

BULLETIN

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RADIO EXPERIMENTERS

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OF GREAT BRITAIN



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AND ADVANCEMENT
OF AMATEUR RADIO

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PULLING POWER

OBSERVANT readers will have noticed that no less than 12 pages in our last issue were devoted to advertising the products of 17 different companies all of whom appear to have adopted as a motto, "the British radio amateur must continue to be served."

Every member outside the fighting services should regard it as his duty to support those firms who are instilling confidence into the radio trade by continuing a live advertising policy. In the past, as results have shown, BULLETIN advertising has paid; that it will also pay now is certain, providing members will realise that they should give every penny of their radio business to those who have faith in the "pulling power" of this Journal.

The heartening news that three of our four Experimental Groups are to continue as separate entities, speaks highly for the keenness and enthusiasm of those directing the Section. When war came, there were a few pessimists who prophesied the end of all experimental work "for duration," but a perusal of the notes published in this issue will show that the same spirit which pervaded the Section in the past, exists just as strongly to-day.

Each of the sub-groups has to tackle its own particular set of problems, and the members forming the groups, even more than those playing a lone hand, will need modern components, valves and equipment if they are to produce worth-while results.

Already plans are afoot to publish articles dealing with signal generators, frequency meters, monitors, and equipment of a kindred nature. Such a programme will tend to make British amateurs more "receiver conscious," whilst post-war off-frequency operation should be a thing of the past.

It seems desirable to reiterate that one of the chief reasons for carrying on the Society at the present time is to have in being when Peace returns, a strong and active organisation fully representative of the Amateur radio movement in Great Britain. So long as the Society can continue its own "pulling power," members may rest assured that those responsible will spare no effort, when the time comes, to impress upon the authorities the urgent necessity for starting up experimental transmitting work without delay.

We would also do well to remember that every member who is serving with a wireless unit of the Armed Forces is automatically providing clear cut evidence that experimental radio work in the future, even as in the past, must receive official encouragement.

J. C.

A STATIONARY ROTARY BEAM AERIAL

By R. H. HAMMANS (G2IG)

Written before the great "close down" this outstanding contribution should, we feel, be presented if for no other reason that it reflects the greatest credit upon the author, who has himself been faced with the problem of limited space for a normal rotary beam. The application to reception of the principles expounded seems worthy of consideration.

THE now well known desirable features of a rotary beam are unhappily attended by certain drawbacks which must be equally well known by anyone who has seriously considered building one. Not the least of these is the quite reasonable attitude of neighbours, the domestic side of the household, and the Society for the Preservation of Rural England. In addition, the mechanical difficulties due to wind and weather combined with expense have created an urgent need for a purely electrical means of rotating the polar curves of a simple fixed array, while maintaining some appreciable gain and directivity.

Mathematical Considerations

Before considering the design of a practical array, the calculations involved in plotting the polar curves should be outlined.

Two vertical half-wave aeriels A, B, are separated by a distance of N wavelengths ($N\lambda$).—Fig. 1.

At a point x , remote from A and B, signals will arrive from the two radiators which for the moment we will assume are fed "in phase." However, owing to the slight difference in the lengths of the paths to be traversed, signals from A will arrive after those from B and may be said to be out of phase by an amount proportional to the distance AP; BP being a perpendicular from B on AX.

$$\begin{aligned} AP &= AB \sin \theta \\ &= N \lambda \sin \theta \end{aligned}$$

Then the phase difference at x (ϕ)

$$\phi = 360 N \sin \theta \dots \dots (1)$$

since one wavelength is 360° phase change.

Now suppose that instead of A and B being fed in phase, there is a phase difference of ψ degrees between the currents in the two aeriels.

This will be algebraically additive to the existing

phase difference at x so that the phase between the field strengths at x may be written

$$\phi_1 = \psi \pm 360 N \sin \theta \dots (2)$$

The magnitude of the combined field strengths due to A and B at any point such as x is the vector sum of two equal signals out of phase by ϕ_1 degrees, and Fig. 2 shows how the resultant is calculated.

$F = MF = 2 MO$ since MNFL is a parallelogram

$$MO = MN \cos \frac{\phi_1}{2}$$

$$= f \cos \frac{\phi_1}{2}, f_1 \text{ and } f_2 \text{ being equal at } x$$

$$\therefore F = 2 f \cos \frac{\phi_1}{2} \dots \dots \dots (3)$$

f is constant for a given input to the pair of aeriels so that

$$F = K \cos \frac{\phi_1}{2} \dots \dots \dots (4)$$

where K is a constant.

Having evaluated ϕ_1 for various angles of radiation θ in (2) it is possible to evaluate F and draw polar curves for each value of ψ . Table 1 will show the complete calculation for one curve, in this case for two aeriels separated by $\frac{1}{2}$ wavelength and fed with currents 45° out of phase, so that $\psi = 45^\circ$.

All these curves are symmetrical about the x axis which is the line joining the two aeriels, so it is unnecessary to calculate all values, only those from 0 to $\pm 90^\circ$ being essential.

In the Table, ϕ_1 is for angles clockwise from the perpendicular on AB, while ϕ_2 is for anti-clockwise angles. See Fig. 3.

Having plotted the curves on polar graph paper it will be seen that there are *three* points on the curve where field strength rises to a maximum and decreases again. One of these maxima is considerably less

θ	$\sin \theta$	$180 \sin \theta$	$\phi_1 =$ $45 + 180$ $\sin \theta$	$\frac{\phi_1}{2}$	$\phi_2 =$ $45 - 180$ $\sin \theta$	$\frac{\phi_2}{2}$	$\cos \frac{\phi_1}{2}$	$\cos \frac{\phi_2}{2}$
0	0	0	45	22.5	45	22.5	.924	.924
15	.259	46.6	91.6	45.8	-1.6	-0.8	.696	1.0
30	.5	90	135	67.5	-45	-22.5	.383	.924
45	.707	127	172	86.0	-82	-41	.07	.755
60	.866	156	201	100.5	-111	-55.5	.182	.566
75	.966	174	219	109.5	-129	-64.5	.334	.43
90	1.0	180	225	112.5	-135	-67.5	.383	.383

Table 1

Two aeriels half wave apart and fed with currents 45° out of phase.

than the other two which are equal, and achieve full signal strength at two points on the circumference of the circle.

Suppose for example that the two aerials lie on a line running E. and W. and spaced by $\frac{1}{2}$ wavelength.

Signals will be greatest at bearings from true north of $194\frac{1}{2}$ degrees and $345\frac{1}{2}$ degrees showing a $14\frac{1}{2}$ degrees rotation of the beam for a 45° phase

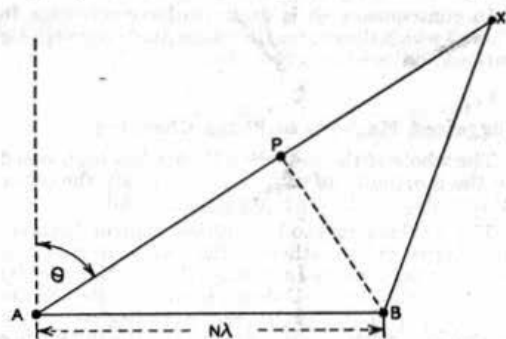


Fig. 1
Plan view of aerials.

change in the aerial currents. Note that the two maxima are not diametrically opposite, so that it would be possible for instance to locate one of the lobes on U.S.A. and one on South America with a minor lobe on India, or conversely one on New Zealand (Z.L.I) and the other on Cape Town with the minor lobe on the West Indies.

It is thus possible by correctly phasing the currents in the two aerials to adjust a major lobe to any desired bearing throughout the 360° without any mechanical motion whatever.

A simple formula may be deduced to give the angle of beam deviation for any phase difference.

From (2) :-

$$\phi_1 = \psi \pm 360 N \sin \theta$$

$$\therefore \frac{\phi_1}{2} = \frac{\psi \pm 360 N \sin \theta}{2}$$

but for max. field strength (i.e. a point on the circle)

$$\cos \frac{\phi_1}{2} = 1$$

$$\therefore \cos \frac{\phi_1}{2} = \left(\frac{\psi \pm 360 N \sin \theta}{2} \right) = 1$$

and since the angle whose cos is 1 is zero;

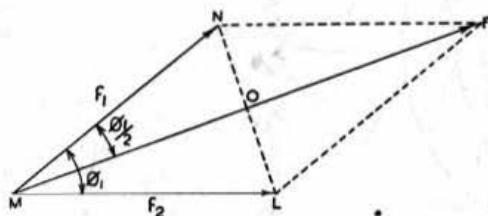


Fig. 2

f_1 = Field strength at x due to A.

f_2 = Field strength at x due to B.

F = Resultant combined field strength.

$$\frac{\psi \pm 360 N \sin \theta}{2} = 0$$

$$\therefore \psi = \pm 360 N \sin \theta, \text{ or where } N = \frac{1}{2};$$

$$\psi = \pm 180 \sin \theta \quad \dots \quad (5)$$

$$\text{and } \theta = \sin^{-1} \pm \frac{\psi}{180} \quad \dots \quad (6)$$

From this formula the useful Table 2 has been calculated.

Phase difference in A & B.	Beam shift from normal.
0°	0°
15°	$4\frac{1}{2}^\circ$
30°	$9\frac{1}{2}^\circ$
45°	$14\frac{1}{2}^\circ$
60°	$19\frac{1}{2}^\circ$
75°	$24\frac{1}{2}^\circ$
90°	30°
105°	36°
120°	42°
135°	49°
150°	$56\frac{1}{2}^\circ$
165°	67°
180°	90°

Table 2

In this table normal is taken as 90° to the line of the aerials and the beam shift is always on the same side of this line for phase changes up to 180° . See Fig. 6.

The minor lobe lies always along the line of the aerials and has a maximum value equal to the "dip" between the two major lobes. As the beam shift approaches 90° the two major lobes approach one another, the dip becoming less pronounced, and at the same time the minor lobe increases in size until

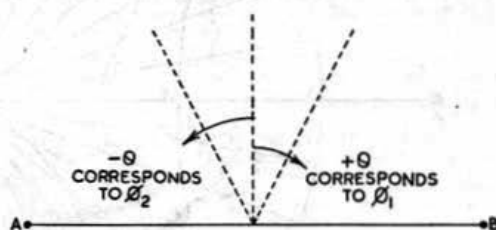


Fig. 3

at 180° phase change or 90° beam shift, the two major lobes coincide, and the minor lobe of the original condition becomes the second major lobe.

The curves shown in Figs. 4 and 5 are drawn from calculated results for phase changes from 0° to 180° and may be rotated so as to give the "mirror" replica by applying the phase changing device discussed later, to the other radiator.

Reference to all the curves will show two well defined minima. The angle at which these occur may be checked roughly by inspection but may be calculated in much the same way as the position of the maxima.

Returning to equation (2) :—

$$\theta_1 = \psi \pm 360 N \sin \theta$$

N is again $\frac{1}{2}$

$$\therefore \theta_1 = \psi \pm 180 \sin \theta$$

At the zero angles, F is nil so combining (4) and (2) we have

$$\cos \frac{\theta_1}{2} = \cos \left(\frac{\psi \pm 180 \sin \theta}{2} \right) = 0$$

But the angle whose cos is 0 is 90°

$$\therefore \frac{\psi \pm 180 \sin \theta}{2} = 90$$

$$\therefore \psi \pm 180 \sin \theta = 180$$

The latter equation may be written as

$$\psi = 180 (1 \pm \sin \theta) \quad \dots \quad (7)$$

$$\text{or } \theta = \sin^{-1} \pm 1 - \frac{\psi}{180} \quad \dots \quad (8)$$

e.g. at what angle does minimum occur for phase change of 90° ?

From (8)

$$\sin \theta = \pm 1 - \frac{90}{180} = \pm .5$$

$\therefore \theta = \pm 30^\circ$ and $\pm 120^\circ$ (Datum angle for these curves taken as 90° to line of aeri-als.)

For receiving purposes it may often be more advantageous to adjust the zero response angle to the bearing of an interfering signal than to secure maximum response to the desired signal.

In consequence, it is useful to have reference to Table 3 which illustrates the phase angle required for various angles of zero response.

Suggested Methods of Phase Changing

The whole of the preceding theory has been based on the possibility of adjusting accurately the phase relationship of the currents in two aeri-als.

The obvious method of phase control involves time lag to one or other of the two radiators, and this may be done by increasing the length of feeder to that radiator. Unless, however, the feeder employed is "flat," i.e. has no "standing wave" on it, changes in length will also change the impedance at the aerial end and mismatch will occur. Fortunately "flat" lines of the 70-80 ohm type are

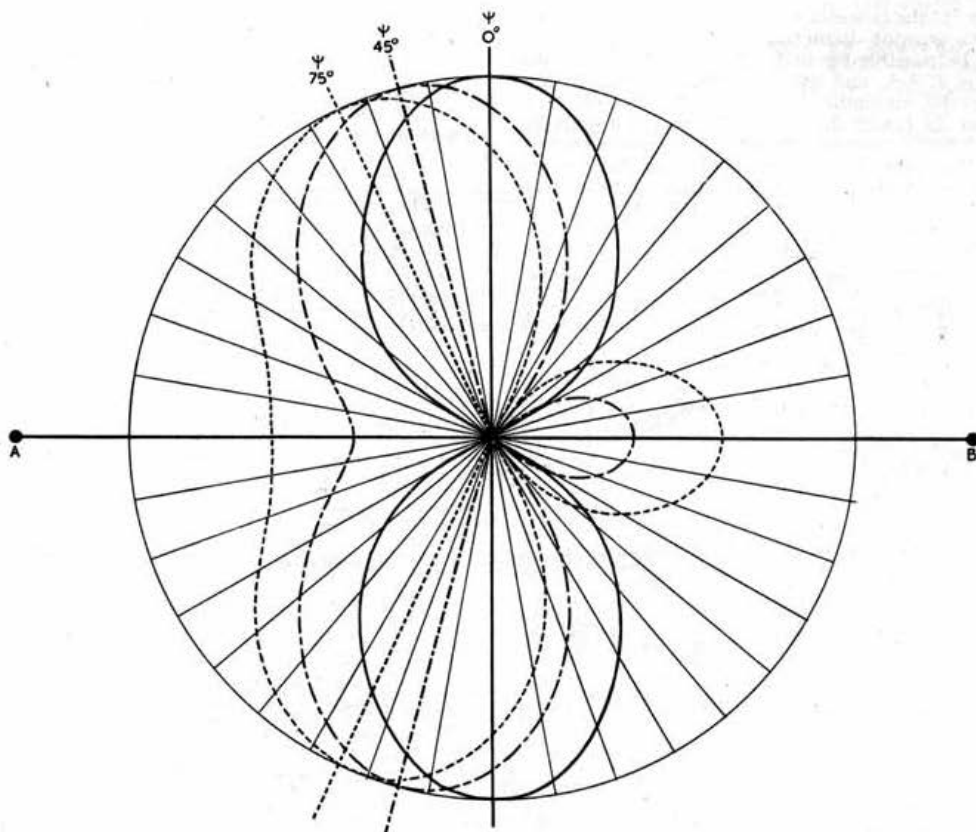


Fig. 4

Polar curves for phase changes of 0° , 45° and 75° .

very conveniently installed, and are desirable from many points of view. It seems, therefore, that the best way of phase adjustment is to arrange a series of extensions of appropriate lengths so as to be switched in series with either of the two feeders to the two radiators.

It will be seen that it is important that these two feeders must normally be exactly the same length so that it is possible to excite the two radiators in phase for broadside working.

Now for practical purposes, it may be assumed that the velocity of radio waves in copper wire is the same as that in space, so that $\frac{1}{2}$ wave of wire will represent 180° of phase change. Twin low-impedance line, of course, has $\frac{1}{2}$ wavelength of wire in $\frac{1}{4}$ wavelength of line, so that for 14 Mc., 180° phase change would result by adding approximately 16 ft. of twin feeder to one aerial.

Since 180° phase change is far more easily secured by reversing the connections of one line, it is obvious that only 90° of phase change by feeder length will be necessary, provided that it is arranged conveniently to lengthen either line at will. Thus, again for 14 Mc., a maximum of 8 ft. of line will suffice for complete 360° coverage. This may be tapped at every sixth part of its length so as to change the phase in steps of 15° or at every third part of its length if 30° steps are considered small enough.

Phase ψ change.	Angle of zero response.
0°	90°
15°	66.5°
30°	56.5°
45°	48.5°
60°	42°
75°	36°
90°	30°
105°	25°
120°	$19\frac{1}{2}^\circ$
135°	$14\frac{1}{2}^\circ$
150°	10°
165°	$4\frac{1}{2}^\circ$
180°	0°

Table 3

The angles shown will be reproduced symmetrically about x axis and rotation to the opposite side of the y axis involves only the application of the phase change to the other radiator.

