

THE T&R

# BULLETIN

A JOURNAL FOR  
**RADIO EXPERIMENTERS**

Vol. 15 No. 6

DECEMBER 1939 (Copyright)

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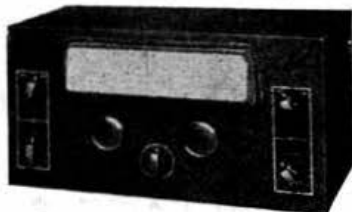
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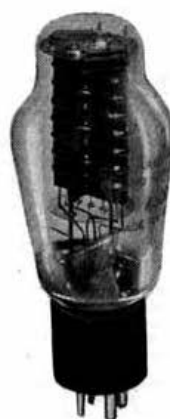
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or general interest. Intending contributors are requested to indicate in advance the scope to be covered by the article under consideration.

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OF GREAT BRITAIN



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AND ADVANCEMENT  
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## CONTENTS

DECEMBER, 1939

	Page		Page		Page
A Quiet Beat Frequency Oscillator Circuit ... ..	246	Experimental Section ... ..	259	A Week of Amateur Radio in Liechtenstein ... ..	264
Power Supplies, Part IV ... ..	248	Cosmic Notes ... ..	260	Random Reminiscences ... ..	267
Crystal Band Pass Filters, Part V ... ..	251	Standards of Radio Frequency ... ..	261	British Isles Notes and News ... ..	268
100% Image Rejection, at Low Cost ... ..	253	The Month "Off" the Air—November, 1939 ... ..	262	Headquarters Calling ... ..	273
Khaki and Blue ... ..	254	The 28 Mc. Band ... ..	263	On Active Service ... ..	274
New Feeder Developments ... ..	255	The 56 Mc. and 112 Mc. Bands ... ..	264		

## PER ARDUA AD ASTRA

TWENTY-ONE years ago this month thousands of young men were turning aside from the trials of war and hoping against hope that a "Blighty" pass would enable them to spend Christmas with their "ain folks." That many, including your present Scribe, were not among the lucky ones is beside the point, except that as we at home think of the new army of young men who will be spending *this* Christmas in unfamiliar surroundings it will perhaps be some small consolation for them to know that the old tag, "a fellow feeling makes us wondrous kind," has for many of us a deeper meaning than would otherwise be the case.

Looking back to the Great War (did we hear someone say "for Civilisation"?) we cannot help comparing the duties of the Wireless Section of the old Royal Flying Corps with those undertaken by the new R.A.F. The chief job of the 1915-1918 wireless operator was to act as "the ears" between a roving plane and the battery to which he was attached; his equipment was primitive (usually a Mark III tuner) and his only means of communication with the observing machine was by means of "white" ground strips which, sad to relate, seldom lived up to their name!

The two decades which have passed since the Armistice, have brought developments in a thousand directions, but it is doubtful whether any have been of greater significance than those appertaining to wireless communication.

Many of those who are carrying on the traditions established by the wireless operators of the last War, have accepted as a duty the task for which their hobby has fitted them. These men by their calling as radio amateurs are at heart kindly souls, desiring nothing better than to be allowed to return as soon as possible to that sanctum, which in peace time, passed under the name of "ham shack." But for the moment sterner tasks beset them, as they beset an earlier generation twenty odd years ago. That they will give a good account of themselves is a foregone conclusion, in fact high praise has already been bestowed upon the vanguard of R.A.F. Civil Wireless Reservists who went abroad in the early days of last September. The fact that many of our members were numbered among them, speaks volumes for the training they received as amateurs.

Their record, and the record of all other members who have answered the call, will stand for all time as a challenge against any who should attempt to belittle the value to the community of Amateur Radio.

With the coming of the New Year we would do well to keep constantly before us the motto of the Royal Air Force, for assuredly the time will come when this great Nation of ours will overcome all its difficulties and will pass on triumphantly to a lasting peace.

*Per Ardua ad Astra.*

J.C.

# A QUIET BEAT FREQUENCY OSCILLATOR CIRCUIT

By E. L. GARDINER (G6GR).

**M**OST users of superhetrodyne receivers, either of the commercial or home-made variety, will have noticed the aggressive hiss which so often assails the ear when the Beat Frequency Oscillator is switched on. This trouble is particularly noticeable in U.H.F. receivers, in which I.F. gain and band-width are both high. Admittedly it can be minimised by keeping the B.F.O. very weak, and by the selection of a low noise level triode for that stage, but in the former case the remedy prevents the full realisation of the increased signal strength which should result from the addition of a correctly adjusted beat oscillator.

A very useful improvement in efficiency can be attained through the use of a circuit which is well known in Telecommunications Engineering, but which seems to have escaped the notice of the designers of communication receivers. The writer claims no originality for the circuit here described, which will be found in any advanced textbook on the subject, but he has tested it out carefully in practice and has no hesitation in whole-heartedly recommending it to any amateur who does not mind the possible addition of an extra valve to his receiver.

## Push-Pull Detection

The essential requirement of this circuit is the adoption of push-pull detection, as shown in Fig. 1. Here two triodes have been used as the second detector stage, a 6N7 double-triode being very convenient for the purpose. It is quite satisfactory to use two diode detectors in an exactly similar circuit, and if the receiver employs a double-diode-triode (or its equivalent) in which the second diode is not needed for A.V.C. purposes, it can be pressed into use as additional detector. If A.V.C. is required it may then be necessary to add a separate diode, or possibly a "Westector" for simplicity.

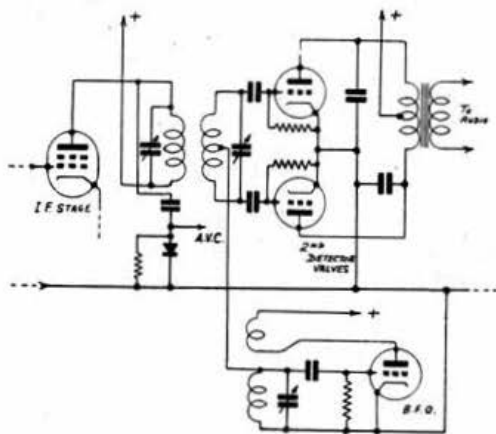
The advantage of push-pull triodes lies in the ease with which the necessary push-pull output connexion can be obtained by means of a centre-tapped audio transformer, or by two plain transformers having their primaries in series (thus providing a centre point) and their secondaries in parallel. An audio transformer will effectively match the impedance of triodes but if used to follow diodes a certain amount of distortion is theoretically to be expected, although it is very doubtful indeed whether this defect would be noticeable in amateur communication. A resistance load for each diode could be provided by those prepared to go to the complication of, for example, a paraphase I.F. amplifier. The writer prefers triodes however, and it must not be forgotten that the use of full-wave detection leads, in itself, to improved detector efficiency. Many amateurs will, no doubt, choose anode bend detection on account of its superior quality for telephony work, and will provide bottom-bend bias for the detectors. The simple grid leak and condenser arrangement shown has been found very sensitive on C.W. however, and is probably as good as any other for D.X. reception,

whilst the cancellation of direct magnetising current in the primary of the push-pull transformer seems to lead to very satisfactory impedance matching and pleasing reproduction.

## Theoretical Considerations

Considering now the main reason for the arrangement, it will be seen that the B.F.O. is injected into the centre tapping of the I.F. transformer which feeds the detectors. Practically, after trying several forms of coupling, it was found quite satisfactory to take this point to earth through the grid circuit of the oscillator, as shown. It is of course important for the best results from this, or any other B.F.O., circuit that the oscillator should not couple into the I.F. channel or into the detector through stray paths, and that it should be adequately screened. Direct coupling as shown, assists in this respect, because it is so tight that it will easily predominate over other forms of stray coupling, and in a particular receiver it was found sufficient to place the oscillator at a remote point on the chassis from the I.F. stages, structural screening being unnecessary. The actual strength of oscillation can be kept low whilst still providing an ample voltage at the detector grids.

Now since the B.F.O. is injected into the centre tapping of the I.F. transformer, it reaches the grids of the two detectors in similar phase, the two halves of the secondary winding merely acting as series impedances. But any voltages which are in the same phase at the two grids will cancel out in the anode circuits, producing no output from the push-pull audio transformer, provided, of course, that the detectors are properly balanced. Therefore, on switching in the B.F.O. any hiss in the oscillator due to valve noise, etc. (which can be regarded as modulation on the oscillator output) is not effectively detected, and so produces little or no noise in the audio stages.



Circuit of a quiet Beat-frequency Oscillator discussed in the text.



