Northern Ireland

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

2DDI recently returned from Canada (where he qualified as a Seagant Navigator) bringing with him G16TK's DX CC certificate and cards. This is probably the only DX CC certificate that has been issued to a British amateur since the outbreak of hostilities. As 6TK has just been promoted F.O. in the R.A.F.V.R. (Training Branch) he receives our congrats on both achievements. ZLIGX is still in GI, but 2BFC and 6153 have left for G. G15HU is constructing a C.R. oscilloscope for receiver servicing using a 4081A tube. He promises a description of this and his pre-selector when both jobs are completed. The latter is being fitted with band switching. 2FHN who now writes from India via G16TK, has seen service in China. He recalls many amusing experiences and reports fit and well. G15QX.

Scotland

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

"A" District.—Due to a last minute decision of the authorities to close the Royal Technical College during Easter, it was necessary to cancel the April meeting. The lecture which was to

have been delivered then, will be given at the May meeting, by Mr. J. S. Tait, B.Sc., A.R.T.C., A.M.I.E.E., who will speak on Quality Sound Reproduction.

"C" District.—At the March meeting GM4NH gave the first portion of his lecture on valves, to a gathering of 14 members. G4KC of Coventry was a welcome visitor. It was decided to conclude the subject of valves at the May meeting. The April meeting discussed THE BULL quiz, and then heard a very interesting and instructive lecture on workshop practice by GM4HR. Our G visitor at this meeting was BRS1608. Membership continues to grow. GM6ZY.

Aircraft Radio Officers New Agreement

A new agreement was recently negotiated by the Radio Officers Union for Radio Officers in the British Overseas Airways Corporation.

From the April issue of *The Signal* official organ of the R.O.U. (which contains the full text of the agreement and its accompanying schedule) we learn that the following are the standard annual rates of basic pay to Radio Officers:—

Third Officer	min. £300 ..	Max. £300
Second	min. £325 ..	max. £450
First	min. £450 ..	max. £550

Annual increments at the rate of £25 per annum are payable to Second and First Radio Officers, subject to satisfactory service, until the maximum salary appropriate to the Officer's grade is attained.

While employed in connection with flights or services operated to and from the United Kingdom from and to countries outside Europe or while posted to a base outside the United Kingdom, an officer is paid, in addition to his basic pay, overseas pay at scales according to salary grade appropriate to overseas staff. Officers are also paid trans-oceanic pay while employed in connection with flights or services operated on trans-oceanic routes. The trans-Atlantic rates are:—

Third Officer	£150 p.a.
Second	£175 p.a.
First	£200 p.a.

Radio Reception in the Falklands

C.Q.M.S. Harry Counce, G6KS, reports that whilst the B.B.C. transmissions on 13 metres are received consistently well in the Falklands, South African and Australian broadcast stations are weak and provide no entertainment value. Rome and Zeesee are always well down on the B.B.C. transmissions. The only other good signal is that radiated by KWID when its aerial is beamed south.

Most of the local residents pin their faith in the Eddystone Kilodyne Four which gives a good performance. The G.E.C. 6-valve superhet working off a 6-volt accumulator battery is also popular. Charging is carried out by means of wind generators. "It seems strange" writes G6KS "to hear a layman telling you that his battery reads 1250—apparently they have all been brought up to respect the hydrometer!"

The low noise level in the Falklands should make it an ideal place for amateur work.

Strays

● Mr. Walter Davies, Junior, BRS5091, of The Bungalow, Kingsley Fields, Nantwich, Cheshire, would be pleased to exchange correspondence with any member who, like himself, is unable to attend meetings. We commend to BRS5091 the idea of starting a Letter Budget for isolated members.

● Mr. A. J. Hallett, G3CQ, pre-war Chairman of the Romford and District Radio Society is again residing at "High Beacon," Havering-atte-Bower, Essex, at which address he will be pleased to receive letters from old friends—Service and civilian. As his duties keep him away from home a great deal, G3CQ is unable to invite callers, but if any local members on leave would like to meet him, he should telephone Mr. Hallett's house to ascertain when he is expected to be home.

● One of our newer members, Fusilier L. Holman Jones, BRS6071, who is in Ward E, N. Wales Sanatorium, Denbigh, N. Wales, is anxious to obtain a copy of *Radio Receiver Circuits Handbook* published by Pitman. Can any member oblige with this or any similar textbook?