Beam deflection is in the direction of the aerial to which the phase delay is applied. Fig. 1 shows the

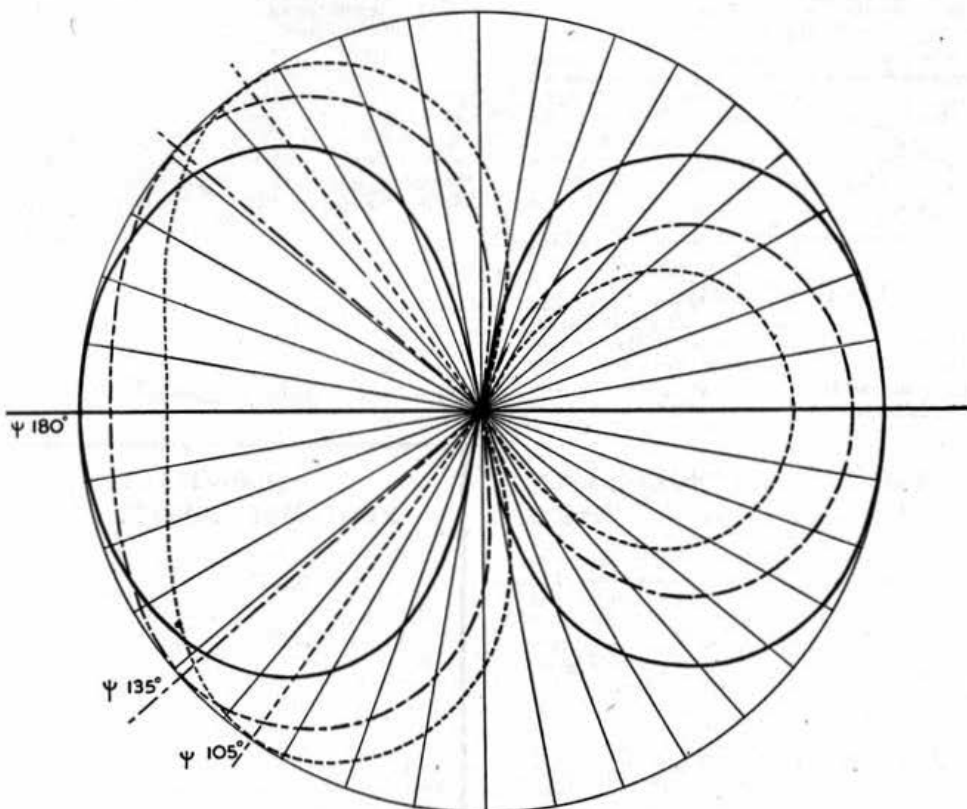


Fig. 5

Polar curves for phase changes of 105° , 135° and 180° .

two radiators in plan; delay to B results in the beam being swung round towards x and vice versa.

It is interesting to note that for small beam deflections, the beam is shifted almost exactly $\frac{1}{2}$ of the phase change in degrees; or at 14 Mc. one feeder must be increased by approximately $3\frac{1}{2}$ inches per

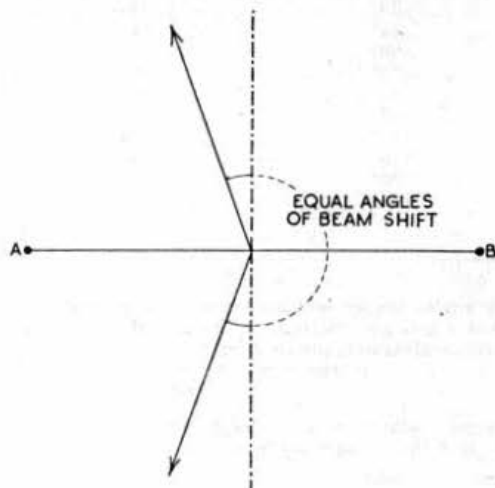


Fig. 6.

degree shift of beam required. This rule of thumb holds good for deflections clockwise and anti-clockwise from the broadside condition but not in the case of the end-fire or 180° out of phase condition.

It is sufficiently close in practice to follow the above rule up to 90° phase change on either aerial (i.e. for clockwise or anti-clockwise rotation of the

beam) or in other words up to 30° of beam shift. Beyond these limits the same steps in phase change produce an increasingly rapid change of beam angle, but on the other hand both maximum and minimum response are less sharp so that no great error would be introduced by substituting a rough factor of $\frac{1}{2}$ in the rule for phase changes between 90° and 180° .

Inspection of the polar diagrams will reveal this widening of the beam in the "end fire" condition for phase changes round about 180° . Consequently, if any choice of site is possible for the initial installation of the system, it should be borne in mind so that the full directivity of the broadside, or in-phase, connection may be concentrated on areas having only isolated stations. In this way the added "selectivity" is useful for reception, and on transmitted test or CQ calls the more populous areas will be covered as a whole instead of in small sections.

The difference in directivity is not large, and gain is maintained at the same value throughout the whole 360° sweep of beam rotation. Gain is derived from the volume of the solid polar curves, so that where the horizontal beam widens the angle of vertical radiation is reduced into a narrower beam. All the polar curves will be seen to have equal radii at the two points where the circle is touched. Field strength at the circumference of this circle is proportional to the length of the radius towards the point on the circumference, so that neglecting any critical vertical angle, the field strength must always reach the full value permitted by a two element remote spaced array.

Considerable work will be necessary to confirm the polar diagrams in practice, because local surroundings may already have provided a "bias" in some direction. Results of such experiments should be of considerable value, and it is to be hoped that results may be communicated to this Journal for correlation and exchange of problems.

Jamaica Society

The Council has been pleased to grant affiliation to the recently formed Jamaica Amateur Radio Club. Mr. T. Myers (Secretary) has been appointed by his colleagues to act as R.S.G.B. representative in the Island. It is hoped to publish reports from time to time.

Surrey Radio Contact Club, Croydon

The above club are holding monthly meetings at the Café Royal, North End, Croydon, on the first Sunday in the month at 3.30 p.m. It is proposed to publish a monthly magazine under the title *The Surrey Radio Contact Club Bulletin*, which will deal with items of general radio interest. Members and non-members of the club will be able to obtain copies (price 3d. each) on application to the Hon. Sec., Mr. S. A. Morley, BRS2780, 22 Old Farleigh Road, Selsdon, Surrey.

Medway Society Carrying On

Mr. G. A. Jessup, G4HG, President of the very progressive Medway Amateur Transmitters Society, informs us that his Society is carrying on. Meetings are held every alternate Sunday afternoon in the house of Mr. W. E. Nutton, G6NU, 42 Richmond

Road, Gillingham. Morse practice and receiver construction are continuing.

Members temporarily located in the Medway towns are urged to get in touch with Mr. Jessup at The Brewing Room, Medway Brewery, Maidstone. [That address should fetch them!—Ed.]

SILENT KEY

KENNETH ABBOTT (G3JY)

It is with deep regret that we have to record the death of Mr. Kenneth Abbott, of Blackpool, who lost his life when H.M.S. *Courageous* was torpedoed.

Mr. Abbott held the call G3JY, and had operated chiefly on 7 Mc. since May, 1938. He had been a member of the R.N.(V)W.R. for some considerable time, and upon the outbreak of war was drafted to H.M.S. *Courageous*, where he served as a telegraphist.

His cheery manner and readiness to assist will be greatly missed by all his friends, and we extend our deepest sympathy to his relatives.

T.E.W.

Crystal Band Pass Filters

By E. L. GARDINER, B.Sc. (G6GR).

PART IV.

Now that amateur transmission is unfortunately suspended for the duration of the War, an excellent opportunity exists for those in a position to do so to modernise their receivers, or to keep active by constructing new ones. The article which follows provides information designed to encourage receiver development along modern lines.

Practical Considerations

THE writer hopes that in the three previous articles the behaviour and advantages of crystal band-pass filters have been sufficiently explained to show that their inclusion is very well worth while. What are the types of receiver best suited to this alteration, and what practical steps are necessary?

Perhaps the simplest case is that of a commercially built receiver which already includes a crystal filter of the ordinary type. If the receiver belongs to the better class of American product, the filter will have been carefully designed and due attention paid to matching the impedance of the crystal used, whilst its efficiency will also be high. Since the whole receiver will have been designed to fit in with a crystal filter, and the necessary reserve of amplification and stability provided, a very successful conversion would be expected. However, it is easy to destroy the balanced performance of advanced modern circuits, and the incorporation of a wide band-pass filter for telephony should not be lightly undertaken except by an amateur amply experienced in receiver construction. If this is decided upon, then probably the safest course will be to reconstruct the filter entirely, using a pair of suitable crystals, in the manner described presently for newly built receivers.

In order to reap the benefits previously described in C.W. reception the alteration of an ordinary filter to a band-pass of some 300 cycles should be an easy matter. Here there will be no necessity to depart from the impedance matching arrangements already provided by the makers.

The Second Crystal

A second crystal of identical type to that in the receiver must be obtained, and differing in frequency by not less than 200 or more than 500 cycles. Very probably the crystal will be found to be a Y or oblique cut plate, and not a bar as has been recommended in these articles, but this may not be important when C.W. only is considered. The type of crystal used is suited to the circuits provided, and it will be better to obtain one similar to it either from the original makers or from a reputable manufacturer, than to risk the insertion of a pair of new crystals to which the transformers, etc., are not suited. If possible, the original crystal should be sent as a sample, so that a second one may be obtained at the correct frequency difference. Very few amateurs will have equipment of sufficient accuracy to measure the small difference of a few hundred cycles, and this will best be done by the manufacturer. The writer has such equipment, and would be prepared to check crystals for members of

the Society if sent to him by post, with return postage prepaid.

Should the pair of crystals be nearly correct, it is a very simple matter for any amateur experienced in crystal grinding to "touch up" one or the other until the desired spacing is reached. If the receiver calibration is sufficiently accurate, or a good signal generator is available, it may be possible to estimate the difference by inserting each crystal in turn into the filter.

Having obtained the second crystal (which it should be emphasised *must* be very similar both in performance and holder to the original) it should be connected in parallel with the existing balancing or phasing condenser. Any one of the circuit diagrams previously published will make this clear. When this has been done, however, it will probably be found that the filter will no longer "balance," that is to say there will be no point on the scale of the phasing condenser at which selectivity becomes high and background noise diminishes. To restore balance, it will be necessary to add capacity across the original crystal to compensate for that of the new crystal and its holder. A 5 or 10 μF cup-type ceramic condenser soldered between the terminals of the original crystal holder will generally be of the right order to correct matters; whilst in a few cases of course the range of adjustment of the phasing condenser may be so large that an additional condenser is unnecessary, the "balance point" merely changing to a lower point on its scale.

Having restored balance, the filter will be ready for use and on tuning through a C.W. signal, the band-pass effect should be easily discernible. There will now be two settings of the tuning dial at which the beat note sharply rises in strength, instead of a single point, as in the original filter. These will be separated by a few hundred cycles, and between them the beat will fall a little in strength. Should it seem to fall excessively, a slightly different adjustment of the phasing condenser is called for. Outside the region bounded by these two peaks, the beat should vanish rapidly. Tuning to say 1 kilocycle outside either peak, it should be possible to reduce signal strength practically to zero. The two extinction points should be symmetrical, and occur substantially at the same setting of the phasing condenser. If they occur at different settings, it means that the two crystals differ excessively in performance, one being perhaps rather a poor specimen in comparison to the other. Should the extinction not be reasonably complete, it means that either the screening of the filter is insufficient, or there is a source of electrical loss present, such as might be caused by poor insulation of wiring, crystal holder or condenser. There should be very little risk of such difficulties, however, in a

commercial receiver, in which the filter was originally effective, and the only point demanding special attention is that the matching of the crystals shall be reasonably close.

Choice of Receiver

In the alteration of a commercial receiver we are very much in the hands of the manufacturer and unless drastic reconstruction of the filter portion be undertaken, there is very little choice of method. A freer hand may exist in the design of a new receiver, or the alteration of an existing receiver either home built or commercial, in which no filter already exists. In the latter case the chief points to be decided are whether the receiver is sufficiently sensitive and stable to merit a crystal filter, and whether space can be found in which to insert it. The latter point is seldom difficult when the filter is for C.W. only, as there are but few extra components to fit in, but it may be less easy if a telephony filter is desired, since this demands an additional screened I.F. circuit.

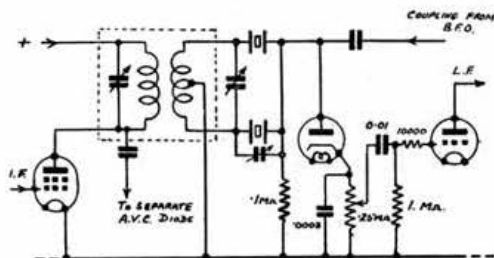


Fig. 15.
Crystal Band-pass Filter preceding diode detector for C.W. operation.

Firstly consider the question of sensitivity. It must be realised that any selective filter whatever will invariably reduce the amplification of the stage to which it is added, if only by a few decibels. The crystal band-pass when properly designed reduces stage gain by about 50 per cent. for the C.W. type, and up to 60 per cent. or 70 per cent. for a wider telephony type. There must therefore be a reserve of amplification available to offset this loss.

Certain receivers in common use employ very few stages, either for reasons of economy or simplicity. A superheterodyne consisting of a frequency changer with no R.F. stage, and employing only one I.F. stage, will not be satisfactory when the band-pass has been added, since only strong signals will remain audible. Such a combination will prove very poor under DX conditions, and is not recommended.

Should the receiver contain an effective R.F. stage, then it may just qualify for conversion. As an example, one widely used commercial set of this description provided ample gain for crystal filter working on frequencies lower than about 7 Mc. At 14 and 28 Mc. however, where the R.F. gain begins to fall off and signals are generally somewhat weaker, there may not be sufficient in hand to provide full benefit from the filter. Of course this defect can be overcome by the addition of a pre-selector, whilst the use of any such expedient as R.F. or I.F. regeneration in the design of a receiver is likely to assist materially.

Summing up, it may be said that a receiver of the

one R.F. and one I.F. type should be "hot" originally if the addition of a crystal band-pass filter is to be recommended. The ideal receiver is undoubtedly one having two I.F. stages, and this arrangement is to be strongly recommended when any new instrument is designed. The filter will now merely lower the gain of one of these stages, whilst leaving the total gain materially better than is obtained from a single I.F. stage. Since it is seldom possible to utilise the full gain of such a combination, the filter loss can be fully made up.

Inserting the Filter

The next decision to be made is the point in the I.F. system where the filter can be most effectively inserted. In the case of existing receivers this may be settled by the space factor, the filter being added to the I.F. coupling close to which a place for the extra components can best be found. Where a choice exists, as in a new receiver, the filter should not, in the writer's opinion, be placed immediately after the frequency changer.

Maximum response from most crystals is obtained when the signals applied to them are not too weak, since signal energy is required to overcome any slight friction of the crystal in its holder. Even in single crystal filters a loss of sensitivity can occur from this cause, although since the signal is in exact resonance with the crystal, conditions are most favourable to its excitation. In the band-pass case this precaution is perhaps rather more important, for signals will not necessarily be in resonance with either crystal.

Secondly, it is always advisable to maintain the maximum gain from the frequency changer, and to follow it by a coupling which transfers as much voltage as possible to the grid of the first I.F. stage, in order to maintain the best possible signal-to-noise ratio when receiving very weak signals. A somewhat different condition exists in broadcast reception, where signals are in most cases quite strong. Here the danger of cross-modulation within the earlier valves of a receiver is very real, and selectivity should be introduced at as early a point in the circuit as possible. The crystal filter may then well follow the frequency changer. A communication receiver however is designed primarily to deal with weak signals. Cross-modulation is not often a major problem, and whilst the crystal filter may work well in an early position, it would seem somewhat wiser to place it at a later stage. It is also believed by some that considerable amplification after a filter tends to accentuate any ringing or other microphonic noises which may originate from the crystals, and whilst these effects are normally absent from the band-pass arrangement, it is as well to take all simple precautions against them.

Between the two remaining positions there is little to choose. The filter will perform admirably as a coupling between two I.F. stages. It also fits particularly well into the conditions of coupling between the second I.F. and diode detector stages, whilst if only one I.F. is used, this position is the only one possible. The resistance of some 50,000 or 100,000 ohms, needed to terminate a C.W. filter is of suitable value to match a diode detector.

In the normal receiver, the I.F. transformer which feeds the diodes is considerably damped by the load which these represent, and as is well known, stage-gain suffers accordingly. There is thus less change

when a crystal filter is inserted at this point, for in any case coupling efficiency is not as high as it may be between other stages. A sketch of this part of a receiver is shown in Fig. 15, and is seen to be delightfully simple. Screening of the filter seems particularly easy when it precedes the detector, doubtless because there is no I.F. amplification to follow, which might bring up slight traces of stray signal until they become noticeable. A word of warning is necessary concerning A.V.C. however. If a double diode be used, the second diode must not be connected to a point in the I.F. system *before* the filter, as is often done to derive A.V.C. from a point at which selectivity is not too great. By so doing the stray capacity (or other coupling) between the two diodes forms a by-pass across the filter, slightly impairing its performance. An entirely separate A.V.C. diode would have to be used in such a case, which however occurs most often in telephony reception, since for C.W. it is not usual to retain the A.V.C. in operation.

Recent tests have shown that the filter will perform particularly well when followed by a detector of the "infinite impedance" type, in which the load resistor is placed in the cathode lead of a triode valve. In this circuit regeneration can be applied by adjustment of the cathode by-pass condenser. Similarly, the well-known leaky-grid detector with reaction is suitable when A.V.C. can be dispensed with. These detector circuits will very well repay investigation, since they enable regeneration to be applied to the filter output coil, thereby reducing its damping, and making a tapped coil unnecessary. The amplification lost in the filter can be overcome, and a telephony filter easily levelled. A reacting detector probably offers the best solution when only one I.F. stage is in use.

It has now been decided therefore for our present discussion to insert the filter either between two I.F. stages, or between I.F. and detector stages, according to structural convenience, and to employ two I.F. stages if at all possible. The actual construction of the filter remains to be discussed.

Filter Construction

In the C.W. case (the circuit of which is shown in Fig. 10) this is very simple. A centre tapped I.F. transformer is needed to feed the two crystals. This may exist in a receiver already provided with a single crystal filter or it can be purchased as a standard component from several manufacturers. In this case, however, the inductance of the secondary will probably lie between 600 and 900 microhenries only,

whilst it has been stated that higher values are preferable. The effect of using a lower inductance will not impair the selectivity of a C.W. filter, but will only reduce the stage gain below the best values obtainable. Thus the use of a commercial transformer may lead to the impression that the filter is giving rather weak signals. If possible, a special transformer should be ordered, having a primary and secondary inductance of 2,000 microhenries, with rather tighter than optimum coupling between them.