This argument only applies in the absence of signals. When a carrier arrives from the I.F. amplifier, it is induced into the I.F. transformer secondary in the correct manner for push-pull operation, producing voltages in opposite phase at the two grids. It is thus very efficiently rectified. The B.F.O. beats with the carrier in each detector, producing two audio beats which are in opposite phase at the respective anodes, and therefore add in the audio transformer to produce an audio signal of double the usual strength. Thus the circuit has the effect of greatly reducing B.F.O. noise in the absence of signals, whilst increasing the audio beat produced when a signal arrives. The vital requirement of quiet background is thus assisted.

A second useful feature of the system arises in its ability to overcome the usual trouble of the B.F.O. voltage getting into the A.V.C. system (as it must do if the latter forms part of a normal detector system) and thus paralysing the set if the B.F.O. is switched on whilst the A.V.C. is in use. Since in many sets the A.V.C. works an "S" meter, the latter is also more or less inoperative

signal will now be required to produce a given beat loudness, and we should expect the loudness of the audio signal to be greater.

Practical tests show the improvement to be striking. The receiver using this circuit was placed beside a well-known commercial receiver widely used by amateurs, and the same signal tuned in on both. For convenience in adjustment, a fairly weak telephony signal from a broadcasting station was chosen, and with the B.F.O. off in each case, the I.F. and R.F. controls were turned down until the modulation just disappeared in the speakers. This meant that each receiver was dealing with a weak carrier, just too weak to enable telephony to be read, and therefore of comparable strength at each detector, allowing for possible differences in detector efficiency and design.

On switching in the B.F.O. of the commercial receiver, the beat note became audible at about S1 to S3, a very doubtful R5 in the presence of interference. In the push-pull receiver, however, the switching-on of the oscillator brought up the carrier from inaudibility to a solid S7 to S8 beat, fully readable even under noisy conditions. Since

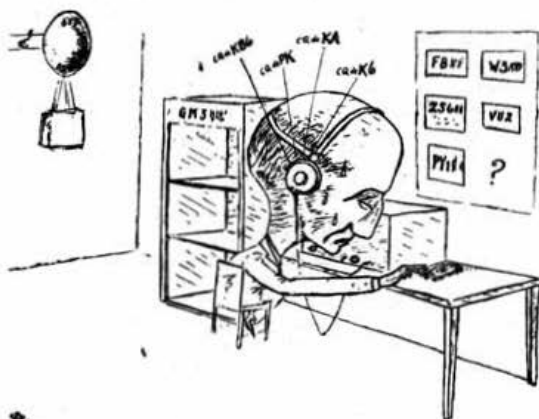
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and New Year Greetings to members everywhere,  
remembering especially those serving at sea, on land,  
and in the air.**

during the reception of C.W. If, however, a separate A.V.C. rectifier, such as the simple Westector shown, or a more advanced arrangement such as an amplifying stage and diode are connected to the primary of the I.F. transformer, then on the assumption that this transformer has a correctly balanced secondary, no B.F.O. voltage reaches the A.V.C. system. The R.F. current from the oscillator is flowing in opposite directions through the two halves of the secondary winding, and therefore will induce no energy into the primary winding if the latter is symmetrically coupled with respect to the secondary.

#### Practical Results

Under practical conditions the circuit described leads to a much improved beat-to-noise ratio. It is found that on switching on the B.F.O. very little hiss is heard, and this can be reduced to a minimum if necessary by careful matching of the two detectors, such as by a slight adjustment of grid bias on one of them. It is then possible to increase the amplitude of the oscillator by a factor of perhaps 10 or 20 fold, without introducing more than a very slight hiss in the absence of signals. The amplitude of the audio beat is given mathematically by the product of that of the signal and of the beat oscillator, and therefore increases, if, as in this case, it is possible to increase the oscillator amplitude without introducing other defects such as hiss. A weaker I.F.

such a marked increase of audio output occurs, it would clearly be possible to work with a weaker signal in the earlier stages of the receiver. I.F. gain could be reduced, and with it one would expect to reduce any valve or circuit noise arising in the first R.F. stage, thus improving the signal-to-noise ratio of the receiver as a whole.



Torments of the Damned, or the ham who required an Oceania contact for his W.B.E. and W.A.C. certificates when war commenced.

# POWER SUPPLIES

By J. N. WALKER (G5JU)

## Part IV.—SMALL POWER GENERATING PLANTS

**M**ANY radio experimenters who have no electric supply mains available probably feel that the scope of their activities is severely restricted, particularly if they are compelled to rely solely on primary cells as a source of electrical energy. Those who are able to employ accumulators are better off, but even then as the output is restricted, the desire for charging the accumulators at home must have often asserted itself. This article will deal with small generating plants producing a direct current output of a magnitude sufficient for most charging requirements. There are also on the market machines of different sizes giving an A.C. output, and particulars of them are included, since the additional advantages will be well worth having.

### Gas Generators

The principle of generating an electric current by the action of heat applied to the junction of two dissimilar metals has been known for nearly one hundred years—one practical application is in thermo-couple radio-frequency meters—but it is only recently that it has been developed to such a degree of efficiency as to allow of the generation of electricity in useful quantities.

Milnes Electrical Engineering Co., Ltd., offer a thoroughly practical thermo-electric generator, the source of energy for which is ordinary coal gas. There are also available special models designed to run off Calor, Butane and Acetylene Gas whilst it is hoped later to adapt the appliance for use with paraffin. Much research has resulted in the production of special alloys and great care has been exercised to ensure the absolute reliability of the units. It is impossible for gas to escape; the burners cannot blow out (except under very extreme conditions) and a thermo-static cut-out ensures that the batteries being charged cannot discharge through the generator when the gas is turned off. An additional refinement has recently been introduced and it is now possible to fit to the generator a control switch which, with one movement, turns on the gas and lights the burners. This feature enables the generator to be

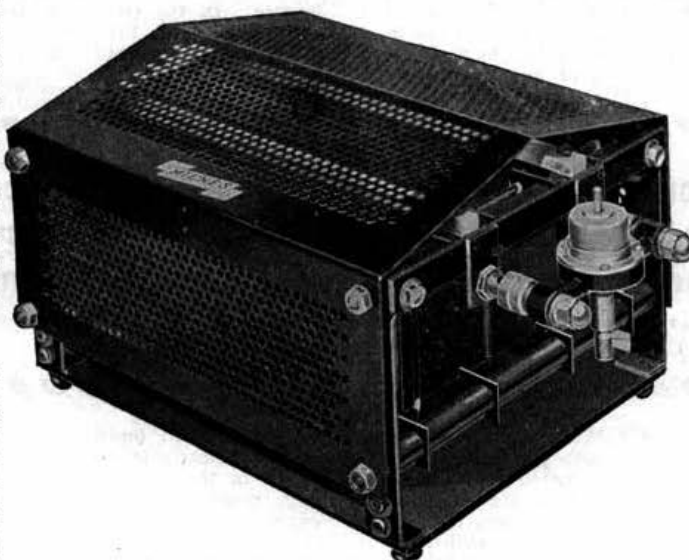
remotely controlled, if desired. For example, it can be placed in a cellar, garage, etc., and connected to the apparatus by means of a cable.

Three models of the Milnes Thermo-Electric Generator are available—4 watt, 6·4 watt and 8 watt, the latter being the one illustrated herewith. The first model generates 2 amperes at 2 volts and, since the output is in the form of perfectly steady D.C., it may be employed either for lighting valve filaments

directly or for charging 2 volt cells, singly or in parallel. It is possible to adjust the voltage very exactly by means of a special governor fitted to all units.

The 6·4 watt model is similar and is specifically designed for operating a battery-type wireless receiver without batteries of any kind. As no cut-out is fitted this model cannot be used for charging batteries.

The 8 watt model delivers 1 amp. at 6 volts, 2 amps. at 4 volts or 4 amps. at 2 volts. The output is sufficient to charge three 2-volt cells in series, or, alternatively, a



A practical model of a Thermo-electric Generator delivering a maximum of 8 watts pure D.C.

Milnes H.T. Supply Unit, at 1 to 1½ amps.

The Milnes H.T. Converter has been designed to work in conjunction with any of the foregoing generators, thereby enabling batteries to be dispensed with completely. It is of the vibratory type and the circuit has been designed to give the maximum possible efficiency, together with freedom from interference, both electrical and acoustic. All the materials incorporated are of first-class quality, so ensuring a long life. The ratings are conservative, and serious overheating will not occur even should the converter be run for lengthy periods at outputs largely in excess of the rated value.

The converter, which is mounted in a cast aluminium case and provided with three separate H.T.appings, all thoroughly decoupled, is designed to run off 2 volts and requires between 2 and 3 amps. at full load. The maximum rated output is 150 volts 20 mA. The output from the two larger thermo-electric generators can be split into two sections, one providing filament current and the other energising the

converter. By this means, the background noise of the receiver can be kept very low.