Ham Hospitality List

Those members who have offered Ham Hospitality will be interested to learn that the list recently published in the BULLETIN was reproduced in the January issue of QST.

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R.S.G.B., 16 ASHRIDGE GARDENS, LONDON, N.13

HEADQUARTERS CALLING

March Council Meeting

Resume of the Minutes of a Council Meeting held at the Institution of Electrical Engineers on Monday, March 22, 1943, at 6 p.m.

Present.—Mr. A. D. Gay (President), Messrs. A. E. Watts, A. J. H. Watson, F. Charman, D. N. Corfield, J. Hunter, G. A. Jessup, S. K. Lewer, W. H. Matthews, W. E. Russell, E. H. Simmonds, W. A. Scarr and J. Claricoats (General Secretary).

Apologies.—Messrs. E. L. Gardiner, J. W. Mathews and H. A. M. Clark.

1. One hundred and forty-two applications for membership were accepted (27 were accompanied by references and 115 were sponsored by Corporate members). One resignation was accepted. Applications from Messrs. W. J. Butler and H. H. Thompson for Life Membership were accepted.

2. The Clydevale Radio and Electrical Experimental Club were granted affiliation.

3. It was agreed to purchase Tax Reserve Certificates to the value of £1,200 and to transfer £500 from Current Account to the Post-War Development Fund, the latter sum to be invested in Government Bonds.

4. It was agreed to support a Provincial District Meeting in Leeds on May 23.

5. War emergency plans drawn up in October 1940, which ensure that the business of the Society shall be carried on even if an ordinary Council Meeting cannot be convened, were re-examined. After discussion it was agreed that the arrangements shall remain in force for the time being.

China Amateur Radio League Convention

Through the courtesy of the British Broadcasting Corporation (Eastern Service) the following message was broadcast to China on May 5 in the name of Mr. A. D. Gay, President of the Society: "The news that the China Amateur Radio League are holding a Convention and Radio Exhibition in Chungking on May 5, has been warmly received by the Council, and members of the Radio Society of Great Britain, and on their behalf, I send you greetings and best wishes for a very successful meeting."

I am glad to be able to tell you that many of our members answered your President's appeal for souvenirs for your Radio Exhibition, and we hope these have arrived safely.

The radio amateurs of Great Britain look forward with confidence to an early restoration of the facilities which will enable them to re-establish communication with the radio amateurs of China. They hope too that the trials of war which have united China and Great Britain, will result in a close and lasting friendship between the amateurs of our two nations.

I am pleased to tell you that the amateur radio movement in Great Britain is stronger than ever, and that the membership of the Radio Society of Great Britain, has increased by nearly 50 per cent. during the past four years. More than 3,000 of our members are serving in either the Army, the Navy, the Air Force, or the Merchant Navy, where their specialised knowledge has proved of great value.

I wish you all the very best of luck and look forward to meeting many of you on amateur frequencies again soon."

London Meetings

There was an attendance of 80 at the meeting held on May 1, at the I.E.E. when Mr. P. W. Winsford, G4DC, opened a discussion on "Planning the Post-War Amateur Station." Other speakers included Mrs. Winsford, Mr. Parsons, G6RP, Mr. Russell, G5WP and Mr. Milne, G2MI. It is hoped to publish a resume of the discussion in an early issue of this Journal.

Mr. A. D. Gay, G6NF (President), warmly welcomed a number of U.S. amateurs who were present as the result of a notice inserted in "Stars and Stripes" by Major Joseph Andrew, W4EFG (Chaplain, U.S.A.A.F.).

At the meeting to be held on Saturday, May 29, Mr. Rex Heatley, G5OH, Technical Manager of Stratton & Co., Ltd., Birmingham will deliver a lecture-demonstration on the Eddystone 358 and 358X Receivers. It is hoped that a good attendance will be recorded on this occasion.

The meeting will commence at 2.30 p.m.

Changes of Address

Members are asked to note that in order for a change of address to take effect as from the next issue of THE BULLETIN advice must reach Headquarters prior to the 25th of the month preceding publication. Changes of address received after the 25th of the month take effect as from the issue due to appear the following month. For example, if a member notifies a change on May 29, the June BULLETIN will be sent to his old address and the July issue to his new address.