A suitable I.F. transformer can, however, easily be adapted by the ingenious amateur. Firstly, one secondary coil should be removed from a spare transformer and this extra secondary slid on to the dowel which usually supports primary and secondary. If possible the primary winding should be placed centrally on the dowel, and one secondary coil arranged on each side of this, connecting the two in series. The combined inductance of the two secondaries, each of about 600 microhenries, will give a winding of the desired higher inductance, whilst the junction between them provides the necessary centre tapping, which is taken to the earth-line in the diagrams. Fig. 16 shows a sketch of the rebuilt transformer.

It is quite possible to arrange all the components needed for a filter within a single large transformer can, bearing in mind that the balancing condenser must be well insulated from earth on both sides. A Polysatrine bracket or bush forms an excellent mounting. Alternatively, perfectly satisfactory filters have been constructed by merely grouping the necessary components closely beneath the holder of the valve which follows the filter, and supporting them on short leads within the under-chassis wiring. Remember that there must be no stray coupling which might by-pass the filter, destroying much of its performance, whilst the well-known laws of clean and logical layout must be observed.

If the usual I.F. transformer be replaced by the centre-tapped one, the secondary (outer) leads may be taken to the crystals situated immediately beneath the transformer. The balancing condenser should be placed very close to this point, and fitted with an insulated extension spindle to the front panel if convenient. The only remaining component, the terminating resistance, may form a grid leak for the following valve, and may be mounted directly upon its holder. The grid lead should be very short, or if slightly longer, should be screened. It is an attractive refinement to enclose the filter in a metal box or compartment, which may then be placed above the chassis, although this is seldom essential.

To permit of the filter being cut out for telephony or less selective reception, the vanes of the balancing condenser should be bent over at the tips, so that in the "all-out" position they short-circuit. This procedure effectively removes the filter, restoring the receiver very closely to its normal condition.

Adjusting the Filter

Adjustment of the filter has already been mentioned. Firstly, the balancing condenser should be shorted, and the receiver put into normal operation. The new I.F. transformer may be trimmed to resonance, whilst the receiver is tuned to a strong and reliable transmission, such as one of the commercial high-speed telegraph stations. On rotating the balancing condenser, a point should be found at which the signals become weak, or vanish entirely. On rocking the main tuning control, two sharp peaks,

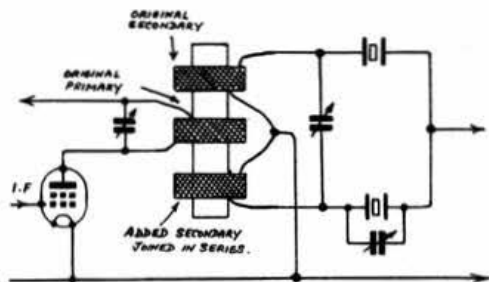


Fig. 16.

Adapting an I.F. transformer to filter use by adding a secondary winding from a spare transformer.

corresponding to the two crystal frequencies, should be distinguished. Remember that these are fixed I.F. frequencies, which cannot be altered, and so the I.F. stages must be lined up to them. Set the tuning to a point between the two peaks, and reline all trimmers to that frequency. For the filter to be correctly adjusted it should then only be necessary to de-tune by a kilocycle or so, and finally set the balancing condenser to give minimum noise either from the signal in use or from general atmospherics. It will be found to handle very much like a normal crystal gate, except for considerably less hair-breadth tuning adjustments, and better signal-to-noise ratio, particularly in the case of slightly unstable transmissions.

Crystal Suppliers

In the foregoing paragraphs it has been assumed that a pair of high impedance bar-type crystals have been purchased from one of the several firms which can supply them. These may be obtained in matched

pairs, mounted in a double holder, for prices in the region of 37s. 6d., and should be practically everlasting. Suppliers include the *Piezo Crystal Co., Ltd.*, *The Quartz Crystal Co.*, and *Simmonds Aerocessories, Ltd.* From the latter firm it is possible to obtain a crystal mounting which includes a suitable balancing condenser, or alternatively, complete filters constructed entirely in screening cans. In other cases it will be necessary to construct a balancing condenser, by removing all except one rotor and one or two stator plates from a good make of small variable condenser, since the usual maximum of 15 μ F is still too large. Provided that the crystals and holders specified are used, the balancing capacity need not exceed 5 or 6 μ F. Condensers of this size are not often listed, although certain types of neutralising condenser could be pressed into service. Modern types are usually of the sliding tubular variety, which although electrically satisfactory, are not convenient as front panel controls.

(To be continued.)

A Simple Card Index System for the Amateur

By A. O. MILNE (G2MI)

HERE is a suggestion for the member without a stand-by hobby whose leisure hours tend to drag for want of something to do. Why not make up a card index system of all your radio contacts? It is a job which, maybe, has seemed rather formidable in the matter of time which might be spent more profitably on the air, but now that our transmitters are temporarily out of action, the obvious advantage of a quick reference system may commend itself to some readers.

It is not such a difficult task as one might suppose, nor is it lacking in interest. The work can be spread out over several weeks if need be, and, like knitting can be picked up or dropped at any time. The writer managed to do it in five evenings, a total of 15 hours work. Each individual will, no doubt have his own ideas on the subject but perhaps a few suggestions and a description of the writer's own system may be helpful.

The "cards" themselves are cut from stout drawing paper, rather thinner than a cigarette card and measure 2 in. by 3 in. The use of this material makes it possible to mark out a large number of cards on one sheet with a ruler and then to use this sheet as a template to cut several sheets together.

The index is housed in a drawer in the receiver bench, which has been divided into sections 12 in. by 2½ in. and each prefix division is indicated by a piece of stiff cardboard 2 in. by 3½ in. with the prefix clearly marked at the top.

The information contained on the cards is a matter for individual choice, but it is suggested that the maximum necessary is call, location, date of contact and whether C.W. or 'phone, together with an indication that a QSL has been received.

A typical card is illustrated which shows the idea more clearly than a description. The cut on the corner indicates that a QSL has been received, an uncut card is therefore proof that a QSL is outstanding.

The compilation of the index necessitates a systematic and chronological search through the station log books, say a couple of prefixes at a time,

making out the index cards as one goes along. It is always rather exciting to pore over the back numbers of the log and this work will prove much more interesting than might at first be expected. Once the index is complete, it is quite easy to keep it up-to-date by adopting the following routine, after a session on the air. First enter up the log and then make out QSL's for new stations worked, these can be identified quickly by reference to the card index. This done, make out new cards where necessary and

(Continued on p. 238)

W2DH.	
TUCKERTON, N. J.	
7.6.37 (14)	
9.7.38 (14 'phone)	
5.3.39 (28 'phone)	
7.7.39 (28)	

The index card which forms the basis of the reference system described in this article.

POWER SUPPLIES

By J. N. WALKER (G5JU)

Part III.—VIBRATORS AND ACCUMULATORS

A Practical Vibrator Unit

It is generally desirable to have available as high a voltage as possible, consistent with a fair amount of current, and the pack has therefore been designed to give the maximum obtainable—250 volts—when using a self-rectifying unit. The components specified are for use with a six-volt accumulator, this being generally available, but the design can easily be modified for use with, say, a 12-volt battery, as will be desirable when a 12-volt car battery is available as a source of primary energy.

The components necessary to prevent damage to the vibrator contacts have been included, whilst the smoothing incorporated will be found sufficient in most cases.

It is realised that a power supply of the type described will often be required for use on the ultra-high frequencies and this factor has been borne in mind in the design, which includes a number of components to prevent interference being radiated.

Construction

The circuit diagram, (Fig. 1), the list of components and the photographs give a good deal of information concerning the construction, therefore brief details of the latter will suffice.

The chassis measures 8 in. \times 4 in. \times 2 in. and is finished grey to match the components. Steel is used but there is no reason why aluminium or any other metal should not be employed. The hole for the transformer, which is of the deck-mounting type, measures 2 in. \times 2½ in., that for the five-pin valve holder, into which the vibrator plugs, is 1 in. diameter, whilst the condenser hole is ½ in. Four holes in the side of the chassis take Belling Lee insulated type "B" terminals and a ½ in. hole on the other side takes the switch. The only leads taken above the chassis are the two to the smoothing choke, for which one small hole suffices.

The small components are all mounted in the wiring, a midget stand-off insulator being used to give support to the R.F. choke and condenser C3. It will be seen that the screening is very complete.

Performance

The first test carried out was with regard to the regulation. This would be expected to be good in view of the fact that the contacts themselves and the primary winding would all be of low resistance, thus reducing power losses to a minimum even with a fairly heavy current flowing. On open circuit the voltage was 280 gradually decreasing to 240 volts as the load was raised to 50 mA. It will be observed that the difference in voltage is due almost entirely to the drop which is bound to occur across the resistance of the transformer secondary and choke windings, and the regulation therefore is excellent. A slight improvement could be effected by substituting a smoothing choke of lower resistance, but the change would be hardly worth while.

Next, the unit was employed to provide H.T. for a well screened T.R.F. receiver, covering the normal amateur bands. The noise level was low when listening on a loudspeaker with the unit placed some 6 ft. away from the set and well earthed. When listening on telephones, a certain amount of buzz was audible which is not surprising when one considers that a smoothing choke of only 10 henries is employed. A further filter section, consisting of a 20 henry choke and an 8 μ F condenser, removed all but a mere trace of the buzz. If the equipment is to be used for reception only, a higher inductance choke should be substituted—the *Bulgin* type L.F. 14S is suitable. The one actually fitted was chosen because of its low resistance, a necessary feature when transmitting work is contemplated.

On a 56 Mc. receiver the noise level was greater but was much reduced on moving the unit a further distance away, when satisfactory reception was possible.

The unit was found to be very effective when used for transmitting work. It was tested on low power 7 Mc. and 56 Mc. transmitters and the note in both cases was just as good as when run off a normal

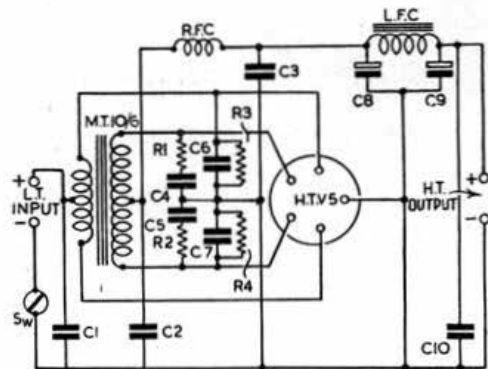


Fig. 1

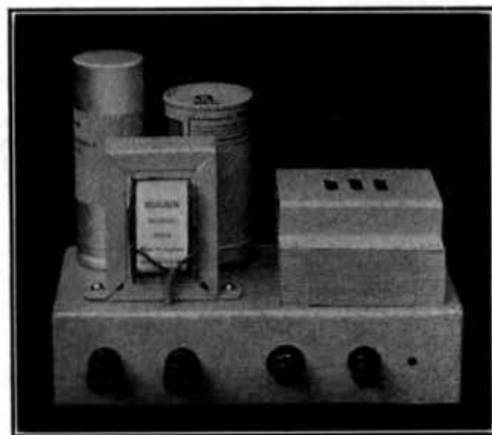
The circuit diagram of the Vibratory Unit.

- | | |
|-----------------------------|-----------------------------------------------|
| C1. | ·001 μ F, Mica, M, T.C.C. |
| C2, C3, C10. | ·001 μ F, Mica, CM8, Bulgin. |
| C4, C5. | ·01 μ F, Paper, PC.101, Bulgin. |
| C6, C7. | ·1 μ F, Paper, PC.PI, Bulgin. |
| C8, C9. | 8–8 μ F, Electrolytic, 500 volts, Bulgin. |
| R1, R2. | 100 ohms ½ watt, H.W.37, Bulgin. |
| R3, R4. | 500 ohms ½ watt, H.W.2, Bulgin. |
| L.F.C. | 10 Henry Low Frequency Choke, LF18S, Bulgin. |
| R.F.C. | Radio Frequency Choke, SW68, Bulgin. |
| Transformer. | MT.10/6, Bulgin. |
| Vibrator. | H.T.V.5, Bulgin. |
| Switch. | Heavy Duty Switch, S.180, Bulgin. |
| Terminals. | Belling Lee, "B." |
| Midget Stand-off Insulator. | Eddystone. |

mains pack. Both transmitters were of the crystal-controlled type and it is probable that the quality of the note would suffer with self-excited equipment, although in view of the decadence of the latter, the point is hardly worth mentioning.

A special test proved that it was perfectly feasible to employ break-in operation, i.e. the vibrator feeding the transmitter, was left running and the first valve—the oscillator—keyed. A slight background noise was introduced into the receiver but it was not sufficient to affect the intelligibility of any but the weakest signals. When used in this way the unit should be placed as far as possible from the receiver, when it is unlikely that any trouble from interference will be experienced.

The unit also proved quite satisfactory when used to provide H.T. to audio frequency equipment but it was found necessary to insert an extra smoothing choke and condenser in the feed to the earlier stages. Under these conditions no untoward noise could be detected in the audio output.



Top view of the Vibrator Unit showing its compactness and clean lines.

Suggested Modifications

As already stated the model described will probably meet the requirements of the majority of interested readers. Some modifications have already been suggested—the fitting of a higher inductance choke for reception purposes and of a lower resistance one where the utmost output and efficiency are wanted.

The vibrator units are all interchangeable and as types are available for running off from 4 to 32 volts, no difficulty will be experienced in adjusting for inputs other than six volts.

When a different input voltage is used it will be necessary to change the transformer. For universal use under varying conditions, the MT/10 transformer is strongly recommended since in addition to the fact that tapings are provided on the primary for 4, 6 and 12 volts, various outputs may be obtained by the simple expedient of varying the tapings. For instance the 12-volt winding may be employed with a 6-volt battery, giving an output of 125 volts at increased current—say, up to 80 mA.

Other Models

Attention has been drawn to *Bulgin* vibrators because they are British-made and of great reliability. There are, however, other makes available, one of the best known being the *Mallory*. Normally this make is sold as part of the *Mallory Vibrapack*, which includes the vibrator itself, the transformer and the noise suppression filters, but not the smoothing equipment. Vibrapacks are available giving outputs up to 300 volts at 100 mA., rectification being effected by means of the *Raytheon* cold cathode valve OZ4.

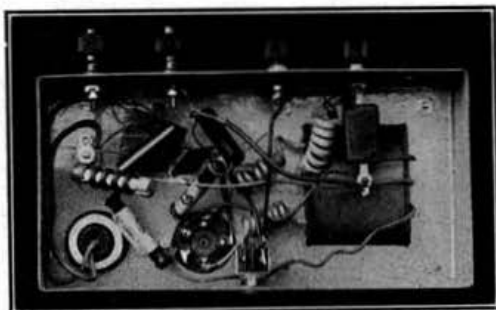
It is understood that *Philips* produce vibratory power packs, for energising car radio receivers but it is not known whether they are obtainable separately.

Choice of Accumulators

Little has been said so far about the choice of accumulators to be used with equipment of the nature discussed, but in actual fact they represent a very important item. It is most essential that the battery delivers the full specified voltage and disappointing results are likely if a miscellaneous collection of cells of different sizes and ages are used. The cells must be of ample size to enable them to deliver the current required, must be in good condition and of low internal resistance. Should one cell in a bank of six (delivering 12 volts) be in poor condition and possess a high internal resistance, the actual voltage on load will be well below 12 volts and the performance of either a rotary converter or a vibratory converter will be below expectations. A 90-watt rotary converter, running at full load, will require about 12 amperes at 12 volts, or 6 amperes at 24 volts, and batteries capable of discharging at these rates over a period of at least 12 hours are desirable. In general car batteries will be necessary of a capacity (actual) of 120 ampere-hours or more.

The *Bulgin* vibrator units consume at full load approximately 4.5 amperes at 4 volts, 3.2 amperes at 6 volts and 1.5 amperes at 12 volts. Smaller batteries may therefore be employed and a perusal of the *Exide* catalogue will enable a suitable choice to be made. The type CZG6 will be appropriate for driving practically all types of vibratory equipment. A battery of three such cells, used in conjunction with a 6-volt vibrator, should last for at least 20 hours at one charge.

(The next article in this series will deal with methods of charging accumulators, when no mains are available.)



Underneath view of the Vibrator Unit. Condensers C6, C7 and Resistances R4, R5 were added after the taking of the photograph.

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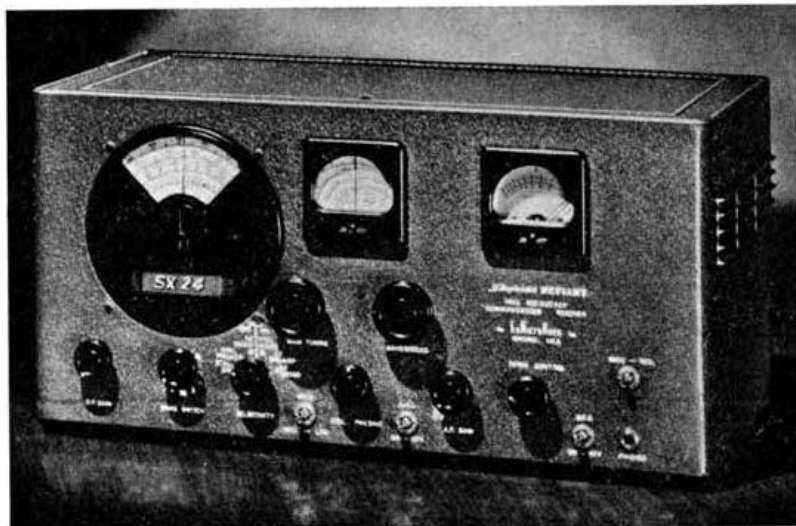
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The New

HALLICRAFTER SKYRIDER



MODEL SX24

AS REVIEWED
IN THIS ISSUE

**Built-in
Frequency
Meter Tuning**

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Including tubes and crystal
but less speaker

110 TO 250 VOLT A.C.
OPERATION

Speaker £4 - 12 - 0

The Sky Rider offers performance that can be favourably compared to any receiver regardless of price. It has new features, like **built-in frequency meter tuning**, that are absolutely new. And in addition it has all the desirable features and qualities that are needed for outstanding amateur reception.