Provided suitable ventilation is provided, the units will be found perfectly reliable in service. The amount of gas consumed—and therefore the amount of heat produced—is small, whilst running costs are low, averaging  $\frac{1}{4}$ d. per hour in the case of the 8-watt model.

### Wind Generators

Wind generators do not appear to be so popular in Great Britain as is the case abroad. They are quite common in America, possibly because the greater market formed by the residents of the "wide-open spaces" has assisted the development to a greater extent than in this country. Be that as it may, the fact remains wind generators form, in most localities, a very useful means of generating a supply of electricity and one with which the running costs are negligible. The cost of an installation will vary considerably according to the size of the plant but should not prove excessive, especially in cases where the owner is a "handyman."

It is, of course, necessary to erect a wind-driven installation in a position where a wind of good velocity blows frequently or regularly. The majority of generators commence producing a reasonable output at 300 revolutions per minute, whilst the number of revolutions for maximum output is in the region of 1,500. The actual speed is dependent on the load taken from the dynamo as well as upon the velocity of the wind. In exposed positions, where winds of gale force are likely to be encountered frequently, special provision must be taken to prevent damage to the installation as a whole, this usually taking the form of an automatic brake.

One of the chief sources of wind generators in this country is *Electradix Radios*, 218 Upper Thames Street, London, E.C.4, to whom the writer is partly indebted for the information which follows and to whom further enquiries should be addressed.

The first essential is a support for the propeller and dynamo. This can well take the form of a lattice mast, which need not be more than twenty feet in height, unless the location is particularly badly screened by trees or buildings. A well stayed tubular steel mast would form a convenient substitute where only a small installation is intended.

The size and type of the propeller will depend on the output required and on the type of dynamo employed. Two-bladed propellers are usually fairly long—between three and four feet for a 50 watt load—and rotate at a comparatively low speed, necessitating gearing up the shaft to the dynamo, at a high ratio. Probably more suitable, but also more expensive, are the multi-bladed propellers, of small diameter and revolving at a much higher speed. The starting momentum of the latter type is low but this is of little importance since no electrical load will be applied until the cut-out operates.

Some means of bringing the propeller into a position facing the wind must be included and this usually takes the form of a "wing" mounted behind and at right angles to the propeller. A suitable size would be two feet by three feet, set three to four feet behind the propeller.

The greatest difficulty likely to be experienced is in the mounting and driving of the dynamo. The step-up gearing necessary may be arranged by means of sprockets and chain, by direct cog drive or by

means of a worm drive. Those who have access to old motor-car store-rooms will probably find it possible to pick up cheaply parts, often incorporating ball-bearings, which can be pressed into further useful service. Otherwise, it is advisable to purchase the propeller, dynamo and other accessories as a complete set. *Electradix* market such an outfit, including excess speed brake, at the price of £12 10s.

A cut-out is an absolute necessity of course, to prevent batteries discharging through the dynamo windings at low propeller speeds and suitable types are also listed by *Electradix*.

Three sizes of dynamo, specially made for wind installations, are offered by the same firm. They are all enclosed ball-bearing models and are self-regulating for voltage. The type W6 weighs 14 lbs., will charge a six-volt battery at 8/10 amps., and can be safely run up to a maximum speed of 3,000 revolutions per minute. The type W12 is a heavier model (33 lbs.), and is capable of delivering 12 amps. at 12/16 volts, full load being realised at a speed of 1,250 revs. Where a very large output is required, type TBW will probably meet the situation with its output of 30 amps. at 12/16 volts. A substantial support will be necessary to carry its weight of 56 lbs.

The installation of a wind generator has many points in common with that of a rotary beam aerial as, for instance, in the provision of a revolving bearing and the means of taking away the energy through slip rings. A study of the various designs of rotary beam aerials which have been published will be of benefit to those who propose erecting a wind charger.

### Petrol Generating Sets

One does not usually turn to petrol-electric generators unless a considerable amount of electricity is required. Few petrol engines are made with a horse power below unity, hence an electrical output of about 300 watts is generally available. It is, of course, quite possible to run almost any size dynamo, even a small one delivering comparatively few watts, off a 1 h.p. petrol engine but the efficiency will be low and the operating costs unduly high. Maximum efficiency is not secured unless an engine is driving a load compatible with its size.

A petrol engine is therefore usually employed when electricity is required for purposes additional to the operation of radio equipment, such as lighting, heating and similar functions. However, many readers of this Journal are interested in transmission and even when the final high frequency output is quite low, a considerable amount of power is required to energise auxiliary equipment. In such cases, the fact that electric lighting will be possible will simply be an added advantage. Some information regarding petrol-electric sets will therefore be appreciated by many both in this country and abroad.

### Second-hand Machines

Several firms who regularly advertise in this Journal hold stocks of both second-hand and new petrol-electric generating sets and, in the first instance, it will be well to get into touch with them, giving brief details of the output desired, physical size and conditions of service. Second-hand machines can be bought from these firms with every confidence, but when purchased elsewhere it would

be a good plan to enlist expert aid when examining the equipment offered.

As regards the dynamo, the main points to watch are the bearings and commutator. If these are worn, the efficiency will be low, the output erratic, and trouble is likely to occur. Where possible, the armature windings should be examined for signs of overheating with possible impairment of the insulation.

It will not be easy to judge the condition of the engine itself, but one can be guided by the general running, which should be smooth and free from undue vibration. Compression should be good and starting-up from cold moderately easy. The majority of manufacturers are willing to supply information concerning their products when the numbers stamped thereon are quoted and, if any doubt exists, it would be well to discover the age of the machines. The more recent their manufacture, the greater the length of life and the more reliable the service that may be expected.

### New Machines

There is one particular range of new machines which has been brought to the writer's notice and these are, in themselves, of such outstanding interest (consisting of types to meet practically all requirements), that it is proposed to give fairly comprehensive information concerning them. The models referred to are manufactured in Canada by *Johnson Motors*, a firm which specialises in petrol engines of several types, notably outboard and inboard marine motors and engines for stationary use—driving pumps, for instance. The agents in this country are *E. P. Barris Ltd.*, 36 Upper Thames Street, London, E.C.4.

The models to be described are of the most modern design and incorporate many desirable features. The compactness and light weight makes it possible to use them not only at home but also in yachts, houseboats, caravans and camps (shades of N.F.D.!). There are certain features which are common to all types and these will be described first.

It must be appreciated that the machines are designed first and foremost as electric generators and they do not consist of an odd engine coupled to an odd dynamo. In all cases, the armature of the dynamo is fitted to the spindle of the engine, which is extended for the purpose. There are no additional bearings and no jointed coupling, both of which would absorb power. The dynamo is specially designed for the job and is of the four pole type, shunt wound, with an additional series winding which enables starting to be effected electrically from the main battery by simply pressing a push-button. Integral cooling is arranged for.

The engine proper, in all models, is of the air-cooled fourstroke type. Ignition is by flywheel magneto, which enables operation to be maintained independently of batteries. On to the face of the flywheel are cast a series of fins so arranged that a blast of air is directed on the fins of the cylinder and cylinder-head so that ample cooling is assured under practically any conditions of service. An aluminium alloy (Lynite) is fitted, whilst the cylinder head is detachable, rendering it a simple matter to decarbonise the engine. Other engine features are splash lubrication, self-lubricating bearings, exhaust muffler and suction carburation. The cast iron base is also the petrol tank and there is no possibility of leakage.

Manual control of the output voltage is allowed

for by means of a rheostat in series with the field winding. A governor is fitted to the engine to maintain its speed at the correct rate, which varies from 1,750 r.p.m. in the small models to 2,500 in the largest.

The smallest model is the *Chore Horse* 6D15 which is capable of delivering 150 watts at 6 volts. Its compactness can be judged from its overall dimensions, which are length 26 in., width 11½ in., and height 12½ in. The weight is 61 lb.

Of large capacity is the type 12D30, giving 300 watts at 12 volts, weighing 78 lb., and measuring 16 in. square. Both models are suitable for charging batteries and are economical both in first cost and in operation, especially since batteries of only a few cells are necessary. The larger model is fitted with a suitable ammeter to indicate the current flowing.

Next comes the *Iron Horse* generating set, model EG500, which is practically identical in size with the 12D30 model but delivers a maximum output of 500 watts at 32 volts. It is very suitable for house lighting whilst there is power to spare for the operation of various appliances.