Returned Bulletins

A considerable number of BULLETINS continue to be returned to Headquarters each month due to members failing to advise a change of address. Immediately a copy of THE BULLETIN is returned the appropriate stencil plate is removed and no further issues are sent until the member concerned forwards his new address. Due to paper rationing it is now impossible to maintain

stocks of back issues, therefore, in their own interest members are urged to assist Headquarters by forwarding a change of permanent address promptly.

BULLETINS have been returned from: B. W. Wynn, 67 Old Lodge Lane, Purley, Surrey; E. H. Cooke-Yarborough, Wadsworth Hall, nr. Doncaster; H. Martin, 559 Huddersfield Road, Waterhead, nr. Oldham; J. Collier, 135 Drummond Road, Skegness.

The co-operation of readers in tracing the present whereabouts of those listed will be appreciated.

District 17 Representative

Capt. Arthur Gee, G2UK, has tendered his resignation from the post of District 17 Representative, consequent upon returning to his home in Essex. The Council has recorded its thanks to him for his past services.

Rubber Stamps

Headquarters has been able to obtain a further small supply of rubber stamps of the Society's emblem (including "T. & R." which are available to members, price, 3s. 6d. each, post free.

NEW MEMBERS

Home Corporates

- * R. WALKER (G6QI), 7 Potters Lane, New Barnet, Herts.
- * W. CLEGG (G8RP), 127 Radcliffe New Road, Whitefield, Manchester.
- * L. HARGET (2BBJ), Marlyn, Harlington, nr. Doncaster.
- * J. F. BUSH (2BYT), 139 Rodney St., Birkenhead.
- * F. FIELD (2CFD), 50 Bromley Gdns., Bromley, Kent.
- * D. BARNES (2CNT), 23 Hilbert Rd., N. Cheam, Surrey.
- * H. J. HILLS (2DAC), Shirley, Second Av., Newhaven.
- * W. R. CHAFFE (2DLJ), Moorlands, Wallisdown Rd., Bournemouth.
- * T. WILKINSON (2DSM), 34 Bigsby Road, Retford.
- * V. R. LEDGER (2PKY), Latch Farm House, Fairmile Road, Christchurch.
- * J. A. W. NASH (2FNB), 82 Marlborough Rd., London, N.19.
- * R. N. HIGSON (2HFP), 194 Downham St., Blackburn.
- * R. J. LEWORTHY (2HGJ), 6 Goldwell Rd., Thornton Heath.

Home Corporates (B.R.S.)

- * W. H. STANTON (567), 25 Beckbury Rd., Birmingham, 29.
- * E. HEESOM (6189), 79 Withers Av., Orford, Warrington.
- * A. SMITH (6190), 92 Trinity St., Huddersfield.
- * J. GARDNER (6191), 14 Bell St., Greenock.
- * W. H. FITZSIMONS (6192), c/o 2 Dalton Rd., Morecambe.
- * G. SHIRT (6193), 127 Birkwood Av., Cudworth, nr. Barnsley.
- * P. B. FELDMAN (6194), 34 Rushall Av., London, W.4.
- * L. J. EARLY (6195), 42 Florence Rd., London, S.E.14.
- * R. H. COOK (6196), 77 Whitgreave Avenue, Low Hill, Wolverhampton.
- * G. F. SMITH (6197), 72 Arthur St., Wolverhampton.
- * K. P. SPRAY (6198), 61 Prospect Rd., Carlton, Nottingham.
- * F. W. CALDECOTT (6199), Farndon, Towers Rd., Poynton, Ches.
- * H. P. CALDECOTT (6200), Farndon, Towers Rd., Poynton, Ches.
- * J. SYKES (6201), 32 Castle Av., Brighouse, Yorks.

A CORDIAL WELCOME IS EXTENDED TO THE

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NEW MEMBERS WHOSE NAMES ARE LISTED