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GENERAL COVERAGE
43.5 to .54 Mc. (6.8 to 555 metres).

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9 TUBES. 6SK7 R.F. amplifier, 6K8 first detector and oscillator, 6SK7 first I.F. amplifier, 6SQ7 diode detector, AVC and first A.F. amplifier, 6F6G power amplifier, 76 beat frequency oscillator, 80 rectifier, 6H6 noise limiter.

S METER calibrated in S units and DB.

Cabinet size, width 19½", height 9½"
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An improved wide range variable selectivity circuit is used. Selectivity is controlled by a switch in four steps from needle-sharp crystal action to broad high fidelity.

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GENERAL COVERAGE—34 to .54 Mc. (8.8 to 556 metres). 8 band positions. Audio output, 5 watts. Temp. compensated permeability-tuned I.F. trans. units (455 kc.). **CONTROLS**—Pitch and tone controls, band, standby and selectivity switches, A.F. and R.F. gain, main tuning, automatic noise limiter switch, crystal phasing, phone jack. Modern ventilation grills. Speaker, P.M. dynamic in separate cabinet of matching design. Cabinet finish, machine tool grey, crystal finish with gunmetal and chrome finish escutcheon. Cabinet size, width 19", height 9½", depth 12½".



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KHAKI AND BLUE

A new feature in which we publish information concerning our members serving in H.M. Forces. Items for inclusion in future issues should reach the Secretary-Editor not later than the first day of the month preceding date of publication.

BERT ALLEN, G2UJ, a prominent BULLETIN contributor and D.R. for South-east England, was among the first batch of R.A.F. C.W.R. men to go to France.

He asks us in a letter (which incidentally had been heavily censored because it included a list of members serving with him!) to send greetings to friends in District 16 and elsewhere.

We learn that he perused G8VH's copy of the September BULLETIN whilst consuming an excellent omelette in a French café!

Letters should be addressed 760407 A.C.2 W. H. Allen, No. 60 Wing, R.A.F., C/o. B.E.F.

H. Fenton, G8GG, recently T.R. for Blackpool who is also with the B.E.F. reports having met GW6KY, G6FZ and G3IY. He too sends greetings to his friends.

Reg. Farr, G8IJ, writing from an R.A.F. E. & W. School, tells us that a large number of amateurs who answered the appeal when C.W.R. was started have passed through the school during recent weeks. These included GM3NI, GM3YN, G4CM, G4QA, 2FIX, 2DRK, 2FQG, 2CVA, BRS1702, 2689 and 3538. Ragchews on "ham" matters have become common-place in the canteen.

G8IJ sends greetings to Barnsley Club members and mentions that he would be pleased to hear from any of them *via* Headquarters.

The many friends of Ham Whyte, G6WY and Geoff. Hutson, G6GH (both of whom are serving in the R.A.F.) will wish to join us in offering them congratulations upon the arrival of "junior ops" Michael Gordon Whyte arrived on September 22, whilst Richard Hutson, who is a son and heir, commenced to bring QRM to his family on October 11.

J. H. Brazzill, G3WP, now a telegraphist in the R.N.V.R., will be pleased to hear from any member who cares to write to him *via* Headquarters. He is at present in Essex.

North London members will be interested to hear that Paul Stein, G8NV, is now in France with the R.A.F.

Kenneth Jowers, G5ZJ, until recently Short-wave Editor of *Television and Short-wave World*, and now Flight-Lieutenant in the R.A.F., sends greetings and tells us that letters for him should be sent *via* the Air Ministry.

Signalman W. E. Bartholomew, G8CK, who has been assigned to H.Q. Station, Eastern Command, would be glad to hear from old friends.

Sgt. A. L. Browning, better known as G8TK of St. Albans, is with the R.A.F. in Bedfordshire, and

would like to receive letters *via* Headquarters. D. R. Aston, G8DR also in the same unit sends greetings to District 12 members.

Thanks to the kindness of Max Buckwell, G5UK, a party of R.S.G.B. members and friends serving with the R.A.F. "Somewhere in Suffolk" were recently given an opportunity of seeing a display of the 1938 films. Among those present were G8PD, 2DFY, 2DHK, 2BBI, 2CPV and 2CGN.

Members in the services who wish to borrow the films should apply to Headquarters.

Leon Newnham, G6NZ, a live wire of the South Hants R.T.S., wishes to be remembered to old friends. L.E.N., now a Flight-Lieutenant in the R.A.F., is stationed in Lincolnshire.



We understand that promotion has come to several prominent members who were granted commissions in the Signal Section of the R.A.F. Ken Jowers, G5ZJ, Austin Forsyth, G6FO, and Ham Whyte, G6WY, are now Flight-Lieutenants, whilst Willie Craig, GM6JJ, John Hunter, G2ZQ, C. H. Parsons, GW8NP, Cecil Page, G6PA, and George Zech, GM8TT have advanced to the rank of Flying Officer.

L. S. Davies, G3ZF, is now in the R.A.F. and stationed in Bedfordshire. He will be pleased to receive letters *via* his home address, 3 Bland Avenue, Peckham, London, S.E.15.

From our Post Bag

"I think far too many members can only see the material advantages which the Society offers, such as the QSL service and THE T. & R. BULLETIN, and forget that it is our Trade Union, protecting and maintaining our interests."

GM4DG.

Experimental Section

Manager: A. M. H. FERGUS, (G2ZC)

THE Section is settling down to wartime conditions and if we have little to offer this month, readers will understand that although our motto is "carry on," we are at the moment faced with two major difficulties, first, along what lines of investigation we can best devote our time and energies, and second, what membership we have left with which to carry on our work. The latter is receiving close attention for it is of primary importance that we should know who can give us their time and services. Changes we must expect and already we are without our Aerial G.M. and his assistant, and as members will see under the Transmitter Group notes, GW4KQ replaces G5JU as G.M.

GW4KQ has sent a circular to every known member of the Transmitter Group, and despite the fact that we might have expected this Group to have been the first to disappear, we find instead, that it is still strong enough to remain as an alive and separate entity, with a programme of work already planned out. This is a most promising start, but the E.S.M. would ask every member of the Section, whether able or unable to continue his or her activity, to send a post card to the G.M., stating the position, as it is important for us to know upon whom we can count.

Those on Service will automatically remain on our registers unless they specify their wish to resign from the Section.

Members will appreciate that with only a monthly contact between them and the Section, plans cannot be made or put into operation quickly, but each G.M. has his scheme of work prepared, so that once we know who is still active, the Groups can go ahead. We have one encouraging sign in that, instead of having to amalgamate the Section membership into one Group, three Groups are strong enough to remain as separate Groups, each carrying out its own work. This answers the few pessimistic members who even went as far as to suggest that the Section should cease work altogether!

Post-War Problems

*"The time has come," the Walrus said,
'To talk of many things.'*

We are at war, and our "radio" House has been disorganised not a little, but a time will come when we shall be able to open it up again. Spring cleaning is considered a necessary preliminary to any house being put in a fit state to be re-occupied after it has remained disused or empty. For the moment our house is in the hands of a caretaker. Whatever the attitude in the past may have been, the E.S.M. has received so many complaints of band interference that he cannot do other than voice them now, together with the common suggestion that division of the bands for telephony and telegraphy would relieve this condition even if it did not cure it. While our house was in full occupancy this step would have been impossible, but now that it is lying empty, steps could be taken to sound our membership—not only of the Section, but also of the Society—to see if that part of our domain cannot be reorganised under better management against its reopening. There are many

other problems that our caretaker may have to tackle, but let us have a clearly defined policy so that when we start up again, we can do so under conditions that will be more in line with sound common-sense.

The ventilation of these questions is one that our Section might well examine, if for no other reason that so many of its members have written about them in the past, yet no one has as yet undertaken a proper investigation.

Silent Key

The E.S.M. wishes to pay tribute to Mr. J. W. Hamilton, whose death was recorded last month. G5JH was a strong supporter of the Auroral Group, and while he held views that were not generally accepted by many, they at least had value in that they opened up a new line of possible investigation. It is to be regretted that a promised article from him will not now appear in print.

G2ZC.

Propagation Group

The present emergency has caused only a few changes in the work of the Propagation Group, and members doing specialised study should carry on as far as possible. For the time being, the sub-groups have been merged into one group, but as soon as the support available has been ascertained, it may be possible to re-establish some of them. Members who are still able to help and wish to resume activity are therefore requested to advise the G.M. if they have not already done so. Individual monthly reports should also be sent to the G.M. until new arrangements are made.

S. Allcorn (2FIH) has sent details of the partial eclipse of the moon in the early morning of October 28 and reports of radio conditions around this date are required.

Friday, the 13th October, was an unlucky day for radio conditions as a brilliant aurora was seen that evening and North American stations faded out. Amazing reception of South Africa on 28 Mc. was experienced and later the same evening South American stations were good. 14 Mc. was also wide open for South Africa, and stations in the Far East, such as PK and KA, were well heard. The effects of this magnetic storm were undoubtedly severe and high-frequency communication was adversely affected for several days. It is a fact, proved by experiment, that radio circuits traversing high latitude paths are more subject to impairment during magnetic storms than those traversing low latitude paths. The degree of intensity of a magnetic storm can, therefore, be judged by the extent that the radio fade-out extends southwards from the magnetic pole. A moderate storm might blanket U.S.A. signals, and the West Indies would disappear during a great disturbance, while South American stations would fade out only during a very severe storm. Reception of far Eastern stations at such times is interesting, however, and further data on early morning conditions is also needed.

Nearly all sources of cosmic data are still available so that there is no shortage of this information. More news of short-wave conditions is needed and listeners can supplement reports for amateur bands with others for short-wave broadcast, shipping and commercial frequencies.

Monthly bulletins of ionospheric data are still

being received from the N.P.L. Radio Research Board and noon critical frequencies increased greatly during the last four days of September.

Recent work by F. L. Mohler has shown a close correlation between ionisation in the ionosphere and sunspot numbers, the effect being greatest for the F2 layer. Ionisation of the F2 layer is believed to come from solar radiation of wavelength less than 910 Å for which the solar atmosphere is very opaque. It is shown that most of the radiation must come from bright flocculi on the sun rather than from the disc as a whole. The decline in the sunspot cycle is made evident by the poorer conditions on 28 Mc. this year than last, and the enhanced value of lower frequency communication around 6 Mc. during night time.

It was with regret that we learnt of the death of Jack Hamilton (G5JH) who went down with H.M.S. "Courageous." He was a virile member of the Aurora sub-group.

G8DA.

Receiver Group

The signal generator is a piece of apparatus which is quite unknown to a great many amateurs, who use signals from other amateur transmitters for receiver experiments. Frequently the transmitting operator is requested to "send a long call," (frequently modulated!), in order that the receiving station can make adjustments to the receiver. Except where aerial or propagation experiments are concerned this method is very unsatisfactory, not only technically, but also because it provides an extra and unnecessary signal on the band. In most cases, however, no other method of testing receivers is available, and it is greatly to be hoped that in the absence of "arranged transmissions" amateurs will turn their attention to the use of the signal generator, which is far more satisfactory for the work. In the case of the 56 Mc. enthusiasts a signal generator is of special interest because even in peacetime signals are far too few, but in war they are almost non-existent.

A signal generator can be anything from a simple oscillator in a biscuit tin to an elaborate precision laboratory instrument, but whatever form it takes, it is a very valuable addition to an amateur's equipment. The three properties of a receiver which are of main interest are sensitivity, noise level and selectivity. Other measurements which are useful to the serious experimenter are overall response, I.F. amplifier resonance curve, crosstalk measurement, overload test, harmonic distortion test, conversion gain in the mixer, A.V.C., etc. In all these tests a signal generator is required and it is by no means beyond the scope of the amateur to construct a suitable instrument.

If construction is contemplated, only the most reliable low-loss components should be used throughout, as it can take the place of any existing frequency meter and should be built as robustly and carefully as any calibrated oscillator or superhet beating-oscillator. Adequate shielding is one of the main problems to be solved and it is essential that the signal should fade out completely when the attenuator control is at zero. This can only be accomplished by the use of heavy gauge metal for the shield cans and boxes, and all earth returns should be connected to a common point. A separate audio oscillator should be used for modulating as the frequency modulation must be reduced to a minimum;

this may easily be obtained by connecting the R.F. oscillator into an aperiodic stage which is modulated.

The question of power supply must receive careful consideration and batteries provide the simplest solution, if provision is made to ensure that no drop in voltage occurs as the battery ages. Mains operation is more satisfactory but the power supply has to be very carefully screened and all leads should be by-passed for R.F. as close as possible to the point where they leave the box. It is advisable to build the power supply in a separate screened box to the signal generator and a useful refinement is to add some form of voltage stabilisation to counteract mains voltage variations and rectifier ageing. This may take the form of a D.C. amplifier controlled by a grid bias battery or one of the commercially available voltage regulators.

It is hoped to publish an article dealing with signal generators very shortly, but in the meantime the following references may be of interest:—

"All wave line-up oscillator." *Radio*, July, 1936.

"A signal generator giving 10 kc. intervals throughout the H.F. spectrum." *QST*, June, 1938.

G5HF.

Transmitter Group

The Group Managership has been taken over by H. H. Phillips (GW4KQ) in succession to G5JU, who relinquishes the position with much regret, after having been a member of E.S.—and, prior to that, of R.E.S. and Contact Bureau—for many years. G5JU looks back on this period with happy memories and takes this opportunity of expressing his thanks and good wishes to all with whom he has been associated. He asks that members of this Group continue to afford their earnest co-operation to the new G.M. who hopes to keep in close touch with them.

Of the four E.S. Groups, the Transmitter Group is in the least happy position, since it is no longer possible for the great majority of members to carry out any experiments connected with transmission. At the same time, it is considered that this fact is no reason why the Group should think of disbanding—a procedure which would be definitely undesirable—since it is obviously necessary that an interest in transmission should be maintained.

There are, it is suggested, two lines on which the Group can continue to do useful work. The first is the study (and later the publication) of information already available from experiments conducted prior to the outbreak of war. Now that members can no longer "go on the air"—at least in the transmitting sense—an opportunity is provided of putting down on paper the results of all recent experiments, for the ultimate benefit of all. Incidentally, this policy applies to members at present outside the E.S. organisation—there must be many such who could assist in this direction. In fact, one could go so far as to suggest that membership of the Transmitter Group would help, in some ways, to make up for the loss of transmission facilities, although it would be somewhat embarrassing if all those members previously holding a transmitting licence responded to this appeal!

Secondly, there is nothing to prevent discussions on interesting problems and points relating to high-frequency and ultra-high frequency transmission.

Such discussions could well include delving deep into technicalities and considerable profit should be derivable from them. As a suggestion, each sub-group could, by means of a Letter Budget, discuss a problem set by the G.C. (or otherwise agreed upon), who would later make a résumé of the findings. After subsequent publication, the general membership would probably be eager to further the discussion.

A letter has already been sent to all members of this group explaining the new proposals and further reference to the latter in these notes would, consequently, be ambiguous, but the G.M. and the E.S.M. would be glad to have members' opinions

GW4KQ.

Cosmic Notes

By E. J. WILLIAMS, B.Sc. (G2XC)

Sunspots

R E P O R T S on sunspot activity received from Tokio mention the central meridian passage of large groups of spots on September 1 and 11, the latter group being visible to the naked eye. This is probably the same group given as C.M.P., September 10, in last month's notes, the apparent error being due to the large size of the group. During October the writer has observed large spots with C.M.P., October 1, 2, 4, 7 and 26.

Large solar prominences were observed at Tokio on August 18 and 25 and September 17, while from Meudon observatory comes a report of a bright chromospheric eruption from 08.13 to 09.14 G.M.T. on August 17.

During the first half of September over 100 individual spots were observed almost daily both at Tokio and at the United States Naval Observatory. The greatest area of the spots was on September 6.

Magnetic Elements

The following data is for the period August 26 to September 23. Moderate magnetic disturbances were reported during the evening of September 2, continuing through the following day, the morning of September 9, the afternoon and evening of September 17, and during September 19 and 20.

Radio Conditions

The F2 layer vertical incidence critical frequencies at Washington (local noon) for the four Wednesdays beginning August 30, were as follows:—7,900 kc., 7,700 kc., 10,400 kc., 6,800 kc., while on October 11 the critical frequency was 10,800 kc.

The poor conditions (reported last month) on September 17, coincided with a moderate magnetic storm (see above). An extremely poor period for short-wave propagation was noted in mid-October, bad flutter fading making its appearance on the evening of October 13, and most signals being very weak. The following day brought conditions well below normal. At midday the 7 Mc. Daventry station which is usually S9 plus was only just audible in Portsmouth and suffering from bad fading, while no broadcasting stations were audible on frequencies above 12 Mc. Conditions continued generally poor throughout most of the following week. From the daily press it is understood that a brilliant display of the Aurora Borealis was witnessed in the Orkney Islands on October 13.

The Hallicrafters' SX24 Receiver Reviewed

T H E SX24 Receiver, a model recently introduced by Hallicrafters, embodies all the refinements of a full-blooded communication superhet receiver, yet is offered at a very reasonable price.

General Observations

The appearance of the receiver is very attractive and it is evident that much care has been expended in this direction, as well as on the technical side. The dark blue-grey crystalline finish is of a hard and durable character, whilst the instrument as a whole is housed in a rigid steel cabinet fitted with ventilating louvres of modern design.