The largest of the *Johnson* series is the *Iron Horse* EG800 model, which generates 800 watts at 32 volts and which is intended for use where the load is really heavy. It is capable of standing up to substantial overloads for short periods and additional refinements are included in the specification, the main one being automatic voltage control, which can be switched in and out of operation as desired. This feature enables the plant to be employed for lighting and other purposes without the necessity of using a floating battery, since appliances will not be over-run should the load suddenly decrease. With batteries, starting may be accomplished electrically; otherwise, it is by means of a rope applied to the V pulley fitted to the free side of the engine shaft. Incidentally, the latter is fitted to all models, enabling power to be drawn off for driving a lathe or other machinery.

### Combination Models

All the models so far mentioned give a D.C. output but included in the *Johnson* range are two most interesting machines, which give two outputs, one D.C. and the other A.C. The value of this unique feature will be readily appreciated by all amateurs.

The *Chore Horse* model 13D62 has an output of 6 volts 200 watts D.C. or 110 volts, 300 watts A.C. The other model, type 13D323, gives 32 volts 300 watts D.C. or 110 volts, 300 watts A.C. The direct current, which also serves to excite the generator field, is furnished by an entirely separate winding. The full output of one winding can only be realised if the other winding is idle but there is nothing to prevent current being drawn simultaneously from both the A.C. and D.C. terminals provided that the total wattage is not exceeded. In general, the better course will be to charge batteries during periods when the A.C. output is not being utilised. Valve filaments and lights, etc., can then be run off the batteries, allowing use to be made of the full A.C. output. The latter can of course be applied to transmitter power packs, modulators or public address amplifiers in the usual way.

### Batteries and Accessories

Whilst any of these generating sets may be used

(Continued on page 280)



# Crystal Band Pass Filters

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

## PART V.

*In this, the concluding, instalment of the series of articles dealing with Crystal Band Pass Filters, the author gives helpful advice regarding the installation of crystal filters for telephony reception. Methods of switching are also dealt with.*

### Practical Telephony Filters.

**M**OST of the remarks in Part 4 apply equally to the installation of a telephony crystal filter, having a band-width of perhaps 3 to 4 kilocycles, and employing the circuit of Fig. 14. It may be pointed out that an experienced engineer should have little difficulty in setting up filters of either type. However, the amateur of less wide experience, who is handicapped by the lack of laboratory equipment such as a signal generator, will be wise to experiment firstly with either a C.W. filter, or a telephony filter in which the crystals are separated by from 3 to 3.5 kilocycles at most, since experience has shown this to be the most satisfactory width for communication purposes. Crystal band-pass filters will be found easier to adjust when the band width is small. Thus the C.W. type differs little from the ordinary crystal gate, and the balancing condenser settings are not very critical, whilst more latitude also exists in component values and layout. It is therefore the most suitable for the beginner. Provided the instructions which follow are noted, a 3 kilocycles band-pass should be little more difficult. The balancing condenser setting however, becomes more critical as crystal separation is increased, and strange curve shapes can occur when this condenser differs widely from its correct position. The experimenter therefore, is advised to gain experience in the setting up of a filter not wider than 3 kilocycles, before attempting any greater widths which he may have in mind.

### Choice of Receiver

The choice of a receiver into which the telephony filter may be inserted is determined by the same needs as have already been stated. Stability of the oscillator is however less vital, but there is rather more need for an ample reserve of amplification. Owing to the fact that the higher sidebands by which a transmission is modulated will be rejected by the filter, there will be an *apparent* loss of strength from this cause, just as there is on a still more serious scale when telephony is received through a single-crystal filter. The gain given by an additional I.F. stage is more than sufficient to compensate for the addition of the filter, and its use is particularly advisable in this case.

The only other respect in which a telephony filter differs from the C.W. case is in the need for an output tuned circuit in place of the resistance  $Z$  of Fig. 10. The space required is thus somewhat greater. It is also rather more important that an input transformer having 2,000 microhenrys inductance be used, for whilst almost any centre tapped transformer will

give fair results from a C.W. filter, in which only the carrier is to be amplified, it is necessary to preserve the whole sideband width in the telephony case. In practice, this means that an unsuitable transformer will weaken signals more seriously, whilst the choice of correct coil values will result in a striking improvement in telephony reception.

### Tuned Impedance Matching

The most vital factor in obtaining full benefit from the filter is the tuned impedance matching circuit which follows the crystals in Fig. 14. Upon the quality of this circuit performance mainly depends.

It may be repeated that should the stage-gain, or the flatness of the band-pass not be entirely satisfactory, or should the output coil be a poor one, excellent results can be restored through the use of a reacting stage after the filter. Regeneration applied to the output coil so as to peak it sharply at the mid-frequency between the two crystals is extraordinarily effective in ensuring good results.

Both  $Q$  and impedance cannot be too high in practice, and it is most advisable to use a Litz-wound iron-cored coil, tuned by an air-dielectric condenser. The circuit must be thoroughly screened, since any I.F. voltage induced into it from the earlier circuits, or from radiation, will reach the detector without passing through the filter. In particular it must be screened from the filter input transformer. Satisfactory results have been achieved when this circuit is placed beneath a metal chassis in close proximity to the following diode valve-holder, relying upon short leads, spacing, and the screening effect of the chassis alone; but to do this is very risky indeed. It is best to enclose the circuit in a second I.F. coil-can, which should not be too small, and space for this arrangement should be provided when laying out any new receiver.

It is possible for an experimenter who prides himself in neat mechanical construction, to build the whole filter into a large coil-can, such as those measuring 2 in. square by 4½ in. high. The input coils are then kept close to the bottom of the can, and the output circuit near to the top, a metal screen being incorporated to divide the can into two screened compartments. Some form of metal chassis will be necessary to support the components within the can. The majority however, will find the use of two cans the simplest solution, Fig. 17 gives an idea of a suitable layout.

Whilst not theoretically necessary in all cases, it will be safest to provide a tapping upon the output coil, whereby the following valve can be taken to a point about one-third turns up the coil from the "earthy" end. This ensures that little damping is

thrown across the circuit by the valve grid impedance, or by holder losses. This is essential when the filter is followed by a diode, whilst when followed by a high impedance pentode, the tapping may be moved up to one-half turns. Best results are obtained if the two portions of this tapped coil are very closely coupled, and the best type of coil has been found to be the usual "honeycomb" I.F. coil having the inner end earthed, so that the inner turns form the tapped-off portion. The tapping point is not critical, and it will be sufficient to pull out carefully a turn from near the centre of a suitable coil by guesswork. If sufficient can be pulled out to permit of the stranded wire being properly cleaned and soldered, a good joint should result. It may be simpler to break the wire, and clean both ends by the recognised method of heating to dull red in a

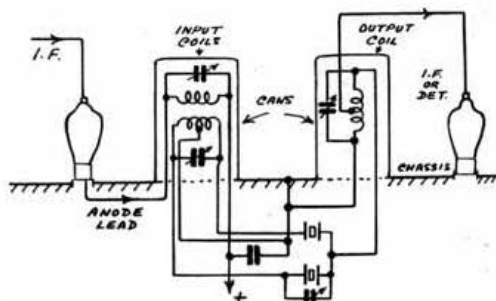


Fig. 17.

Suggested chassis layout for crystal telephony filter. Input and output coils in separate cans, with trimmers at top. Crystals and balancing condenser directly below chassis, leads very short, and insulated condenser spindle extended to front panel.

gas or spirit flame, then dipping the ends into methylated spirit, whereby the covering and enamel is removed from all strands without breaking any of them. The two ends can then be tinned and soldered together with the tapping wire. Making a good joint in stranded wire is not very easy without experience, and some may prefer to purchase a tapped coil from one of the leading coil winding companies, who will prepare them to order. The inductance specified should be 2,000 microhenrys, tapped at one-third turns.

### Lining-up Procedure

Having installed a telephony filter, the lining up process will be similar to that for C.W., but rather more critical if a nicely symmetrical curve is aimed at. When instruments are available, the I.F. amplifier should be fed with unmodulated carrier from a signal generator, and the output after the filter observed. This may be done with the aid of a diode R.F. voltmeter, or by measuring the A.V.C. line voltage when this is fitted. It should be easy to locate the peaks due to the two crystals, which should be very sharp before lining up has been completed. The generator frequency should then be set as nearly as possible half-way between these points, and the I.F. circuits lined up, including the filter output circuit which will be the most critical of all. Next, tune the generator to a frequency 2 or 3 kilocycles *outside* either crystal, and set the

balancing condenser to give zero response. An attenuation of at least 60 dB should be reached if the filter screening and components are satisfactory. Leave the condenser set in this position, and mark it permanently. Finally set the generator again to the mid-band frequency, and line all circuits.