- * E. WALMSLEY (6202), 286A Crescent Rd., Great Lever, Bolton.
- * A. W. WHITE (6203), 123 Gordon Road, Fareham, Hants.
- * J. E. FRITH (6204), Upway, Church Path, London, S.W.19.
- * C. N. GRANGE (6205), 26 Pargeter Rd., Smethwick 41.
- * M. J. TOOLE (6206), 78 Queen St., Redcar, Yorks.
- * D. F. KING (6207), 97 Lodge Road, Redditch, Worcs.
- * M. O'CONNOR (6208), 4 Victoria Place, Douglas, I.O.M.
- * B. A. BLACKBEE (6209), 19 The Chase, Featherby Rd., Gillingham.
- * W. E. BAUGH (6210), 49 St. Davids Av., Carmarthen.
- * E. H. HAMMOND (6211), 67 Aston Av., Fallowfield, Manchester 14.
- * F. TURNER (6212), 77 Denby Lane, Codnor, Derbys.
- * D. LAMB-SHINE (6213), 257 Wickham Lane, Abbey Wood, London.
- * S. C. PARKES (6214), 7 Manor Rd., Richmond, Surrey.
- * J. F. GILDER (6215), 6 Kensington Square, London, W.8.
- * G. H. FORD (6216), 62 Prince Edwards Rd., Lewes.
- * P. A. PRACH (6217), Ravensdale, Corpach, Fort William.
- * H. E. FAIRBROTHER (6218), 44 St. Aubins Avenue, Sholing, Southampton.
- * MISS A. H. WILLIAMSON (6219), 202 Malone Rd., Belfast.
- * F. W. MUNDAY (6220), 22 Central Hill, London, S.E.19.
- * A. W. INGLETON (6221), 83 Manor Drive, London, N.20.
- * W. E. TAYLOR (6222), 48A Standon Park, London, S.E.23.
- * B. J. BAKER (6223), Jetza, Rose Av., Clay Mills, Burton-on-Trent.

* Denotes Re-Elected to Membership.

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REQUIRED.—Two 6L6 or two 807 and good crystal mike.—B. K. GEORGE (2BKZ), 52 Delamere Road, Hall Green, Birmingham, 28. Phone: Springfield 3510.

SALE.—Avomitor D.C. in mahogany case, 35s., perfect. Thordarson class AB/PP input transformers, type T7201, 20s. Thordarson class AB/PP output type 6774, suitable two L5's or 2A3's, etc., 25s. Thordarson D.B. Mike Transformer, type 3020 primary 200 ohms, secondary 100,000 ohms, 20s. Mike to suit, 25s. Table stand, 10s. 6d., 2,000 volt moving meter, £2. Moving iron meters, class finish 50 mA., 100 mA., 12s. each. Valves: Four 2A3's; two 53's; two PX4; four PX25; two 59. Offers. Also Eddystone -00017 condensers, TX and RX. Trophy RX 3-valve battery, 6-2-550 metres. Demonstration model, £6 10s. Wanted Garadi's Radio Trouble Shooters handbook. Wired chassis to suit 6ASG, 6K7G, 6Q7G, 25A6G, 25Z6G. Will exchange for other gear.—W. B. STIRLING (GM6RV), Clutha, Yarrowburgh Place, Ardrossan.

SEVENTY-EIGHT different "BULLS." None after September 1939. Some rather battered; most without backs. Offers.—H. GUNDELL, Sawley House, Dewsbury.

TWO Electrolytic 16 mfd. 450v., 3s. 6d. each. Four Dubilier Mansbridge 2mfd. 200v., 1s. each. One ditto, 250v., 1s. 6d. One T.C.C. Mansbridge 4mfd. 400v., 5s. 6d. One Electrolytic 8mfd., 400v., 3s. 6d. One Mansbridge 1,000v., 400v., 5s. 6d. Another 1mfd., 200v., 1s. Phillips Receiver Transformer, tapped primary, H.T. and Fil windings, 5s. 6d. G.E.C. 3-gang, all-brass, screened -0005 variable Condenser with trimmers, 5s. 6d. Ferranti AF3 Transformer, 10s. 6d. G.E.C. 3-1 Transformer, 4s. 6d. B.T.H. 4-1 ditto, 4s. 6d. Die-cast chassis for Eddystone All-World Two, 3s. 6d. Eddystone screened H.F. Choke, 2s. 6d. Raytheon RK 1851, unused, boxed, 12s. 6d. Double spring Gramo Motor, runs, but needs adjustment, 5s. 6d. Ferranti 0-50 Milliampmeter, 21in. projecting type, new in case with leads, £3. T. & R. Bulletins, 1930-1939 inclusive; best offer secures. Wanted: Thordarson modulation transformers 11M77 and 15D79; must be perfect.—G2XV, 89 Perne Road, Cambridge.