The controls come readily to hand in the places where one would appropriately expect to find them. The tuning knobs, if not of large diameter, give a very smooth action, entirely free from backlash or slip, whilst the other controls are also firm in operation and quite free from noise.

The translucent dials give even illumination, whilst the dials themselves, being clearly and sensibly marked, are easy to read.

Technical Details

The specification of the SX24 has been widely advertised and it is therefore hardly necessary to go into it in detail. Suffice to say that the valve line-up is practically identical to that found in most modern superhets of the communication type. The valves in the early stages are of the "S" type, i.e., having static characteristics similar to the usual run of octal-based American valves, but possessing reduced physical dimensions, this resulting in an improved performance on the higher frequencies.

A fully tuned radio-frequency stage is operative throughout the range of 43.5 to 54 megacycles covered by the receiver. A combined oscillator and frequency-changer valve of the 6K8 type is employed. Since this particular valve utilises the electron beam principle and possesses low inter-electrode capacities, the conversion efficiency is equally as high as in the case where a separate oscillator valve is employed.

The remaining seven valves perform functions normal to a receiver of this type. Separate three-gang condensers are employed for band-set and band-spread tuning.

Special Features

Without doubt, the most interesting feature of the SX24 is the built-in frequency meter tuning. By this term it is not intended to convey that the receiver incorporates a calibrated monitor utilising a separate valve—this is not the case. What is meant is that the design of the tuned circuits has been so carefully worked out as to enable the tuning dials to be directly calibrated. The accuracy of calibration of the receiver under test was checked at many points by means of the HT7 frequency standard, which is reviewed separately, and was found to be remarkably good throughout the whole range.

For general use, the band-spread condenser is set at zero capacity—the frequency of the signals being received is then shown directly on the dial of the band-set condenser. When employed for amateur

signal reception, the band-set condenser is set at a point indicated on the band-spread dial, under which condition the latter indicates the actual frequency to which the receiver is tuned. For the greatest accuracy, the main dial must be set against either a frequency standard employing a quartz crystal, or else against a commercial station of known frequency—the marker stations JNJ and EAN serve well for the 14 Mc. band.

A special position (3B) is provided on the wave-change switch in order that the full 7 Mc. band may be spread out over the whole of the band-spread dial. In this particular case the position to which the main dial should be adjusted is indicated as "57 Div." instead of in megacycles and it should be noted that this figure refers to the degree divisions on the outer edge of the main scale.

The value of the frequency meter tuning is evidenced in a number of ways. For example, in these troublous times, it is very useful to be able to tune in immediately to a distant short-wave broadcast station—on the SX24, this can be accomplished in exactly the same way as on a normal broadcast receiver.

Another useful feature is the calibrated "S" meter. It should be noted that this does not come into accurate operation until the R.F. gain control



The Hallicrafters' SX24 receiver.

is advanced fully, when a switch will be heard to close and the dial will become illuminated. Naturally, the selectivity switch must be in one of the right-hand positions, *i.e.*, A.V.C. on, for the "S" meter to become operative.

A noise limiter of special design is incorporated and this has proven to be quite effective, particularly on the higher frequencies covered by band "4." Motor car ignition interference is noticeably reduced without materially affecting signal strength.

Finally, by means of a special plug at the rear, the receiver may be adapted for operation from batteries, with either a vibratory converter or H.T. batteries supplying the high tension.

Performance

The signal-to-noise ratio is obviously high and at no time was the amount of background noise objectionable. The manufacturers recommend an aerial seventy-five feet long for maximum performance but this was very satisfactory in all respects with an aerial only thirty feet long. On the one hand, long distance c.w. signals are deceptive in their strength—one cannot pass over a fairly strong signal with the assumption that it is probably of European origin. At the same time, weak signals

can be sorted out and read through practically the worst interference. Similarly, amateur telephony signals can usually be brought in clearly with the selectivity switch in the "Crystal Phone" position. As one would expect, the performance on the medium waveband is far ahead of the normal broadcast receiver—stations practically inaudible on the latter come in during broad daylight on the SX24 at a strength which gives good programme value.

High fidelity reception is secured with the selectivity switch in the "broad" position. The selectivity can be progressively increased, enabling, with the aid of the efficient crystal filter incorporated, signals on adjacent channels to be completely eliminated. The crystal phasing control is very effective and its proper use gives true single signal reception—a signal which is S9 on one side of beat drops to S2 on the other whilst weak signals are only heard on one sideband.

To entirely remove second channel interference, it is necessary to use more than one R.F. stage (*i.e.*, a preselector) or very complete screening, with the R.F. stage completely enclosed, or a high intermediate frequency. Since the tuning condensers are of a fairly open type, it is not surprising that a certain amount of second channel interference is observable in the case of the SX24 receiver. It is, however, by no means serious and, particularly with the crystal in operation, gives rise to but little inconvenience. It is noticeable that second channel interference only occurs when the interfering signal, on its fundamental frequency, is very strong. It follows that, when short skip conditions obtain, the European short-wave broadcast stations tend to intrude on the 14 Mc. band but when conditions are good for DX, there is practically no trace of second channel interference. On lower frequencies, this trouble is completely absent.

Television signals, from London (both sound and vision), were audible in Bristol at fair strength, indicating that the sensitivity is well maintained up to the highest frequency. At the time of writing, the 28 Mc. band is just beginning to open up and several American telephony stations have been audible. Fading had been severe but, with the "S" meter fluctuating between S3 and S1, much of the speech has been readable, background noise being low even with the gain controls well advanced. Oscillator creep is non-existent except during a short period after initially switching on.

The receiver was also given a trial under portable conditions, using a six-volt accumulator for filament heating. With only a standard 120-volt H.T. battery providing high tension, the results were excellent over the whole range, although, of course, the power output was much reduced. The manufacturers recommend a source of H.T. providing 180 volts and with this value the performance would undoubtedly be equal to that given by operation from the mains supply.

The HT7 Frequency Standard

ANOTHER instrument recently introduced by Hallicrafters is the HT7 Frequency Standard. This employs a 100 kc. crystal in a special circuit which incorporates three valves, plus rectifier. The first valve is the crystal oscillator, the second a

harmonic multiplier and the third a 10 kc. multi-vibrator. The oscillations produced by the latter, when in circuit, are locked to the output of the second valve.

It thus becomes possible to locate on a receiver points (a) 1,000 kc. apart, (b) 100 kc. apart, and (c) 10 kc. apart. By virtue of the fact that the output circuit of the harmonic multiplier valve is tuneable, thereby augmenting the strength of the harmonics, the latter are audible on very high frequencies. The manufacturers give 30 megacycles as the upper frequency limit but the writer has found that the 1,000 kc. beats are easily located up to at least 60 megacycles.

The uses of the HT7 are manifold. Space does not permit going into them in detail here but they are fully explained in the data sheet which accompanies the instrument. In brief it is possible to calibrate receivers of the broadcast, communication and ultra-high frequency types, also monitors and electron-coupled oscillators, all with a high degree of accuracy. The calibration of crystals of unknown or doubtful frequency can be readily undertaken, in conjunction with a normal receiver. Interpolation between the 10 kc. points will give the actual frequency almost to a kilocycle.

On test, the instrument proved perfectly reliable in operation and there is no question but that it would prove a valuable addition to the amateur—or, for that matter, the professional—experimenter's laboratory, particularly in view of the stringent requirements of the British Post Office as regards frequency measuring equipment. The construction of the unit is compact and rugged, the finish being identical with that employed with the SX24 receiver.

The SX24 receiver and the HT7 Frequency Standard are obtainable from *Webb's Radio*, 14 Soho Street, Oxford Street, London, W.1, to whom enquiries should be addressed. G5JU.

Model 40 Universal Avometer

THE Model 40 Universal Avometer is the latest addition to the range of meters manufactured by *Messrs. Automatic Coil Winder and Electrical Equipment Co. Ltd.* and replaces the Model 36.

The instrument is similar in many respects to the Model 7 Universal Avometer, reviewed in THE T. & R. BULLETIN dated October 1937, but has six ranges less and in consequence is somewhat cheaper. The meter has 40 ranges comprising readings of voltage (A.C. and D.C.), current (A.C. and D.C.) and resistance. The ranges are selected by means of two switches and three small adjusting knobs for resistance measurements. An overload cut-out, operated by a mechanical trip depending for its release on relative movement between the pointer and the moving coil due to the inertia of the former, is provided to safeguard the instrument against accidental damage. The cut-out may be quickly re-set by depressing a button mounted on the front panel.

A black finished case 7½ in. by 6½ in. by 4 in. fitted with a carrying handle houses the meter together with one 1½ volt and two 4½ volt batteries, these latter being for the resistance ranges.

A button is provided which when depressed divides all ranges, except resistance, by two. As a

voltmeter the current consumption for full scale deflection is 6 mA except for the lowest A.C. range.

The selector switch ranges are as follows:—

D.C. volts: 0-0.12, 1.2, 12, 120, 480 and 1,200.

D.C. amps.: 0-0.012, 0.12, 1.2 and 12.0.

A.C. volts: 0-12, 120, 480 and 1,200.

A.C. amps.: 0-0.012, 0.12, 1.2 and 12.0.

Ohms: 0-1,000, 10,000, 100,000 and 0-1 megohm, the latter using an external A.C. or D.C. source.

The instrument was checked in accordance with B.S.S. 89 for first grade instruments. The reference standards being a Crompton potentiometer and N.P.L. calibrated standard cell for the D.C. ranges, laboratory sub-standards for the A.C. ranges and standard decade boxes for the resistance ranges.

The error of the D.C. ranges did not exceed 0.5 per cent. of true reading either at half or full scale, whilst the A.C. ranges were correct to within 1 per cent. of full scale reading, the greatest error being found on the 0-12 volt range. The measurements of resistance were very accurate, the error in no case exceeding 1 per cent.

The meter was found to be quite dead-beat and the scale is marked in such a way as to be both easily read and capable of accurate setting. As an aid to the latter an anti-parallax mirror is furnished.

This model can be confidently recommended as an invaluable experimental or laboratory meter where the extra ranges and higher cost of the Model 7 is unjustified.

Details and prices of Avo instruments are available from the address noted above. G5CD.

Eddystone E.R.A.7 Receiver

This receiver covers four wavebands, 13 to 35 metres, 31 to 85 metres as well as the medium and long wavebands. There appears to be nothing unusual about its performance on the medium and long wavebands, and it behaves as a first-class receiver should do, giving adequate selectivity without loss of quality. Second channel interference is negligible and the 12-in. energised loud-speaker easily handles the 5 watts audio output without any audible distortion.

The two outstanding features, however, are its amazing sensitivity and low noise level on short waves, coupled with very efficient A.V.C. Unlike most all-wave receivers the volume control can be kept at maximum, whilst tuning round, without producing undue internal noise; at the same time the sensitivity is comparable with a receiver specially designed for short-wave operation alone. The A.V.C. is such that it enables real entertainment value to be obtained from S.W. broadcast stations.

The short-wave efficiency has been obtained partly by reason of the careful and solid construction of the receiver which is built on a cast aluminium chassis, whilst ceramic insulation is used where possible. The three-circuit I.F. band-pass filters employ air dielectric trimmers and a separate oscillator is used and designed to give minimum frequency drift.

This receiver can be recommended as an excellent all-round set which is of special interest to short-wave listeners. The short-wave performance is well above the average.

G5HF.

THE MONTH "OFF" THE AIR—October, 1939

By ARTHUR O. MILNE* (G2MI)

IF there were enough spare kilocycles for the whole of mankind to be Hams, there would certainly be no more war!

What an unlucky lot we are, for when trouble turns up we are deprived of the most important part of our hobby automatically besides having to face the general upheaval in company with others. The war is responsible for amateurs in still more countries being put off the air, including South Africa, who did their grand good-bye on 28 Mc. on Sunday, October 29. Most of Europe seems to have "gone" although TF, EK, U, HA, ES, D, EA, YU and SV were still working at the time of going to press. We must now look to President Roosevelt to keep the bands open for us!

Several reports are to hand this month but we should like to see still more sending in a line. GM6MS reports hearing J8AN, but thinks he is a pirate. We see no reason for that, J's and XU's have been coming in very well, so why not a J8? A Chinese station, XGOX, comes over well on 25.2 metres with a news bulletin in English at 22.15 G.M.T. TAP on 31.7 metres also gives news in English from Turkey at 21.15 G.M.T.

One of the surprises of the month has been the appearance of some German amateurs, especially D4BUF, whom many will remember seeing at one of the I.E.E. meetings not so long ago. He was S9+ working DX on 14 Mc. on October 21.

Y16ZC who says "QSL via R.S.G.B." has the advantage of us as we have not the pleasure of his acquaintance. If he would care to send a dozen or so stamped addressed envelopes for the pile of cards which is accumulating from the four quarters of the globe, we should be indeed grateful.

OQ5IM, a new Congo station who QSL's, is operated by M. J. Gabriel, c/o. Banque Belge d'Afrique, Box 747, Elisabethville, Congo Belge. EA7AV who has been doing a roaring trade in W's, is recognisable by the letters EJSAV which is "spanish morse" for the call sign aforementioned!

We have no information about any of the Spanish amateurs now appearing on the bands but understand that licences are again being issued.

Apropos our remarks about FB8AD, G6VF writes to say he has had two cards from him and also struck lucky with FB8AG, FB8AH and U9MF. His last six QSO's before the "great silence" were HA8T, ZS4AA, XU9MI, VK3DP and W8QPK making a grand finale W.A.C. Let's hope he makes his opening bow in the same style in the not too distant future. 6VF also mentions the WCBX news bulletins between 06.00 and 07.00 G.M.T. on 49 metres.

G8HX suggests a H.A.R.C. certificate for those who just missed DX Century, "Heard all rare countries"! G3JD sends in a good log and reports hearing SV1AC. G5SO who is serving in the Navy has his RME with him. He paid his first war-time visit home recently and said he never realised what a forlorn appearance the shack would have after a G.P.O. visit.

BRS2317 using a straight receiver has spent a good deal of time on the bands since the War and reports plenty of activity including KA, CR6, OQ, PY, HA,

EK and W. The PA's seem to be missing but PK4KS still puts in a good signal. Similarly the ON's are off but OQ's are coming in well, especially on 28 Mc. This band is now wide open and maybe it is only a question of "sour grapes" but it does seem to be even better than ever. The W5's and W6's are really remarkable; CPIAA and KB6OCL on 'phone are two good ones on 14 Mc. ARSAF not do good!

We heard U4AM just before the War but knowing the difficulty with the QSL's from the U9's and 6's did not bother to call him. Well, the wiser ones are, just getting their cards, that is if they have any envelopes at the Bureau! XU5WT is a very consistent signal on 14 Mc. and is in great demand around tea-time.

The week ending October 21 provided us with three days of the very worst conditions on record due to a very heavy magnetic storm. It was noted that, at the time, there were several large sunspots clearly visible to the naked eye at sunset.

G6ZO writes to say he has obtained his B.E.R.T.A. thanks to VQ5WES who came up to scratch with the 40th card. He is keeping a watch on conditions with the aid of an O-V-1 and comments on the large number of XU's to be heard. His list also includes several K6's, KB6, K7, CR6, CT4AA who claims QRA as "Modelo Island," EA5A at Cartagena, EA7AV at Valencia and EA7BB. The XU's include 4GC, 4TT, 5HR, 5LT, 5SC, 5WT, 5YC, 6SF, 8MI, 8MY and 8WS. XU5SC gives QRA as Central News Agency, Kweiyang. XU5WT, Box 685, Shanghai. Obvious pirates include SX1BJ, SU2PS and SU7KW probably located in Eastern Europe. He heard a few ZS stations on 7 Mc. during October, including ZT1AX and ZT6L on 'phone.

G2MI has just received his W.A.S. certificate

D.X. PERSONALITIES—No. 5.



J5CC whose card represents Japan in nearly all DX C.C. claims.

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

addressed to 29 Kechill Gardens, England. Someone, probably a Ham in a sorting office, was good enough to send it to R.S.G.B. on chance. G6CL and G8IG have also received their W.A.S. certificates.

G4JZ still thinks ZK1AG may be genuine; we hope he is right but doubt it. G4NY is trying to keep in touch by post with other Hams, especially those on active service, and wonders why the P.O. had to take his one and only morse key.

Well, that's the story this month so try to keep cheerful; it can't go on for ever and, besides, think what marvellous receivers we shall have by the time we get on the air again. Cheero!

Tailpiece

We quote the following paragraph from the November issue of QST.

"Just as we go to press it becomes apparent that two legitimate-sounding D stations that have been working two-way with U.S.A. in our band are apparently stations of Government agencies. They ask those they work about the war, pump for information on public reactions, feelings, etc. In other words they are asking us to violate our neutrality code. We must watch and have nil to do with any such. We must not give information to a belligerent, directly or otherwise, and best keep entirely clear of 'em.'"

The 28 Mc. Band

By NELLY CORRY (G2YL)

CONDITIONS during October were similar to those of a year ago, but the general impression among the regular listeners seems to be that the band was quieter, not only because of the great reduction in the number of signals, but also because average QRK's were not up to the standard of recent years. Towards the end of the month the high-frequency limit gradually increased, and G6DH heard U.S.A. signals up to 46 Mc. on October 25, and up to 42 Mc. on several other days. The band was exceptionally quiet on October 4, 6, 14, 15 and 17, and BRS3003 heard the hissing phenomenon at 16.17 G.M.T. on October 2, and at 15.25 G.M.T. on October 19.

The only amateur signals reported from Oceania and Asia were K6PLZ and U9ML, heard by BRS3179 and BRS3003, but G6DH logged JUM on about 27.5 Mc. fairly regularly around 08.00 G.M.T. BRS3179 also heard stations in J, XU, PK, KA and ZL being called, so there are still quite a few amateurs active on 28 Mc. in these continents.