Particular attention should once again be paid to the output circuit, and if the crystal peak responses are appreciably different, owing to slight differences in the damping of the two crystals, symmetry may be restored by lining the output circuit slightly nearer to the frequency of the poorer crystal. It should be found that the dip originally occurring between the crystals will be filled up by the resonance of the output circuit in particular, and of the other I.F. circuits to a lesser extent, so that the final dip is not more than one-third lower in voltage than the crystal peaks. When so adjusted the filter will sound substantially flat to the ear. Signals may then be tuned in, and the balancing condenser *slightly* readjusted to give the best ratio of modulation to static, noise and other interference.

When lining up the filter without a signal generator, the above procedure should be followed as closely as possible, using a reliable radio signal, preferably near to the low frequency end of the tuning range, where tuning will appear less sharp. The two crystal peaks should be easily detected by ear, and the receiver tuned so that the I.F. signal falls between them, as described above. Lining up can then proceed. Always remember that the I.F. is fixed once and for all by the crystals, and that all lining up must be done in relation to them, taking the frequency half-way between the crystals as the reference frequency, or nominal I.F. of the receiver. Once this idea is grasped, it will be found a great convenience, because it is no longer possible gradually to mis-adjust the I.F. of a receiver to a wrong frequency, thereby upsetting the ganging and calibration of the R.F. portion. Final adjustment of the balancing condenser by ear should be done on signals, remembering that it is the setting giving best attenuation outside the band-pass which should be used, and not necessarily that which gives loudest signals. The test is to balance out interference.

### Switching of Filters

It has been mentioned that crystal filters can easily be removed from circuit by arranging the balancing condenser to "short" at the end of its travel. The effect of the second crystal, which is not shorted, can then be neglected, and the receiver reverts to normal except that there will be a slight loss of stage gain owing to the centre tapping of the filter input transformer. If a high inductance has been used as recommended, the voltage across half the secondary will be nearly as great as that across the whole secondary of a normal I.F. transformer, and so little loss occurs. Two I.F. stages in which crystal filters are used should not give trouble from instability, since the slightly lowered gain and complete screening help to overcome any tendency to self-oscillation or feedback. It may be still better when space permits to provide an actual shorting switch across one crystal, so that the filter can be cut out without destroying the optimum setting of the balancing condenser. This switch must, however, be a very low loss and low capacity type, having preferably Frequentite or Polystyrene

insulation. A toggle switch would not be satisfactory. A C.W. filter will of course be cut out when receiving telephony. Theoretically there may be no need to cut out a telephony filter, but to do so may be useful when searching the frequency range, receiving high quality broadcast stations, or U.S.W. transmissions. It has been pointed out that crystal band-pass filters lend themselves readily to the choice of several band-widths, and to conclude this description a few of the simpler methods of switching from one to another will be mentioned.

A very simple method applicable to a receiver having two or possibly three I.F. stages, and thus ample gain, is to include a C.W. filter between, say, the first and second stage, and a second telephony filter between the second stage and the detector. Both filters can then be cut out when normal low selectivity is required, and either can be introduced at will when interference conditions demand. In constructing an ambitious receiver of this nature, do not reject the idea of three I.F. stages as altogether excessive. The additional cost of a third stage is not serious, and if the gain of each is kept under control by a method such as cathode bias adjustment, excellent stability should be achieved; whilst all the gain desired will be available when receiving very weak signals through, perhaps, both filters in cascade. If in obtaining the necessary crystals, it is arranged that the C.W. band-pass either falls centrally within the 3 kilocycles telephony filter, or coincides with one edge of it (one crystal of each identical in frequency), the two can be used together in single-signal C.W. reception still further to eliminate the unwanted sideband. An attenuation of 140 dB for the unwanted beat note has been measured in this system, which is giving excellent results in a receiver to be described by the writer in a later issue of THE BULLETIN.

Should two or more band-widths be desired from a single filter, they may be attained by the use of three crystal and a single-pole selector switch, as shown in Fig. 18. Crystals are obtained having a separation from A to B of 300 cycles for C.W., and from A to C of 3 kilocycles for telephony. Crystal A remains in one arm of the bridge permanently, whilst either B

or C, or a short circuit, is introduced into the other arm by means of the switch. This system gives an instant choice of either broad selectivity (the other I.F. circuits alone), 3 kilocycles band-width, or 300 cycles at will, whilst other widths could easily be added through the use of additional crystals and switch contacts. The arrangement has a minor drawback in that the mean I.F. changes slightly on switching over. To avoid this it would be necessary to employ double-pole switching, so that a fresh pair of crystals could be selected for each band. Similarly an elaboration on these lines would enable the output matching impedance to be changed for each band, using a resistance at band-widths of a few hundred cycles, and substituting circuits tuned to the centre of each other band. It is doubtful if any but the exceptional enthusiast will wish to go to these lengths, and no great difficulty should be found in working out suitable switching. The arrangement of Fig. 18 can be recommended, however, to those who wish to make their latest receiver outstanding in selectivity over any commercially built receiver at present on the market.

## 100% Image Rejection, at Low Cost

By R. T. REED (G2RX)

ON most receivers having no more than one R.F. stage, trouble is usually experienced from images of 19 metre B.C. stations appearing within the 20 metre amateur band.

The writer recently fitted an American 1851 valve in the R.F. stage of his 1938 Super Sky rider and although a remarkable improvement in gain on the H.F. bands was secured, the number of CW, 'phone and radiotelephone images appearing around 20 metres was very distressing to say the least of it.

A good two-stage preselector would of course have been the obvious solution, but as images were only troublesome around 20 metres, and as the gain of the R.F. section was then quite sufficient for the noise level at the writer's site, it seemed rather an expensive way of overcoming the difficulty.

Accordingly a wave-trap was constructed to tune to 19 metres and this was inserted in the aerial circuit of the receiver close to the aerial terminal. The trap was adjusted to give maximum rejection at about the centre of the 19 metre B.C. band, and a very encouraging improvement on 20 metres was obtained; images which previously had been S9 were now only S4. Following up the idea another similar trap was placed in series with the first, and this effectively overcame the last trace of image interference. Apparently the selectivity curve of the trap at 19 metres is fairly sharp for it does not affect the strength of signals received on 20 metres.

### Construction

The two traps each use a small mica variable condenser ("Sickles" 20  $\mu\text{F}$  in this case), and a coil consisting of 25 turns of 26 D.C.C. wire scramble-wound on a piece of  $\frac{1}{2}$ -in. ebonite rod. They have been wired permanently under the chassis of the receiver, and in series with the aerial lead.

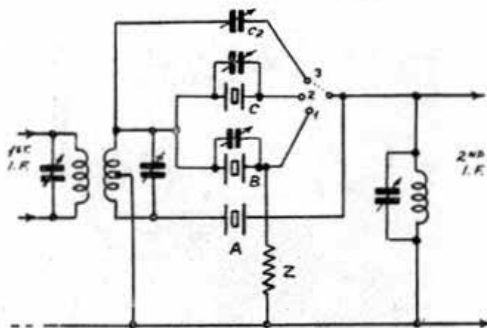


Fig. 18.

A band-pass filter in which a selector switch provides three degrees of selectivity: 300 cycles in Position 1, 3 kc. in Position 2, and low selectivity in Position 3. The output coil is not tapped, as it represents a compromise between the three positions. The condenser C2 provides optimum coupling when the filter is cut out, and is not essential.

# 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.*

G8FV, who is serving abroad will be glad to receive letters which should be addressed 761210 A.C.2 N. H. Payne, North Detachment No. 2 Air Mission, c/o Registry Air Ministry, King Charles Street, London, S.W.1, Per A.D.L.S., Bag D.

Drv. James Cairns, G3UC, of Lancaster, who is in France with a Light A.A. unit, wishes to be remembered to his many acquaintances.

A.C.2 E. R. Dolman, 2DCG, reports meeting F3AJ whilst serving with the B.E.F. J. W. Russell, G2ZR, now an A.C.2 in the R.A.F. has also had an unexpected and interesting personal contact with J. F. Judd, Y12GQ, who operated from Iraq some years ago. The latter produced an excellent series of photos taken whilst abroad.

A.C.1 David Mayers, GM6SJ informs us that GM3HY, GM3PB, G3YC, G4IB, GM5SW, G5OQ, and several B.R.S. members are with him at an R.A.F. station in Fifeshire. They will be pleased to receive letters, which can be sent via Headquarters.

L./Bom. R. Bullock, 2HHX, now serving with 320th Battery R.A. 131st Field Regiment, will be pleased to hear from any member in the R.A. Letters should be sent c/o B.E.F.

Pte. T. Bingham, BRS3656, who is in the R.A.O.C. wishes to be remembered to G5AO and other Reading members.

K. R. Peattie, 2FQG, now an A.C.2 with the B.E.F. sends greetings to F./O. Zech and friends in Glasgow. He hopes to be on leave next month having been abroad since the early days of the war.