VIBROPACK wanted, for working off 6-volt car battery; to give 150-200 mA. at 220-230 volts.—Details and price to Box 96, PARRS, 121 Kingsway, London, W.C.2.

WANTED.—Avometer model, 7 or 40; also Taylor All-wave Signal Generator Model 60, A.C., or similar instrument of well-known make.—Offers to LT. BRYNLDSEN (LA9N), Post Box 86, Paddington, D.O., London, W.2.

WANTED.—Instruction Book, alignment chart and/or circuit diagrams relating to Hallicrafts Ultra Skyriders, 3-7 to 53 metres. Cash or loan.—HINCHLIFE (2AHG) Stoney Bank Road, Thongsbridge, Huddersfield.

WANTED.—Pifco, Avomitor or other small multi-range Test meter.—OWEN, "Fernleigh," Llynchys, Oswestry.

WANTED.—Three LF. Transformers, 1,600 kc/s.; Sky Champion or similar.—BR83779, "Clickemint," Ponteland, Newcastle-on-Tyne.

WANTED.—Two Milnes Units (minors): reasonable. Details, etc., to F. SMITH, c/o Barker, Knightsbridge, N. Cheltenham, Glos.

WANTED.—150 mA. swinging choke 25-5 H.; also 15-watt universal output transformer, Matchmaker or similar; also A.C. or universal auto-changer and pick-up.—Write details and price to BR5027, 6 Beaumont Road, Acton Green, Chiswick, London, W.4.

WANTED.—0-1 milliammeter. For sale: 6F7, 80, 42, all in first-class condition.—2DRT, "Allendene," Spalding Road, Pinchbeck, N. Spalding, Lincs.

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- W. STEPHENSON (6224), 85 Percy St., Blyth.
N. HILL (6225), 89 Banks Rd., Lintwaite, nr. Huddersfield.
F. J. SHIRLEY (6226), 70 Leathwaite Rd., London, S.W.11.
C. C. WHITE (6227), 9 Albert Cres., Penarth, Glam.
R. BROOKER (6228), 11 May Tee, Brompton, Chatham.
W. COULING (6229), 3 Ruthella St., Carlisle, Cumb.
R. J. W. HADLEY (6230), 45 St. James Rd., Dudley, Wores.
L. F. JORDAN (6231), 54 Marne Ave., Welling, Kent.
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A. E. NEWTON (6246), Highways, Sandwich Rd., Deal.
R. L. WATSON (6247), 101 Manor Av., London, S.E.4.
R. SHEPHERD (6248), 8 Duke St., Shaw, nr. Oldham.
T. S. FRASER (6249), 25 Roseburn Tce, Edinburgh, 12.
J. E. ILIFFE (6250), 15 Diseworth St., Leicester.
S. S. WARD (6251), 26 Walkers Heath Rd., Birmingham, 30.
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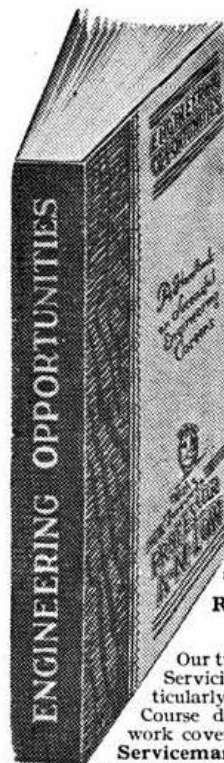
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electronic briefs: television

To produce a moving picture it becomes necessary to break down the action into a series of still pictures. Each still scene is flashed on the screen individually but done so rapidly that the human eye sees a smooth action. If the motion picture projector is slowed down the action becomes jerky. Each still picture is called a frame and the conventional movie projector flashes between 24 and 30 frames per second on the screen. Television is based upon the same principle but the problems involved are much more complex.

Television, using the same basis for creating picture action as the movies, breaks down the picture or scene to be broadcast into a series of still pictures called frames. But each frame must also be broken down into approximately 200,000 tiny segments, each segment being broadcast separately and reassembled at the receiving end so rapidly that 30 frames can be flashed on the screen every second. Thus some 6,000,000 separate signals must be transmitted per second. Furthermore each of these signals starts as light, is converted into an electrical impulse, broadcast and then reconverted to light again. To make television talk, a conventional sound transmitter must be coordinated and synchronized with the picture broadcast.

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