From Africa a total of 28 ZS stations and OQ5AB were reported, and a few were logged every evening up to October 29, except for the 6th, 14th and 15th. BRS3003 heard 10 different ZS stations on October 9, 16.30-18.00 G.M.T., all using 'phone. But on October 29, BRS3179 overheard the sad news, from ZS5T, that he and all other ZS stations were being closed down from midnight on that date.

South Americans were only heard spasmodically, and those reported were CE3AG, PY2AC, PY2MI, PY4FE, YV1AQ and YV5AE. Central American and West Indian stations were more consistent and included H17G, TG9BA, TI2AK, TI2FG, TI2RC, TI3AV, XE1CQ, XE2FC and five K4's. G5BM heard a new country in YN3DQ of Nicaragua on October 8.

W's were heard on most days, but were erratic during the periods October 3-7 and 13-20. BRS3179

found W6's and W7's more numerous than for many months, particularly on October 1, when he logged no fewer than 52 different W6's! The same evening at 19.00 G.M.T., G6DH heard 27 W6's and one W4 in half-an-hour, and October 2 BRS3003 logged 20 W6's. Two American ship stations were also heard active in the Gulf of Mexico, viz., W2CQB, s.s. "Pan-Kraft" heard by BRS3179, and W5FTA, a tanker, heard by BRS3003. Another ship, heard by G5BM, was W5HQP in the Pacific Ocean.

A few signals were logged from Eastern Europe (ES, OH, HA, U2, 3 and 5), and stations were heard calling HB, I, ON, TF and YU. In addition, BRS3179 logged "D4BUF," and W's were heard working this station and other D's. It seems unlikely that there are any genuine D's active at present, and a possible explanation is that the erstwhile "Rare Country" pirates have temporarily changed over to "Belligerent" call signs!

Reports from G5BM, G6DH, BRS3003 and BRS3179 are acknowledged with many thanks.

The 56 Mc. Band

By CONSTANCE HALL (G8LY)

"Hang up your headphones on the old shack wall,
And cuss, cuss, cuss,
Hang up your headphones on the old shack wall
But do not make a fuss.
What's the use of listening
It hardly is worth while, so—
Hang up your headphones on the old shack wall
But smile, smile, smile!"

IT was in the sense of this lament, based on that old favourite "Pack up your Troubles," that the majority of 56 Mc. and U.H.F. enthusiasts reacted when the news came through that their licences had been determined. Since that day the writer has frequently been asked "what should a keen U.H.F. ham do during these long 'black-out' evenings." There can be but one reply—if you have access to your shack, set about improving your receiving gear and other non-transmitting apparatus.

During the past year it became abundantly clear that U.H.F. transmitters were well in advance of U.H.F. receivers. Let us then adopt as a war-time slogan "Build Better British Receivers."

News is scarce this month although as usual G6DH sends interesting items. He reported early in October that the upper frequency limit for DX signals had increased to about 34 Mc. which is of course usual for the time of year. Later in the month he heard U.S.A. signals up to 46 Mc. (October 25), but these were probably harmonics except one, on 43 Mc., which may have been W1XKV (Mass.). RIS (?) on 41 Mc. was a good signal up to 14.00 G.M.T., whilst U.S. transmissions have been peaking between 14.30 and 17.00 G.M.T.

G8OS has all the components for a new receiver, 2ZV is busy with someone else's H.F. equipment (!) whilst 2AAH tells us that he is still U.H.F. minded.

To these members and all others who have expressed their continued interest in U.H.F. work we record our thanks.

American Activity on 112 Mc.

Several good and consistent contacts on 112 Mc. have recently been reported. For example, WIBBM

with 15 watts to a 6J5G worked WISS at a distance of 75 miles and on schedule he heard WISS on ten days. The latter worked W1JUN and W1BBO at 55 miles. Neither W1BBO nor WISS employed beam aerials.

Using a three-element beam, W1BBO heard 39 stations. W4EDD with 400 watts c.c. will be looking for DX as soon as he gets a good receiver!

In our last notes the call W9ZJB was incorrectly recorded. This station was the first to work all U.S. Districts on 56 Mc.

The writer again appeals for news of interest to U.H.F. enthusiasts.

Contemporary Literature

By L. FRYER (GM2FR)

CALCULATION OF TRIODE CONSTANTS. J. H. Fremlin, M.A., Ph.D., A.Inst.P. "Electrical Communication," July, 1939. Vol. 18, No. 1.

The author proposes a new treatment of the equivalent diode, from which formulæ for anode current and mutual conductance in plane or cylindrical triodes are obtained in terms of the penetration factor, the inter-electrode distances, and the voltages applied to grid and anode.

It is shown experimentally that the value of penetration factor thus obtained may be used with some accuracy up to considerable current densities. Calculated and experimental values of mutual conductance at close spacings are compared, and it is shown that if allowance is made for emission velocity, very close agreement can be obtained down to values of grid-cathode clearance of only a few per cent. of the grid pitch. A definite maximum value of mutual conductance for constant current density is shown to occur at a cathode-grid clearance of the order of half the grid pitch.

THE SCREENED LOOP AERIAL. R. E. Burgess, B.Sc. *The Wireless Engineer*, October, 1939.

In this paper the author describes a theoretical and experimental investigation of the screened loop type of receiving aerial used in direction-finding and field-strength measurement. The theory of the screened loop is analysed and the simplifying assumptions made are indicated, and are shown to lead to a good first approximation for the value of pick-up for the screened loop. The pick-up is computed for the special cases of the screen gap short circuited, capacitively loaded, and tuned. It is shown that enhanced pick-up may be obtained by the suitable capacitive loading of the gap in preference to an increase of the number of turns in the loop, and the practical aspect of this system is discussed.

Confirmatory experiments are described, and the paper is concluded with an indication of a suggested continuation of the investigation.

CURRENTS INDUCED BY ELECTRON MOTION. Simon Ramo, A.M.I.R.E. *Proceedings I.R.E.* September, 1939.

A method is given for computing the instantaneous current induced in neighbouring conductors by a given specified motion of electrons. The method is based on the repeated use of a simple equation giving the current due to a single electron's movement and is believed to be simpler than methods previously described.

A SIMPLE 56 Mc RECEIVER. Paul Popenoe, Jr. *Radio News*, June, 1939.

The set described in this article uses a 6K7 in the tuned radio frequency stage, 6C5 quench oscillator, 6J7 detector and 6F6 pentode output. It is very easy to build and should give selective results.

The whole set is built on a chassis, $5\frac{1}{2}$ in. \times $9\frac{1}{2}$ in., with a panel, $10\frac{1}{2}$ in. \times 7 in. and a cabinet to match.

Hamrad Wholesale Ltd.

We published a statement in our September issue to the effect that Hamrad Wholesale, Ltd., of 32 St. Lawrence Terrace, London, W.10, had gone into voluntary liquidation for the duration of the war. Information has since reached us that such statement conveys a wholly misleading and quite inaccurate representation of the position.

Accordingly we tender our sincere apologies to Hamrad Wholesale, Ltd., and feel that in the very unfortunate circumstances, the least we can do is to reproduce the circular letter that we now gather accurately sets out the position—such letter being that which Messrs. Hamrad Wholesale, Ltd., addressed to their customers early in September last and which reads as follows:—

The Wireless and Electrical Trader. 16 September, 1939

HAMRAD WHOLESALE AN EMERGENCY EXPEDIENT

"You will, of course, know that the war has occasioned the cancelling of all transmitting licences. This means that for the moment there is no demand for many of our goods. Both our directors are now engaged, whole-time, on national defence work, pending further calls being made upon their services.

Following, therefore, the example of the Government, we have felt that in such a crisis in our history we should take immediately some emergency measures to preserve our reputation and goodwill. We are without possibility of doubt absolutely solvent, and we hope before so very long will be flourishing again. Why therefore should we wind up?

We have sought advice and are told that the easiest, cheapest and most efficient emergency expedient is by mutual consent to appoint a receiver in respect of the very small sum outstanding upon debentures issued by the Company. Such an appointment can be revoked as simply as it has been made and so we could resume business at short notice without costly legal formalities. Such an expedient, too, will enable our very good friends to have from the receiver any goods in stock which they may want in addition to allowing the book debts to be got in, so that there will be funds available to discharge our current liabilities.

Please note that we have neither given up business nor even closed up, but are merely marking time while there is more urgent national work to be done, and so that our directors can do their bit towards bringing nearer that day when all of us are free to give whole time to our individual businesses and our country no longer needs us—save as taxpayers.

We feel sure you will agree there is no need for us to apologise, but only to explain.

The name and address of the receiver to whom for the present all orders and communications should be sent direct is, W. R. Carter, F.Inst.P.S., 7-8 Little Turnstile, High Holborn, London, W.C.1."

BRITISH ISLES NOTES AND NEWS

DISTRICT 1 (North Western)

THE District Scribe (G6CX) would like to emphasise the fact that a monthly report is still required from each Town Representative or his successor, notwithstanding the fact that we are at present engaged in hostilities.

Whilst several younger members are absent on military or naval service there are many who are able to carry on, although their spare time may be somewhat limited through Civil Defence and other duties. The hobby we have chosen is one which imbues its devotees with an enthusiasm which cannot be lightly abandoned, and there is much we can do even though deprived of our transmitters.

The receiver is the weakest link in the majority of amateur stations and we can now devote our time and energy to effecting an improvement without the distraction of running a transmitter and maintaining schedules. Frequency measuring instruments, speech amplifiers and similar devices will, no doubt, receive the attention they deserve but seldom receive, and much can be gained by a serious study of the theoretical side of our hobby.

With the confiscation of our transmitters the spectacular side of "ham radio" has departed but we must look forward to the time when our licences are restored and be ready to "get on the air" as soon as we receive the necessary permission.

Developments are likely to be rapid, as they were in the last war, and up-to-date information may be difficult to obtain. We must keep in touch, pool our information and maintain our organisation and this can only be achieved by frequent and regular meetings.

This month we received only one direct report—from Blackburn. The Blackburn members have a well merited reputation for the keen interest which they have created in their area, and at the last North Western Provincial District Meeting they earned a tribute from our Secretary-Editor for the enthusiasm and originality displayed by them in building up their organisation. They have shown a lead once again and it is up to all of us to follow their example.

Blackburn.—Monthly meetings are held at the Town Representative's house on the fourth Sunday, at 10.45 a.m., and there is also an informal meeting once every fortnight at the same time and place. Many members intend to build new receivers and there has been a general interchange of ideas on the subject. One member has joined the R.A.F. and two or three are awaiting their papers. Every member entering H.M. forces receives a small gift as a memento of brighter days, purchased out of subscriptions contributed by those who remain.

If any member of the Society should find himself in Blackburn he will be sure of a welcome from the T.R. Visiting hours are as follows:—Weekdays between 18.00 and 24.00 G.M.T., weekends between 12.30 G.M.T. Saturday and 24.00 G.M.T. Sunday. G6CX.

Cumberland.—Just before the war the scattered membership in this county had reached a sufficiently high figure to warrant the appointment of a T.R. G6JZ, 6WR, 3BW, 4PZ, 8RZ, 2AUM and 2DWG

are society members, whilst several others are prospective. With the outbreak of hostilities 6JZ took a post with the Air Ministry, whilst 3BW and 4PU have joined the colours.

Those members still at home are improving their receivers and keeping up Morse speed.

G8RZ, who is acting T.R., called a meeting at his own house on October 26, which was attended by 3SY, 6WR and 2AUM. The local group would like to hear from 3BW and 6JZ to whom they send 73.

Mr. H. Caunce, 24 Vanbrugh Road, Anfield, the Liverpool T.R., requests all members in that area who are willing to support local meetings to write to him stating whether weekday or Sunday meetings are preferred.

Arrangements for the continuance of meetings will depend upon the response given to this request.

G8DI and 2DCG, now with the B.E.F., send greetings to Liverpool members.

DISTRICT 3 (West Midlands)

The Annual General Meeting of the M.A.R. Society, attended by 44 members, was held at The Hope and Anchor Inn, Birmingham, on October 8.

It was unanimously agreed that in view of existing conditions future meetings would take place every other month on Sunday mornings at 10.30 a.m.

The following officers and committee were elected for the year 1939-40:—President, Mr. C. Naylor Strong; Hon. Treasurer, Mr. G. Hart; Ass. Hon. Sec., Mr. E. J. Wilson. Committee:—Messrs. W. Asher, W. Follis, D. Goudie, G. Lapworth, W. Vincent, C. Young.

Mr. F. E. Barlow, who is serving with H.M. Forces, was re-elected Hon. Secretary for the duration of the war. Mr. W. Vincent was appointed Deputy Assistant Hon. Secretary.

The President proposed that all members serving with H.M. Forces should be elected members of the Society for the war period.

Mr. G. Brown was awarded the President's Cup for the best lecture of the year. Mr. Goudie was runner up.

DISTRICT 4 (East Midlands)

As it was found to be inconvenient for the Trent Bridge Hotel to cater for our Monthly Meeting (the news arriving too late for inclusion in last month's notes) it is possible that Nov. 6 brought fireworks of a kind which have no part in history! Members are asked to get in touch with their T.R. for particulars of the meeting in December. . . . If in doubt, or if your T.R. is serving, write to the D.R., not forgetting to include any items of interest for next month's notes concerning yourself and your local friends.

Scarcity of news continues, although we hear that G5PA and 3PZ are both at Cranfield, while 3RF is with the R.N.V.W.R. Regular weekly meetings are still holding the Leicester membership together, shack visits being as popular as ever despite the lack of gear. Members out of touch should drop a card to the T.R., G6VD. Code practice sessions are again popular at this station and Sunday mornings find the locals keeping up their speed or trying to give 2IX more than he can take. G8LD who is at the local

G.P.O. had the questionable pleasure of "evacuating" his own transmitter! G3AN and 4BJ are the only known Leicester members serving with the colours; to these and all others we send our 73. G5UQ who has moved to Birmingham was a very popular figure and keen supporter here for many years; the choir on 1.7 Mc. will eagerly await the return of their vicar! In the meantime we are looking for a cartoonist to sketch Percy with three waistcoats, two overcoats and trilby atop headphones, holding down a balloon barrage with one hand and a teleprinter with the other! Any offers?

G2RI.

Forthcoming Events

- Nov. 19 Scotland "A" District, 2.45 p.m.
Y.M.C.A. Residential Club, 100
Bothwell Street, Glasgow.
- " 24 Northern Ireland District Meeting.
6.15 p.m. for tea at Thompson's
Restaurant, Donegall Place, Belfast. Presentation of 14 Mc.
N.F.D. Replica to G15QXP.
- " 25 District 13, 3 p.m. at West Norwood
Brotherhood Hall.
- " 26 District 12 (North London Section),
3 p.m. at G5FA, 35 Torrington
Gardens, N.11.

DISTRICT 5 (Western)

Fifteen members, including GW3CR, attended a Saturday afternoon meeting held in Bristol recently. During the discussion which took place, it became evident that Saturday afternoon was inconvenient to many whilst Sunday afternoon had to be ruled out owing to difficulties connected with transport and the finding of a suitable meeting place. The T.R. is therefore looking for a room where evening meetings can be held, when a programme of technical talks will be arranged. As a result of a suggestion made by G6RB, it is probable that future meetings will be held on Thursdays coinciding (as near as possible) with the full moon, to reduce black-out inconvenience.

The "G5FS Memorial Trophy" has been awarded for the year 1939 to G3YH, in view of his consistent battery low-power work, carried on under difficult conditions.

It is learnt that G4CM is in France whilst 3RQ and 3HN are "somewhere in England."

G8DA, 8LB and 8ML recently visited G3LZ at Sedgeberrow, and were pleased to see him well again. He is eager to resume his R.N.V.W.R. activities.

G8DT and 8ML have had their Morse keys returned and, with the aid of G5BK's sounder, Morse practices are now regularly held. Meetings take place every Friday at G8DT, 22 Leckhampton Road, Cheltenham, and visitors will be welcome.

DISTRICT 7 (Southern)

Croydon.—The Surrey Radio Contact Club is tackling the problem of keeping amateur radio going in no half-hearted fashion with regular meetings, whilst October saw the introduction of "QRX," a monthly news sheet, initiated with the excellent idea of keeping their members now abroad, or in other parts of the country, in touch with local affairs and with each other. Copies may be obtained

(price 3d.), from either A. B. Willshire, 14 Lytton Gardens, Wallington; or S. A. Morley, 22 Old Farleigh Road, Selsdon, South Croydon. Basil Wardman (G5GQ), the scribe, has in the first issue set himself a very high standard, and in consequence produced a worthwhile source of news which will, no doubt, be eagerly anticipated by local members.

Guildford.—As far as can be ascertained by the D.R. (who is carrying on the job of T.R. for the present), the number of members left in the vicinity who could get to a meeting in spite of petrol rationing and the black-out is so very small that it will not be possible to run them at the previous venues. It has been decided, therefore, to hold meetings on the first Sunday in each month at different local QRA's. Those wishing to attend can obtain details from the D.R.

G8LT has been granted a commission in the R. C. of Signals. 8NT has been detailed to G.P.O. radio work somewhere in the south. 8IX has constructed a 28 and 56 Mc. superhet which is performing exceedingly well.

G5WP.

DISTRICT 8 (Home Counties)

Up to the time of going to press it has not been possible to hold a District Meeting, as the regular meeting place in Cambridge, is not yet available. Some members have written to, or called upon, the D.R. and news from other members will be very welcome.