F./O. C. R. Plant, G5CP, located at 32 Somerset Way, Iver, Bucks, will be pleased to hear from old friends either at the above address or via Headquarters.

Another cheery letter has reached us from Bert Allen, G2UJ, who is serving as an A.C.1 with the R.A.F. in France. He reports that 2DHL of Streatham was a recent visitor. GM6GQ and 2ZY were until recently closely associated with him, but both have now moved to new spheres of action. G2UJ sends greetings to G2WS (his Deputy) and to all T.R.'s in District 16.

G8NV wishes to be remembered to his friends in District 12, and would like to hear from any who care to write. His address is 760541 A.C.2 P. Stein, Headquarters, 60 Wing, R.A.F., B.E.F. He and 2UJ are at present sharing the same hut. We also earn from 8NV that GM6GQ has been promoted to corporal.

Mr. V. A. Sims (G5VS), well known in the South-end area, is now serving in Ceylon as a Telegraphist in the R.N.V.(W.)R. He will be pleased to hear from old friends, who should address letters c/o H.M. Wireless Station, Matara, Ceylon.

Mr. G. F. Mason (G5BR) would be pleased to hear from friends in the Services. His present address is AC.2 Mason, 760039, No. 67 Wing Detachment, A.A.S.F., B.E.F.

We offer our congratulations to Mr. C. R. Emary, M.B.E., who escaped with slight injuries and shock when a Japanese liner which was bringing him back to England from a spell of duty in the Mediterranean, was mined off the South-east Coast.

Mr. Emary, well known under the calls VS6AX and G5GH, has now left to join the B.E.F. He sends seasonal greetings to his many friends at home and abroad.

Congratulations also to Lieut. E. S. Shackleton, "Shack" (G6SN), on his promotion to the rank of Captain. It can now be revealed that "Shack" was the author of the excellent series of articles published recently under the title "Workshop Practice." He is at present serving in the Midlands with the Royal Corps of Signals.

M. d. L. Raymond (F8VC) and his brother, Lieut. Pierre Raymond (CN8BA) are serving with the French armies. The Raymond's who are R.S.G.B. members ask to be remembered to their British friends. F8VC is, we understand, associated with G3MP and 8MQ, both of whom are in the R.A.F.

## R.A.F. New and Old



F./O. George Zech, GM8TT (left) and F./O. Cecil Page, G6PA (right) with our Secretary, G6CL, who served with the R.F.C. and R.A.F. in the last war.



# NEW FEEDER DEVELOPMENTS

By E. H. CONKLIN (W9BNX)\*

WHILE it is well in an elementary study of aerials to dissociate feed systems such as Johnson Q, J, Collins and Delta-Matched, from the aerial proper, there are times when the feed system radiates. In the latter case there may be unpredicted results, especially at ultra-high frequencies. Lately, there have been some developments in feed systems which are of general interest.

## Concentric Line Feed

When a concentric line is used directly to feed a doublet at its centre, common practice is to hook a quarter wavelength wire to the inner conductor and the other quarter wavelength wire to the outer conductor, as illustrated in Fig. 1. In the case of a horizontal aerial, we can consider the left half of the doublet of Fig. 1 as being at earth potential, and not fed by the line. Essentially, the aerial consists of an earthed quarter-wave which is directly fed, and another that receives its entire excitation from radiation. One engineer who has been making measurements at ultra-high frequencies states that the addition of the second quarter-wave wire sharpens the pattern moderately and produces a 2 dB gain in the favoured direction.

A recent development effectively ungrounds the "undriven" quarter-wave wire, resulting in balanced feed with the line effectively feeding both wires. It is pictured in Fig. 2. The only change is the placing of a quarter-wavelength tube around the concentric line, shorted to the line's outer conductor at the bottom, to permit the last quarter-wavelength of the line to assume a potential other than that of the outer conductor.

This leads to another possibility, which is already in use at the Empire State Building in New York. Now that balanced lines can be fed directly with a concentric line, it is possible to operate four 220 ohm open wire lines, hooked to separate doublets, in parallel, to match directly into the 55 ohm concentric line. This is illustrated in Fig. 3. Of course, it is still necessary to match each 220 ohm line to each doublet, but again this is done simply by building the doublets for the proper impedance.† The method used in the sound portion of the RCA television aerial is shown in Fig. 4.

## Vertical Radiators

A problem with vertical aerials is to feed them from the bottom without upsetting the balance of the feed line. Another is to prevent the line from re-radiating power picked up from the excited aerial (which current is in phase in both wires of an open wire line). If a doublet is lifted above the earth, the

radiation pattern in the vertical plane has a number of lobes of maximum radiation, separated by angles at which the radiation is zero. Much the same thing occurs with a high horizontal aerial, but in this case the nulls and maxima are reversed. For certain angles of radiation—and in the case of very high aerials, even some low angles—one polarisation should give maximum signal and the other none. This may explain a few cases of failure of a good aerial to receive an ultra-high frequency signal of the "skip" type.

If there is radiation from the feed line caused by unbalance, re-radiation of picked-up power, or unwanted capacity coupling at the aerial, the overall radiation pattern is further complicated. When this happens, it is of considerable help to use a complex beam because of the greater relative strength of the signal radiated from the aerial compared with that from the feed line.

The Western Electric type of concentric feed‡ was designed to keep radiated power off the feed line. As shown in Fig. 5, the lower half of the aerial is a quarter wavelength tube around the feed line,

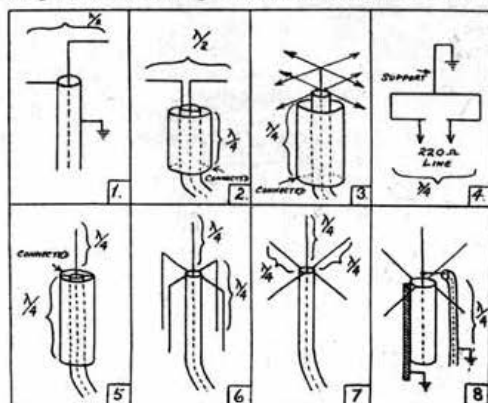


Fig. 1.

Usual method of connecting concentric line to horizontal doublet.

Fig. 2.

Balance Converter to feed balanced system with concentric line.

Fig. 3.

Balance Converter to feed four spaced lines of about 220-320 ohms.

Fig. 4.

One type of folded doublet which matches an open wire line directly.

Fig. 5.

Western Electric type of concentric line fed aerial.

Fig. 6.

Wires substituted for tubing of Fig. 5.

Fig. 7.

Earth plane quarter-wave vertical.

Fig. 8.

Earth plane quarter-wave vertical but with radiator at earth potential.

\* Associate Editor, "Radio."

† "Television Transmitting Antenna for Empire State Building," Nils E. Lindenblad, "RCA Review," April, 1939. "Multi-Wire Doublet Antennas," John Kraus, "Radio," May and June, 1939.

‡ "Concentric Line Antenna," "Radio," November, 1937.

§ "Ultra-sensitive U.H.F. Receiver," E. H. Conklin and Arthur Avery, "Radio," June, 1939.

insulated from the concentric line at the bottom but not at the top. This forms a quarter-wave resonant section such as used in some ultra-high frequency receivers as tuned circuits, and permits the bottom of the aerial to assume a high potential while the concentric transmission line inside it, which acts as the inner conductor of the "trap," can remain at earth potential.

The outer tube presents a mechanical problem of mounting at its top and insulating at its bottom. It can be considered as being made up of a number of parallel quarter wavelength wires, as illustrated in Fig. 6. This suggests something else.

A quarter wavelength wire, insulated at its far end, "looks like" a zero impedance at its near end. The same would be true of the centre of a half-wave wire, the centre of which, then, can be used as an earth. It will have no pick-up (if horizontal) and will not radiate. This type of earth has been recommended for use at high frequencies to terminate non-resonant aerials such as Beverage wires and tilted wires because of the difficulty of obtaining a constant resistance earth. It can also be used to terminate the outer conductor, which in the case of Fig. 6 would amount only to spreading the lower wires horizontally as shown in Fig. 7. This has been termed a "ground plane quarter-wave vertical." Since the outer conductor of the line hooks at the centre of two half-wave horizontal aerials, it is actually at an earth point and both the aerial and line are completely balanced. One of the outstanding advantages of the aerial is that the field below the earth plane drops off to an extremely low value. On receiving, this shielding effect should be very helpful in greatly reducing motor car noises from near the base of the tower supporting the radiating system, or if it is supported high enough above earth, then from anywhere in the vicinity of the aerial.

This proposal has been made by G. H. Brown to whom we are indebted for the close-spaced idea incorporated in so many W8JK and reflector types of beams. The aerial of Fig. 7 has the disadvantage of having a radiator that is not directly earthed for lightning. That objection is met by the construction of Fig. 8.