At present we are not aware of any District member serving with H.M. forces, but several are engaged on Civil Defence. G2XV is experimenting with methods of cutting quartz. 5JO is converting his shack into a workshop and hopes to do some model-making. 5DR is in the Auxiliary Fire Service, while 5BQ has been busy with billeting, and as an air raid warden. 5DQ does a good deal of listening, and has designed a pre-selector. 2PL is working with Standard Telephones, at New Southgate, and is, we understand, a frequent visitor to G6CL. 4AZ, aiming at 30 w.p.m. is practising as per Webb's advertisement! 5OV, and 5PU, are on aero work "somewhere in England," and are therefore particularly busy. 3WW, who is clerk to a county council, reports that he has no leisure time to occupy, but 3BK is doing some constructional work. 2DSL, who was with G.E.C., at Coventry, has unfortunately had to relinquish his appointment owing to ill-health. 2HIF, of Bridlington, is at Sidney Sussex College, and is welcomed to the District. XZ2DY, who has been in England for some months, is due to return to Burma almost immediately. We wish him "bon voyage," and hope to resume contacts with him at an early date.

G5BQ.

DISTRICT 9 (East Anglia)

We are glad to record that the threads of "Ham Radio" are once again being picked up, and that our members are attempting to adjust themselves to the very different set of conditions now prevailing.

The D.R. wishes to support Council's view-point, that we must all stick together so as to be able to present a united front at the cessation of hostilities.

Most local members are undertaking one form of National Service or another and the names of those in H.M. Forces will be found in the official lists. It is hoped that the D.R. or headquarters will be informed of others which may have been missed out.

Yarmouth (which has never looked back since our Secretary's visit two years ago), seems to be doing the most sensible thing, by keeping going with local meetings. Even if it's only a ragchew at one of our shacks, what could be better? Please let the scribe have reports if you wish these notes to continue.

G2XS.

DISTRICT 10 (South Wales and Monmouth)

Cardiff.—Six members were present at an informal meeting held here on October 15 when the position of radio amateurs in wartime was discussed. It was decided that future meetings should take place monthly at alternate QRA's. A cinema show was arranged for October 29 at which the local N.F.D. films and others were displayed.

The local group send best wishes to G6FO, GW8NP and 2DXS who are now with the Services. Those remaining "active" in Cardiff include GW2UH, 2XZ, 3VL, 4KQ, 5AB, 5XN, 8AM, 8UH, 8WU.

DISTRICT 12 (London North and Hertford)

The first of the war-time series of "fireside chats" was held at G6CL on Sunday afternoon, October 29. The meeting was a great success, sixteen members being present. It was good to see many old faces again and to get back for an hour or two into the spirit of "Ham Radio" after the changed conditions which most of us have been forced to live in for the last two months. The meeting developed into a general ragchew and some amusing tales were told of happenings in the early days of September when "The Visitations" took place. We were pleased to welcome from other Districts, G2WV (D.R. for South London), 8KZ and GM8TT.

If the response appears to justify it, endeavours will be made early in the New Year to arrange one or two meetings at the Orpheum Cinema, Temple Fortune, to enable the North London groups to get together. G5FA will be glad to hear from anyone willing to organise meetings in his immediate locality.

Our congratulations to G3DT who recently married a YL "AA" from South London, and also to G5DV (omitted from what would have been the September notes) whose wedding was attended by G5CW and 3MS.

We have been pleased to hear from G3GX, 5CW, 8DR, 8NV, and 8TK who are serving in H.M. Forces along with others in the District.

A disappointed man was 2FVX who received notification that he had passed his Morse Test two days before the "close down."

The next North London area meeting will be held at G5FA, 35 Torrington Gardens, N.11 (telephone, Enterprise 4347). Trolley bus 521 to Blake Road or tube to Bounds Green Station.

G5FA.

DISTRICT 13 (London South)

Apologies are offered for the absence of notes under this heading in the September and October issues. This was due to the D.R. being away "in the country." A rapid survey has now been made in South London and the first meeting under present circumstances has been arranged for 3 p.m. at Brotherhood Hall, Norwood, on November 25. It is hoped that all members will do their best to be present as it is vital to the interests of the Society that everyone should do his utmost to keep things going. Several of our T.R.s have left the District,

but those who remain are doing their best to cope with the situation. May we therefore appeal to all to support such meetings as we are able to arrange. The D.R. would welcome any suggestions and comments.

May we here and now offer a word of praise to the Secretary-Editor and his "home office" for carrying on so splendidly; it is up to every District to follow this lead, so please do not let South London down. Good luck to all.

G2WV.

DISTRICT 14 (Eastern)

Should these notes reach members of the district who are serving or doing National Service, the D.R. will welcome news from them.

Chelmsford.—Local members remaining at home are determined to keep in contact "for the duration" and to continue experimental work. At the first meeting since the outbreak of the war, which was attended by G5RV, 6LB, 2AJF, BRS3650 and Mr. F. Varney, it was agreed to resume normal local meetings on the first Monday in each month. All visitors will be especially welcomed.

G5RV is preparing to build cathode ray apparatus and testing gear which DX hunting had previously held up. G6LB plans a big receiver overhaul. 2AJF is in the R.A.F. Reserve and is dreaming of his wings. BRS3650 reports listening activity. G2KG is doing his bit as a Lieutenant in the R.E.'s. VK2XC has a commission as Sub-Lt. R.N.V.R. (Aux.).

G3SI has received a letter of thanks from the Royal Lifeboat Society in connection with an S.O.S. he picked up from a French trawler on the 7 Mc. band.

DISTRICT 15

(London West, Middlesex and Buckinghamshire)

A few reports have come to hand including one from the Hayes T.R., G8FA, who was called up with the C.W.R. and not as a militiaman as reported last month. He wishes to be remembered to all in the District including G8KZ. He is with G3MC and both would welcome a letter from anyone sent *via* the D.R.

South Middlesex.—G2VV reports that G8MK who is "somewhere in France," would welcome letters which should be addressed 6010572, Sig. Campbell, 32 W/T Section (GHQ), Royal Corps of Signals, B.E.F. 2KI is on the Wireless Register. 2NN is also down for National Service, but at present is doing A.R.P. work. 8SM is on police work, while 2VV is engaged in Government work (radio communication). Local members manage to keep contact.

West London.—G3UQ has been unemployed, 4AR and 4FS are waiting for calling-up papers, 8KZ is a chief warden on A.R.P., 8VM is expecting to go to sea, 3XI is taking a "Poly" W/T course, 2DVD and 2BAJ expect to be called up shortly, G6CO will be glad to receive visitors but a p.c. first please, 2CYF is on A.R.P., whilst 6RW is busy on receivers.

Wembley.—G5SR and 2UM are training Radio Officers for the Merchant Navy, 6WN is busy keeping track of members, 4MT is in the R.A.F.V.R.

Edgware.—Monthly meetings take place in conjunction with the Edgware Radio Society who are holding their Annual Dinner on November 25. Details can be obtained from G3HT who has joined the staff at Webb's Radio.

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Local news is scarce but we learn that BRS2398 is now in the R.A.F. in Bedfordshire. 2DLY is experimenting with C.R. Tubes.

The D.R. will welcome news of members who have joined the forces and he promises to write to as many as his limited time permits. He would like home-side members to write to those who have been called up and suggests that the latter may like to send their replies in a form which would enable them to be included in the District Letter Budget which should be revived to enable us to keep in closer touch. The letter from G8FA is an example of the necessity of the budget as he sends word to several members therein. May we solicit your support wherever you may be?

G6WN.

DISTRICT 16 (South Eastern)

As reported elsewhere, Mr. W. H. Allen (G2UJ), D.R. for South-east England, is now with the B.E.F. in France. Until an acting D.R. is appointed T.R.'s and others with news for these columns should write direct to Headquarters.

Mr. W. A. Scarr (G2WS) until recently D.R. for the East Midlands and now resident at 8 Beckenham Grove, Shortlands, Bromley, has offered to act as T.R. for Bromley and Beckenham. Members within easy reach of these towns are asked to get in touch with Mr. Scarr, who is anxious to arrange meetings.

DISTRICT 17 (Mid. East)

On Sunday, October 29, the Grimsby and District Short Wave Society held its first meeting since the beginning of the war. Among those present were G2VY, 3YQ, 4GZ, 5GS, 6AK, 8VI, 8CI, 800, 8KH, 2AJV and BRS3699. It was unanimously agreed that the Society should continue to hold regular meetings and to carry on its work as far as possible.

The D.R. will be glad to hear from members in the District, especially those who are in the Services. G5GS.

SCOTLAND

Several districts have recommenced regular meetings, or are about to do so, but in remaining districts transport difficulties, etc. may prove insurmountable. Members living in such districts who are able to attend meetings in adjoining areas will be welcome.

"A" District.—A meeting of "A" District members took place in the Coffee Room of the Y.M.C.A. Residential Club, 100 Bothwell Street, Glasgow, on Sunday, October 22 at 2.45 p.m. Mr. Jack Wyllie (GM5YG), Vice-President, addressed those present, stressing the necessity of carrying on and pointing out that it was a duty we owe to those members at present serving with H.M. Forces. He also suggested how best we might occupy our leisure moments, now that we are "off the air," by analysing the results of our past experiments. A discussion took place as to ways and means by which we might create some interest to keep the membership together. In this connection a committee was elected to deal with the matter. The members of the committee are GM6WD, 5ZX, 8HJ, 3AR and 6JD. The next meeting will be held in the same place, same time, on November 19 and any R.S.G.B. member, service or otherwise, who may be in Glasgow on that date will be made welcome.

Members will be glad to learn that the Glasgow Band Occupancy Check Group distinguished themselves in the April Check by recording the greatest

number of stations active on the four bands. GM6JD thanks his group, namely BRS1295, 2CHN and GM8RM for their excellent co-operation and fine effort. It was fully appreciated by G5WI.

"B" District.—A meeting was called for November 5 to discuss arrangements for the continuance of meetings and also to elect a new D.O. in place of Mr. R. McRobb who was elected D.O. in August. The latter expects to be leaving to take up a new appointment shortly.

"C" District.—Meetings will probably be resumed before these notes appear in print.

"H" District.—Expect to resume meetings soon.

Correspondence

To the Editor, THE T. & R. BULLETIN

DEAR SIR,—*"Relax and Let Yourself Go"* was the message contained in our October advertisement. Evidently the block for that advertisement took this message to heart to such an extent that it jumped clean out and came back upside down, being published in this position!

We should like to point out that although our Home Constructors corner horn or our more elaborate one for that matter, can be used upside-down, it is desirable when this is done to hoist it up so that the bass chamber opening comes near the ceiling so that its radiations are confined by walls and ceiling to $\frac{1}{4}$ th of a sphere and in order that the mouth of the horn proper shall come at the height at which a window, looking through into the studio, would normally be placed.

If the corner horn is merely turned upside-down so that the mouth of the bass chamber is half way between floor and ceiling, the bass chamber is not loaded perfectly, while for the sound to emerge near the floor is unnatural and prevents the result from becoming really lifelike.

Yours faithfully,

VOIGT PATENTS LIMITED.

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(Director, Voigt Patents Ltd.)

(Editorial Note.—We understand that owing to urgency the block in question was posted direct to our printers by another Journal, and our Advertising Manager did not see a "pull" of the illustration until it appeared in our October issue.)

"The Wireless World"

When *The Wireless World* made its welcomed re-appearance on October 20 as a monthly periodical, many seasoned readers were quick to appreciate the revision to the format which was so popular in earlier days. The smaller style provides a more compact and companionable publication.

The October issue contained many important technical contributions, ranging in scope from a lengthy treatise on Gramophone Record Scratch to a description of the new "steerable" short-wave aerial used for D.F. work. The usual topical features and carefully prepared reviews (including a full description of the Pye International Model 906) appeared, in addition to a brief description of recent inventions.

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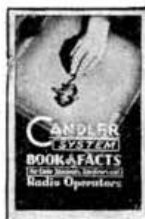
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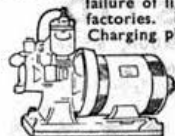
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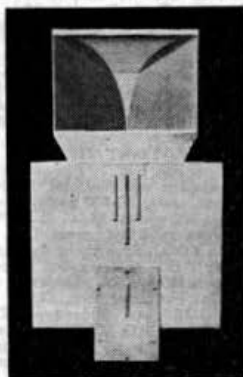
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SECOND LIST

WE are proud to publish a second list of amateurs who have joined H.M. Forces. In several instances details have reached us indirectly (especially in the case of members serving with the B.E.F.), therefore, although every effort has been made to avoid errors, it is possible that some may have occurred. In order to keep our Roll up-to-date we again ask all members to advise us of their service details as soon as possible after enlistment. Particulars should be sent to the Secretary-Editor, R.S.G.B., 16 Ashridge Gardens, London, N.13.

The present list contains information received up to November 2.

Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
2nd Lt. R. W. Addie ...	R. C. of S.	G8LT
A.C.2 W. H. Allen ...	R.A.F. ...	G2UJ
Sig. E. P. Appleby ...	R. C. of S.	G8ZD
P./O. H. Assig ...	R.A.F. ...	G5HI
A.C.2 D. R. Aston ...	" ...	G8DR
A.C.2 E. F. Baker ...	" ...	G5OQ
Sig. H. G. Baker ...	R. C. of S.	VU2BM
Sgt. C. F. Barnard ...	R.A.F. ...	G8AC
Sig. W. E. Bartholomew ...	R. C. of S.	G8CK
Gnr. P. M. Bartlett ...	R.A. ...	G3OK
Cpl. H. E. Bennett ...	R.A.F. ...	G8PF
Tpr. D. G. Blair ...	R.A.C. ...	G8VU
—A. W. Blow ...	R. C. of S.	G2TT
—J. L. Bowes ...	R.A. ...	G4MB
Sgt. H. D. Bramwell ...	R.A.F. ...	G2RF
Drv. I/C. E. Brannan ...	R.A. ...	2HHW
Tel. J. H. Brazzill ...	R.N.V.R. ...	G3WP
A.C.2 D. E. Bridges ...	R.A.F. ...	BRS.
		935
Lt. W. G. P. Brigstocke ...	R.N. ...	G5ZQ
A.C.2 M. A. Brookes ...	R.A.F. ...	G5OI
A.C.2 H. C. Broom ...	" ...	2CWW
Tel. A. H. Broomfield ...	R.N. ...	G6OQ
Sgt. A. L. Browning ...	R.A.F. ...	G8TK
A.C.2 M. Buckwell ...	" ...	G5UK
Cpl. R. A. Butterworth ...	" ...	G8BI
Capt. R. H. B. Candow ...	R.A.O.C. ...	GM5SC
—J. C. Carslaw ...	R. C. of S.	2ACY
Pte. P. E. Chipperfield ...	R.A.O.C. ...	2FBH
—J. R. Christophers† ...	R.N. ...	BRS.
		3051
L./Tel. R. Clark ...	" ...	G6BJ
A.C.2 L. J. Cleggett ...	R.A.F. ...	BRS.
		2834
Sig. J. Cleghorn ...	R.E. ...	GM3BZ
A.C.2 B. Coia ...	R.A.F. ...	GM3HY
A.C.2 N. Coleman ...	" ...	2DHL
Stf./Sgt. C. Collins ...	R.A.O.C. ...	G8SC
A.C.2 R. J. Cooper* ...	R.A.F. ...	G8BX
A.C.2 V. T. S. Cribb* ...	" ...	G3AN
Mid. L. Davie ...	R.N. ...	BRS.
		3457
A.C.2 D. F. Davies ...	R.A.F. ...	G3RQ
A.C.2 L. S. Davies ...	" ...	G3ZF
L.A.C. A. Dickinson ...	" ...	G4DP
Act.W.Tel. J. Dickson, B.Sc.	R.N.V.(W.)R.	G2HV

Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
A.C.2 H. C. Doherty ...	R.A.F. ...	G4HP
A.C.2 E. R. Dolman ...	" ...	2DCG
Sig. T. P. Douglas ...	R. C. of S.	GM3BA
Tpr. N. Druce ...	4th Cty. of Lon. Yeo.	BRS.
		2600
Lt. A. F. Deane-Drummond	R. C. of S.	BRS.
		1593
Sig. A. Dunn ...	" ...	G3PL
Gnr. H. H. Eyre ...	R.A. ...	G5KM
A.C.2 R. H. Farr ...	R.A.F. ...	G8IJ
A.C.2 H. M. Fenton ...	" ...	G8GG
Gnr. D. W. Flavell ...	R.A. ...	G3PG
Sgt. J. M. Fleet ...	R.A.F. ...	GW8JY
Ft./Lt. A. Forsyth ...	" ...	G6FO
—L. Frank ...	R.A.O.C. ...	G4NU
Sgt. W. B. Gilhespy ...	R.A.F. ...	G6GS
A.C.2 C. H. Gould*	" ...	2FGH
A.C.2 G. W. Guy*	" ...	G8TH
A.C.2 N. Guy ...	" ...	G2DN
Spr. L. Hardie ...	R.E. ...	2FHH
Prob. Sub.-Lt. G. Henderson.	R.N.V.R. ...	G8JV
A.C.2 J. A. Hobson ...	R.A.F. ...	G5BX
Capt. W. D. Horniman	R. C. of S.	BRS8
2nd Lt. D. G. Hull ...	" ...	BRS.
		2933
Sgt. G. Hutson ...	R.A.F. ...	G6GH
Sgt. F. Inchley ...	" ...	G3AG
P.O.Tel. H. T. S. Jeal ...	R.N. ...	G8HH
A.C.2 W. D. Johnson ...	R.A.F. ...	G8NS
Ft./Lt. K. Jowers ...	" ...	G5ZJ
A.C.2 G. F. Keen ...	" ...	2BIL
A.C.2 E. Kestin ...	" ...	G3ZL
A.C.2 L. S. King ...	" ...	G4IB
A.C.1 N. Kirby ...	" ...	G6FV
P.O. J. Kippax* ...	R.N. ...	G8AK
—J. M. Kirk ...	R.E. ...	G6ZO
C.Q.M.S. C. W. Kirk ...	" ...	G4CL
Cpl. B. Lagden ...	R.A.F. ...	G3GX
Ft./Sgt. A.E. Lambourne	" ...	G5AO
Gnr. W. Lee ...	R.A. ...	G6LZ
A.C.2 T. A. Lewis ...	R.A.F. ...	2FTO
P./O. G. G. Livesey ...	" ...	G2LX
Maj. W. H. Lloyd, M.C.	R. C. of S.	G5TV
A.C.2 T. M. Lott ...	R.A.F. ...	2CIN
A.C.2 J. F. Lucas* ...	" ...	G2HK
Sgt. E. A. Luckhurst ...	" ...	G3DB
Sig. F. E. Marshall* ...	R. C. of S.	G2XQ
L.A.C. N. H. Meanwell	R.A.F. ...	2BIC
A.C.2 C. E. D. McLean*	" ...	2CLS
A.C.2 C. G. Merrison*	" ...	2ADJ
Sig. G. B. Moss ...	R. C. of S.	G4NB
Sgt. P. C. Mortimore ...	R.A.F. ...	G8KI
Gnr. J. Nelson ...	R.A. ...	G6XG
A.C.2 M. A. Newman ...	R.A.F. ...	G3DZ
Ft./Lt. L. E. Newnham	" ...	G6NZ
Spr. N. V. Nichols ...	R.E. ...	BRS.
		3376
A.C.2 A. Oughton ...	R.A.F. ...	G8BQ
War.Tel. W. J. Page ...	R.N.V.(W.)R.	G3PA
F./O. C. H. Parsons ...	R.A.F. ...	GW8NP
A.C.2 T. Paton* ...	" ...	2DVV

Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
Mid. A. J. R. Pegler ...	R.N. ...	BRS. 3182
A.C.2 R. D. Pettigrew	R.A.F. ...	G4BQ
—M. Pittam ...	R.N. ...	BRS. 2977
F./O. C. R. Plant ...	R.A.F. ...	G5CP
Tel. C. W. Plimmer ...	R.N. ...	BRS. 2786
A.C.2 J. Pollard ...	R.A.F. ...	G3IY
P.O.Tel. H. Punch ...	R.N. ...	G6UR-ZBIR
A.C.2 V. C. Raynor ...	R.A.F. ...	G6FZ
A.C.2 W. T. Rees ...	" ...	GW3CR
A.C.1 V. Richardson	" ...	G4NG
A.C.2 R. W. Roberts ...	" ...	BRS. 3704
A.C.2 A. D. Rock ...	" ...	G8PR
L.A.C. R. W. Rogers ...	" ...	G6YR
F./O.(Med.) J. Scholefield.	" ...	G2TR
A.C.2 H. W. Simpson, B.Sc.	" ...	G8DI

* Non-members.

† Recorded as R.A.F. last month.

‡ Recorded as G4MG last month.

Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
Spr. R. G. Smith ...	R.E. ...	BRS. 2947
A.C.2 J. Starkey ...	R.A.F. ...	GW6KY
A.C.2 P. Stein ...	" ...	G8NV
Pte. D. Sutton ...	R.A.O.C. ...	G3NB
A.C.2 H. M. Swann ...	R.A.F. ...	G5MS
A.C.2 T. O. G. Tallboys	" ...	2ATK
A.C.2 P. E. Taylor ...	" ...	G4RX
Sgt. P. Tremaine ...	" ...	G8PB
A.C.2 M. Trier ...	" ...	G8VH
Sig. A. E. Tupman ...	R. C. of S.	G3ID
Cpl. C. D. S. Underwood	R.E. (Postal Section)	G5UD
P.O. E. Vaughan ...	R.N. ...	G2VA
D.R. G. Verry ...	Anti-Tank C.	2CDQ
Sig. G. F. Wakefield ...	R. C. of S.	G5WG
2nd Lt. N. T. Warren...	R. C. of S.	2BLB
Lt. T. C. Whimster ...	R.A.O.C. ...	G8UJ
A.C.2 T. S. White ...	R.A.F. ...	G4DS
Tel. H. P. Wiggins ...	R.N. ...	G2CP
F./O. G. H. Williams...	R.A.F. ...	G3BI
Cpl. T. B. Wimbush ...	" ...	G6HP
Pte. R. J. Woods ...	R.A.O.C. ...	2AJD

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" 3.5 and 7 Mc. ...	15/- ± 2 kc.
" 14 Mc. ...	30/- ± 5 kc.
(b) 100 kc. ...	15/6 ± 0.1 kc.
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(b)—(5×10 ⁶)	

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TO ADVERTISERS

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A SIMPLE CARD INDEX SYSTEM—

(Continued from page 216)

enter any additional information on existing cards. The presence of a card in the index is then proof that a QSL has been sent.

To sum up, the facilities offered are:—

(1) Quick reference as to whether a station has been worked before, with a consequent saving in QSL cards.

(2) Check on QSL's received.

(3) To see at a glance how many times a particular station or prefix has been contacted.

(4) A handy cross-reference to the station log, enabling the operator to turn up the correct page for further details.

No one who takes the trouble to prepare an index will ever regret the initial work involved.

HEADQUARTERS CALLING

Life Membership

We would direct the attention of members to Article 27, which states that "At any time after election to the Society members may, subject to the approval of Council, commute all future annual subscriptions, by payment of ten guineas, which shall entitle such members to all privileges and rights of ordinary membership for the remainder of their lives."

Applications for Life Membership should be addressed to the Secretary-Editor.

Changes of Address

Members in H.M. Forces who anticipate changing their address at frequent intervals are urged to arrange for THE T. & R. BULLETIN and other Society correspondence to be sent to their home address. Providing re-direction is made without delay no extra stamp is required on the wrapper or envelope.

Magazines for Members on Service

Several members serving abroad with the B.E.F. have intimated that they would be glad to receive technical and other magazines. Those in a position to forward books direct to France are asked to write to Headquarters for the names and addresses of Service members who have informed us that they would like to receive them.

Service members are likewise asked to communicate with Headquarters in this connection.

Ham Hospitality

Apocryphal the editorial comments which appeared in our last issue it has been suggested that Headquarters should prepare and publish lists of civilian members who would be willing to entertain service members stationed in their neighbourhood.

We shall be glad to put the suggestion into immediate effect as further proof of our desire to render maximum service to our members.

Santa Claus Knocks Early

One of our senior overseas members has forwarded the Secretary-Editor a cheque for 30s. which he wishes to be devoted to the purpose of sending ten copies of *The Amateur Radio Handbook* to members with the B.E.F.

Any member serving in France who would like a copy for his kit bag should send a note to Headquarters, but remember, first come—first served.

Our Dominion friend, who insists upon remaining anonymous, hopes that his offer may induce other members, at home and abroad to forward donations for a similar purpose. As there are a large number of our members in France, we trust his suggestion will receive the support it deserves.

Meanwhile we record our thanks to the originator of this Santa Claus example of "ham spirit."

Back Issues

It is essential during war-time that no more copies of each issue of THE T. & R. BULLETIN be ordered than are absolutely necessary. In past years members have allowed their subscription to lapse for

several months and then asked to be brought up to date. This has generally been possible but under present conditions, where paper must be conserved, and storage space is valuable, we cannot load Headquarters with big stocks of back issues on chance.

Members will greatly assist us by renewing their subscription promptly thereby making sure that their copy of THE BULLETIN arrives regularly each month.

Members Notepaper

To meet the wishes of many members we have decided to again stock Members Notepaper. This is now available in packets of 100 sheets at 3s. per packet, post free, or two packets for 5s. 9d.

American Handbooks

For the time being, due to import and foreign trading difficulties, we have decided not to purchase stocks of new American publications.

If trading restrictions ease later, it is anticipated that limited supplies of the A.R.R.L. and *Radio Handbooks* will become available.

QST Subscriptions

Due to the alteration in sterling exchange, we have been compelled to raise the QST subscription rate from 12s. 6d. to 15s. per annum. Members who have, in the past, subscribed direct to the A.R.R.L. or have purchased copies from booksellers would be well advised to pass their order through the Society in view of the present difficulty of sending money out of the country.

Reseau des Emetteurs Francais

We have received official information to the effect that our sister society in France, the R.E.F., has suspended operations for the war period. All services operated by R.E.F., including the QSL Bureau and the publication of the journal *Radio R.E.F.* are affected by this decision.

New Members

HOME CORPORATES

- J. L. WINTER (BRS3711), 125 Balmoral Road, Morecambe, W.E.
 N. BRANDON (BRS3712, 2BZN), 221 Fox Lane, N.13.
 SIGNALMAN J. HARRIS (BRS3713, 2ATZ), Royal Corps of Signals, Eastern Command H.Q.
 R. M. WALLACE (BRS3714, 2BQZ), 69 Dens Road, Dundee, Angus.
 J. CHEEVERS (BRS3715), 16 Border Street, Greenock, Scotland.
 B. H. GREEN (BRS3716), 31 Monivea Road, Beckenham, Kent.
 S. VINICOMBE (BRS3717, 2BTD), 2 Elmore Road, Horfield, Bristol, 7.
 F. W. WHITWORTH (BRS3718), 109 Torbay Road, Harrow, Middx.
 G. W. CHAPMAN (BRS3719, 2HFV), "Dorame," White Close, Plomer Hill, High Wycombe, Bucks.

DOMINION AND FOREIGN

- R. R. WITCHELL (W6NHK), 612 N. Linden Drive, Beverly Hills, California, U.S.A.
 W. E. KING (BRS480), Bank of British West Africa Ltd., Minna, N. Nigeria.

QSL Section

Is your Call Sign here ?

To assist the Section to clear its files of unclaimed cards, will the owners of the undermentioned calls please forward at least one stamped, addressed envelope to Mr. A. O. Milne, 29, Kechill Gardens,

Hayes, Bromley, Kent? If you do not want your cards, will you please send a post card and say so; we can then destroy all cards for your call, as they come in.

Some of the cards in file at present are too good to be destroyed without one last effort being made to have them collected. If only some members could see what is in store for them! MX1A, CR4, SV6, VS6, Nevada, New Mexico, U4, U5, U6 and others which the average aspirant to the DX Club would give his sugar ration to possess!

No further lists of this type will be published and all outstanding cards for the calls listed will be destroyed after a lapse of six weeks from the date of publication of this issue of THE BULLETIN.

At least three, and in the majority of cases more than six cards, are waiting for the following calls:—

G2: AN, AV, CY, DD, DF, DJ, DN, FJ, FT, FV, GH, GM, GP, GR, GU, GW, HO, KS, LQ, MY, NM, RD, RK, RN, TF, UB, US, VT, VX, XA, XF, XU, YK.

G3: AL, BI, CA, CL, CU, DT, FD, FS, FY, GN, GO, GQ, GV, HA, HU, IA, ID, IG, IO, IP, IY, JA, JS, KF, KV, KY, LH, LN, LU, LV, LW, MC, MG, ML, MM, MO, MQ, MT, NL, OB, OF, OX, OZ, PG, PI, QA, QW, QZ, RR, RS, RT, RV, RX, SV, TB, TS, UD, UN, UP, UY, VG, VH, VO, VT, VU, WN, WT, WY, XB, XC, XF, XL, XU, XX, XY, YC, YM, YW, ZN.

G4: AK, AM, AT, AX, BC, BM, BO, BP, CD, CR, DJ, DN, FX, GF, GJ, GY, GZ, HF, IK, IU, IY, JC, JL, JK, JM, JP, JQ, KC, KF, KJ, KO, KW, LB, LF, LG, LJ, LO, LT, LW, MA, MB, MC, MD, MI, MS, MV, NH, NI, NR, NS, OB, OC, OD, OH, OJ, ON, OR, OT, PA, PC, PH, PK, PN, PP, PQ, PS.

G5: AP, AX, CH, CL, DS, DW, FK, IC, IR, JL, JZ, LF, MH, MR, OV, QX, RJ, RQ, SC, SJ, SS, SX, TI, TZ, UB, UF, UQ, VD, WG, XJ, XT, XW, YC, ZU, ZY.

G6: AD, DT, DY, FB, GZ, HT, HX, HZ, IL, IO, IR, JB, JV, JX, KK, KT, KU, KX, LD, LZ, MK, MM, MN, NB, NC, NL, NP, NY, OR, OS, QA, QF, QS, QV, RA, RR, SC, SJ, SQ, ST, UC, UM, UR, UT, UX, VN, VQ, VS, WJ, WO, WR, WT, WU, XM, XR, YX, ZG.

G8: AL, BX, CG, DO, DO, DU, FG, FZ, GC, GI, GM, GS, HC, HG, HL, IK, IS, IT, IX, JT, KM, KO, KR, KW, KX, LC, LN, LO, MA, MV, NB, NI, NV, OA, OD, OI, OS, OU, PC, OI, OR, OV, QX, RB, RD, RS, RX, SB, TK, TV, UC, UI, UP, UR, UT, UV, VI, VO, WH, WV.

It is suggested that in cases where a member knows that a friend, whose call is listed above, is on Active Service, it would be helpful to collect his cards for him.

G2MI.

A "Ham Radio" Crossword

The following is the solution of the crossword puzzle published in our last issue:—

ACROSS.		DOWN.	
1. Flat top	23. Len.	1. Feeders.	16. Nitre.
2. Beam.	24. Steel.	2. Lax.	17. Doe.
8. Each.	26. Islet.	3. Acc.	19. Ill.
9. Excite.	28. Leech.	4. Thine.	20. Entered.
11. Soft.	30. Sere.	5. Owed.	25. A leak.
13. Nodes.	31. Reaper.	6. Basso.	27. Sharp.
15. Ended.	34. Rave.	7. Met.	29. Ergo.
18. Noise.	35. Link	10. Toddle.	30. Sol.
21. Rio.	35. Coupled.	12. Fusee.	32. Pal.
22. Dot.		14. Entice.	33. Eve.

"The Englishman's Home"

Members who have seen the British film "The Englishman's Home," which has been showing in London, will be interested to learn that Douglas Walters, G5CV, supplied the apparatus for the transmitter, and other gadgets around which the whole plot rotates. He also wrote much of the scenario for the radio scenes and assisted in their direction when the film was "shot" at the Denham Studios. Desmond Tester takes the part of the "ham" whose station was operated under the imaginary call G7EY.

The plot concerns two spies who turn the station into a beam station which directs German planes over London in thick fog. The planes drop men and guns by parachute—and then the fun starts. The R.A.F. co-operated by loaning planes.

The film was originally banned by the Air Ministry, but later passed.

The Wireless World Diary

Every amateur worth his salt will welcome the appearance of the 1940 edition of this popular Diary. To the men in the services, no less than to those at home, this handy compendium will prove infinitely useful, for as usual it contains a comprehensive technical section in addition to the diary entries which give a week per opening.

The very complete list of world broadcast stations, including those working on short-waves will be found particularly useful at the present time.

The valve tables which include base connections, have been considerably amplified to cover many new valves taken into service during the year.

Of particular interest to Society members is a list of British transmitting valves. It is unfortunate that for the moment this information loses some practical value, but its inclusion will nevertheless be appreciated.

For the modest price of 1s. 6d., *The Wireless World Diary* is worth its weight in "electrons"!

* * * *

Footnote.—How about sending a copy to your pal with the B.E.F.? Forward his name and address together with 1s. 8d. to Headquarters and leave the rest to us.

Mullard Technical Bulletins

No. 9 of the series of Technical Bulletins issued monthly by *Mullard Wireless Service Co. Ltd.*, Century House, London, W.C.2, contains a further comprehensive article dealing with the characteristics of frequency changer oscillator circuits and Part 2 of an article entitled "Carrier Waves with Asymmetrical Side Bands." An instrument for measuring self inductance and capacity is also described.

For the advanced student or radio engineer these Bulletins are of the utmost value. Applications for copies should be made to the above address making mention of this Journal.

EXCHANGE AND MART.

Advertisement Rates

MEMBERS' private advertisements 1d. per word, minimum 1s. 6d.

TRADE advertisements. One inch Semi-Display (max. 50 words), 10s., half inch (max. 25 words), 5s. TERMS: Cash with Order. All copy and payments to be sent direct to Advertisement Managers, Parrs Advertising Ltd., 121 Kingsway, London, W.C.2, by not later than the 30th of the month for the following month's issue.

BACK NUMBERS of Radio and QST wanted. —J. C. GRAHAM, Aberdeen Airport, Dyce, Aberdeen.

G6DS.—Known the world over for quality. QSL Cards and Log Books. Send for samples. —QRA, 14 Lambley Avenue, Mapperley, Nottingham.

THERE'S a "HAM-AID" to suit everyone. Samples from G6XT.—TILLOTSON BROTHERS, Commercial Street, Morley, Yorks.

McELROY STRAIGHT MORSE KEYS. 20 patterns Morse telegraph keys in stock, including "Amateurs" model at 7s., Commercial at 12s. 6d., De Luxe at 15s. All post free. High Note Buzzers, wavemeter type, 1s., postage 2d.—WEBB'S RADIO, 14 Soho Street, London, W.1.

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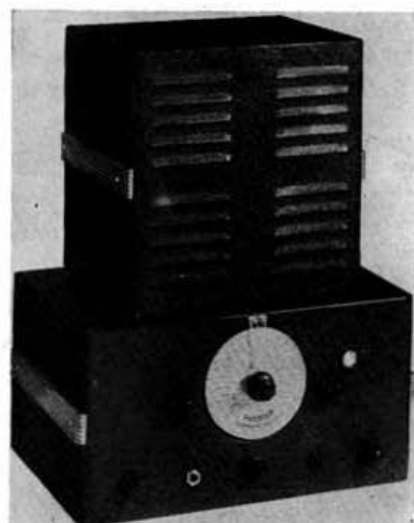
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