### Belfast Y.M.C.A. Radio Club

Mr. Frank Robb, G16TK, advises us that the above Club is carrying on in spite of present difficulties. At the recent Annual General Meeting the following officers were elected:—

President	...	Dr. Andrew Trimble, M.D., J.P.
Chairman	...	Mr. J. Gallagher, 2CIZ.
Hon. Sec.	...	Mr. E. Sandys, 2FHN.
Hon. Treas.	...	Mr. F. A. Robb, G16TK.

The Club is open daily, and a regular meeting takes place on Wednesday evenings at 8 p.m. Morse classes are being continued and receiver construction is under way.

The Club will be pleased to welcome all visiting amateurs, who are invited to get in touch with Mr. Robb at 60 Victoria Avenue, Sydenham, Belfast.

The following Club members are serving with H.M. Forces:—G14OB, 5AJ, 5DX, 8MI, 2BNM, 2FDL, 2COL and Mr. Doherty, an operator of G16YM.

Readers who wish to correspond with GI amateurs whose addresses are unknown to them, may write via Y.M.C.A. Radio Club, Wellington Place, Belfast.

### Romford and District Amateur Radio Society

Mr. A. J. Hallett (G3CQ), Chairman of the Romford Society, informs us that the Sunday morning meetings which take place at his home are well supported and the Morse practices given are much appreciated. It is hoped shortly to find a meeting place in a more central part of the town.

The Hon. Secretary of the Society, Mr. R. C. E. Beardow (G3FT), is now serving as a telegraphist on H.M.S. "Cormorant."

### QRX

Times, without number in the past, monthly Club Magazines have reached us, but seldom if ever have we enjoyed reading one so much as "QRX" the official publication of that very active society which describes itself as The Surrey Radio Contact Club.

Basil Wardman (G5GQ) has always been regarded as among the first flight of "ham" journalists, but as Editor of this newcomer to our light literature, he has surpassed himself.

The following quote from his opening editorial will perhaps serve to illustrate what is in store for readers.

"Be it known to all of you who can read that we of the Surrey Radio Contact Club, having been shut down by the Post Office, blacked out by the Home Office, taxed out by the Chancellor and slung out by our families; having explored every avenue and unturned every stone, have decided that something or other ought to be done."—And believe us when we say something *has* been done to brighten the Croydon area!

A three shilling postal order to the Hon. Secretary, Mr. S. A. Morley, 22 Old Farleigh Road, Selsdon, Surrey, will qualify you for a hundred laughs a month—unless G5GQ deserts his post.

Slip along to the Post Office now.

### Radio Mailbag to Byrd Expedition

The third Byrd Antarctic expedition will not be without mail from home during its long stay in Little America, for arrangements have been made whereby General Electric's powerful short-wave transmitter in Schenectady will again send letters and messages from friends and relatives, just as was done on the two previous expeditions to the Antarctic.

This mailbag service to Admiral Byrd and his men was inaugurated on Friday night, December 8, by international broadcast station WGEQ, formerly W2XAF, operating on 31.48 metres or 9,530 kilocycles, and will continue every two weeks until the expedition returns.

The second programme, on Friday, December 22, will offer an appropriate time for the sending of Christmas messages and greetings. At that time the expedition will be on board ship, at some point between New Zealand and Little America. Both the "Bear of Oakland" and the "North Star" will be equipped to receive these programmes.

# Have this ALL-WAVE EDDYSTONE RECEIVER for ALL-WORLD Xmas — on 7 days HOME TRIAL

**YES**, the heading means exactly what it says—we will send you this Wonder “Eddystone” All-World All-Wave Receiver, carriage paid to your address for you to subject it to 7-days Home Trial, and should you then find it not up to your fullest expectations you are at liberty to promptly return it—when we will cheerfully refund your money in FULL.

This is an exceptional offer—but we make it because we want YOU to see for yourself what words cannot fully convey—the outstanding capabilities of this Set that makes everyone we show it to wish to obtain it.

It is a 7-valve Mains Receiver that will give you intriguingly interesting World-wide reception—something EXTRA—news from all countries of World-wide events, official and unofficial impressions, American amateurs, etc., and has the following specification:—

**A 7 VALVE SUPERHETERODYNE** circuit for A.C. mains 200/250 volts, 40/100 cycles, 60 watts consumption.

**WAVE RANGE.** 13-33 metres; 31-85 metres; 200-555 metres and 900-2100 metres with switch selector.

**SPECIAL CHASSIS CONSTRUCTION.** The chassis is a one-piece aluminium alloy die-casting which gives extreme rigidity to the assembly. Its construction ensures complete freedom from alignment drift.

**SPECIAL COIL UNIT CONSTRUCTION.** The coil box is also a one-piece aluminium alloy die-casting. Every coil is rigidly held and cannot move. Maximum screening due to die-cast construction. High coil efficiency and reliable switch.

**SPECIAL INTERMEDIATE FREQUENCY STAGE.** Again enclosed in die-cast box for rigidity and good screening. Band-pass circuit with Litz wound coils and air dielectric trimmers, the latter are positively locked so that the preselected frequency of 465 K/cs. is constantly maintained.

**SPECIAL TUNING DIAL.** The wavechange switch rotates an illuminated cylinder some 10" long providing a separate scale for each frequency range. Calibrations are in megacycles and metres for the short wave bands and in metres and Station names for the medium and long waves.

**SENSITIVITY.** The sensitivity is constant and high over the entire waverange. It requires no more than 4 to 6 microvolts to obtain a 50 milliwatt output. Even with this high gain the level of background noise is low.

**SENSITIVE AUTOMATIC VOLUME CONTROL** specially arranged for efficiency on short waves.

**H.F. AMPLIFIER** stage which operates on all wave bands. Including this stage there are nine tuned circuits in all.

**MAGIC EYE** is fitted for accurate tuning.

**A SEPARATE OSCILLATOR VALVE** eliminates frequency drift.

**DOUBLE SMOOTHING.** A double smoothing circuit reduces “hum” and extraneous noises to a minimum even on bad supply mains.

**TONE CONTROL.** A variable control enables tone of reproduction to be adjusted to suit personal tastes.

**OUTPUT** stage is fitted with a power Pentode valve capable of giving 5 watts of undistorted output.

**LOUD SPEAKER.** This is a 12" auditorium model moving coil fitted with a special bell diaphragm and has an extremely flat response curve. It is in a class considerably above the average and gives correspondingly good reproduction.

**GRAMOPHONE PICK-UP** and external speaker terminals are provided.

**In OAK or WALNUT CABINET, 25 Gns.**

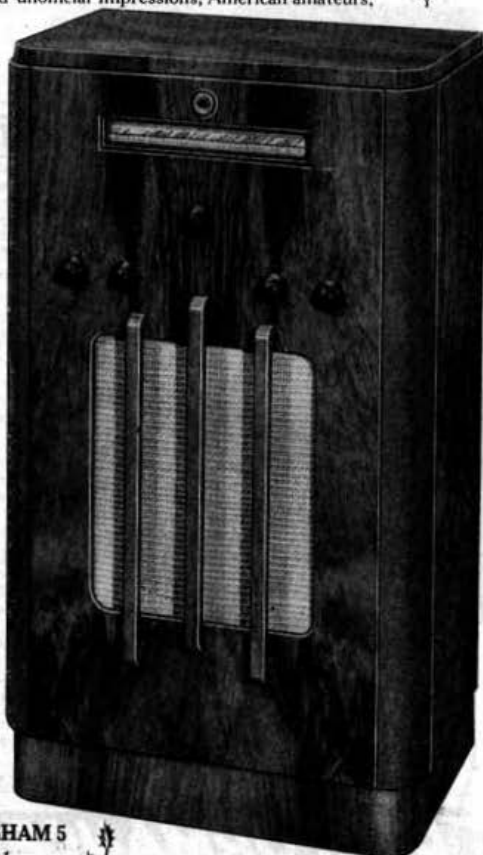
**CHASSIS AND SPEAKER, 21 Gns.**

**WRITE FOR A SET—NOW—TO**

**STRATTON & Co., Ltd.**

**EDDYSTONE WORKS, BROMSGROVE STREET, BIRMINGHAM 5**

*Agents: WEBB'S RADIO, 14 SOHO ST., LONDON, W.1*



# TROPHY COMMUNICATION RECEIVERS



"Listening in on a TROPHY is a most exciting experience"—

DAILY SKETCH, 17-11-39



"A good all-round Receiver; very efficient on 10 metres"—  
TELEVISION & SHORT-WAVE  
WORLD



ALL TROPHY'S ARE  
FULLY GUARANTEED

## "Now installed at Radio Royal"



Europe's Largest Press Listening Post

**TROPHY 8** 8 valves. 5 Bands, 7-550 metres (43 mc. to 545 kc. continuous). Continuous bandspreading. Illuminated scale engraved in kilocycles, with divisions permitting of settings of 800 deg. in 1 deg. steps. R.F. on all bands. Separate oscillator. Beat frequency oscillator with separate pitch control. Send/Receive switch. A.V.C. and B.F.O. on/off switches. Self-contained smoothing circuit. High impedance output sockets are provided for use of separate P.M. speaker and jack incorporated for alternative headphone use. Pleasing black crackle-finish steel cabinet, size 16½ in. long by 9½ in. high by 10½ in. deep. For use on A.C. 200/250 v. 40/100 cycles supplies. Despatched accurately aligned and aerial tested. **Cash price £13 : 17 : 3.**

**TROPHY 8 SPEAKER.** Balanced permanent magnet moving-coil speaker, housed in celotex-lined steel cabinet, finish and design to match TROPHY 8. **£2 : 6 : 3 extra.**

● **LATEST NEWS BULLETINS IN ENGLISH** from every corner of the World plus an amazing variety of entertainments, all additional to the usual B.B.C. broadcasts. Enjoy all these—choose and always recommend TROPHY.

**TROPHY 6** Six international octal-type valves. Four frequency ranges, providing a continuous coverage from 6.5 to 545 metres. Directly calibrated frequency scale. Independent electrical bandspread with separate illuminated dial. Automatic volume control and beat frequency oscillator on/off switches. Send/Receive switch. Pitch control. Provision for using doublet input. Headphone jack. Built-in speaker. Cabinet in steel, pleasing black crystalline finish. Overall dimensions : 17½ in. wide by 10 in. high by 9 in. deep. Despatched accurately aligned and ready for operation on A.C. 200/250 v. 40/100 cycles supplies. **Cash price £10 : 19 : 6.**

## New 2 - Stage PRESELECTOR

This R.F. amplifier represents unbeatable value in perhaps one of the most useful of acquisitions. For use with any kind of set. Increases signal strength, selectivity and range and reduces second channel interference to a minimum. Selector and send/receive switches and inputs for single-wire or doublet aeriels. Dimensions : 12½ in. by 12½ in. by 9½ in. deep. **Cash price £7 : 8 : 6.**

IMMEDIATE DELIVERY on all POST ORDERS. Easy Terms Available. CALLERS : Note London Show-rooms given below.

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77 (TR) CITY ROAD, LONDON, E.C.1  
Telephone CLissold 9875  
41 HIGH HOLBORN, LONDON, W.C.1  
Telephone HOLborn 3248

West End London demonstrations, R. E. M. LTD., 70 Wigmore Street

## TROPHY S/W 3

Regenerative 3-valvers for A.C. and battery use (A.C. model, 2 plus rect.), with a really amazingly high degree of sensitivity. Wave-range, using self-locating coils for external insertion, 6.2 to 550 metres. Metre and band calibrated scale. Built-in speaker and phone jack. *Wireless World* and many users have confirmed the capabilities of the TROPHY 3, recommended with every confidence for all-world short-wave contact.

**BATTERY MODEL.** Complete with coils for 12 to 52 metres but less batteries. **Cash price £6 : 6 : 6.**  
**A.C. MODEL.** Complete with coils for 12 to 52 metres. **Cash price £6 : 18 : 9.**

If extra self-locating coils required for complete coverage 6 to 550 metres, add 18/6 to TROPHY 3. Cash Prices.



Complete TROPHY  
technical specifications  
free on request.  
Write NOW

# PERFORMANCE AND PRICE UNEQUALLED



# Experimental Section

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

**R** EPORTS this month are scarce, consequently our notes contain little of special interest, except for some important observations from Mr. H. R. Heap our Receiver G.M. The main reason for our brevity is that the Section is undergoing a reshuffle due to war conditions, and each such change necessitates a good deal of reorganisation. Last month a new Transmitter Group Manager was elected who has had to settle down, and this month we have to record further changes. Mr. O. M. Derrick (GM3OM) takes over the Aerial Group, and Mr. E. J. Williams (G2XC), becomes the Propagation Group Manager, therefore until these groups are reorganised, we cannot expect reports.

We should like to record our thanks to Mr. P. Malvern for the work he has done as Propagation G.M., and also to his assistant Mr. L. Coursey.

It would be of great assistance if members serving in the forces, or those whose duty now entails such demand on their time as to exclude them from radio work, would let their GC, GM, or the ESM know the position by post card, so that our records may be kept as up-to-date as circumstances allow. We have lost many members as was to be expected, but we have been glad to add a few new names to our register during the past two months, which in itself is encouraging.

G2ZC.

## Receiver Group

The problem of the audio frequency response of receivers has recently arisen in connection with experiments on output transformers. In many commercial receivers it has been found that the limiting factor in the receiver's response has been the output transformer and a recent case came to hand where the output valve delivered 10 watts undistorted

output into a speaker which was quite capable of handling the power. The actual waveform of the output (fed from a sine wave modulated signal) was very poor as shown in Fig. 1 when the gain of the receiver was at maximum. In order to obtain a nearly sine wave output, the gain control was turned down to about one quarter maximum; in other words the receiver was actually only able to deliver about three watts undistorted output. The substitution of a similar transformer on a larger core enabled the full output to be obtained.

The tendency in modern designs seems to be to cut down the size of the transformers and this means a reduction in the maximum undistorted output, for it is virtually impossible to construct a transformer on a small core which will handle large voltages without introducing distortion. This statement may appear unjustified without some explanation, so the following is given to enlighten those who may be seriously interested in the response of receivers and audio frequency amplifiers.

The power delivered by the secondary of the transformer is given by:—

$$\frac{V^2}{\text{Load Impedance.}}$$

The voltage across the secondary (V) is given by:—

$$4.44 \times f \times S \times \phi_{\text{Max.}} \times 10^{-8}$$

where S = Number of turns.

„  $\phi$  = Flux density times area of section of core.

„ f = frequency.

Therefore assuming the frequency and number of turns to be fixed, the smaller the area of cross section of the core (i.e., the smaller the physical dimensions of the transformer), the greater must be the flux density for a given voltage. However, with high values of flux density, serious harmonic distortion is introduced, furthermore the magnetising current is increased, resulting in poor reproduction at the lower frequencies. One way of reducing the flux density is to increase the number of turns, but this gives a high leakage inductance and increases the capacity, resulting in a cut-off of the higher frequencies. This leaves only one method of obtaining good frequency response with a given type of core, that is to increase the section of the core. In this way a very good idea of the performance of a transformer can be obtained by taking note of its weight. At low powers a small transformer may be excellent, but directly the gain is turned up, distortion of the kind indicated in Fig. 1 will show up on an oscilloscope test. Interesting experiments can be carried out with various types and sizes of transformers and it will be found that in most cases the performance improves directly with the weight.

As far as the response curve is concerned the following two hints may be useful:—

(1) If the resonance frequency of the leakage inductance and distributed capacity is too sharp, the curve can be flattened by placing a 100,000 ohms resistor across the secondary of the transformer. The effect is shown in Fig. 2 which illustrates how the curve is flattened at the sacrifice of a little gain.

(2) Very often it will be found that reversing the connections to the secondary of the transformer will affect the response at the high frequency end. A case has been known where, connected one way round, the curve began to fall off at 2,000 cycles, but

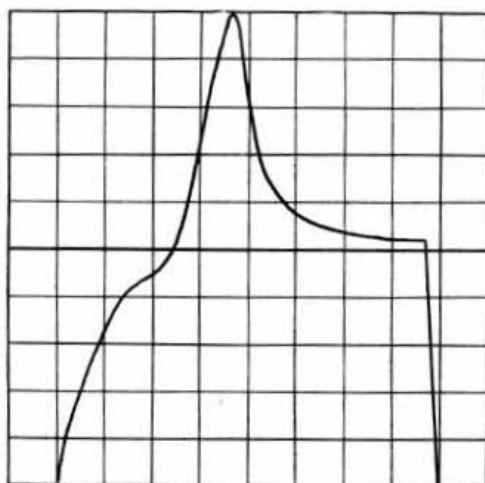


Fig. 1.

Actual waveform reproduced from an overloaded transformer when fed from sine wave.

with the connections reversed the curve was almost flat up to 9,000 cycles. This is due to the by-pass effect of the capacity between primary and secondary and is reduced to a minimum when the start of the primary winding is connected to the anode of the preceding valve, and the end of the secondary winding (assuming it is wound over the primary), is connected to the grid of the following valve.

G5HF.

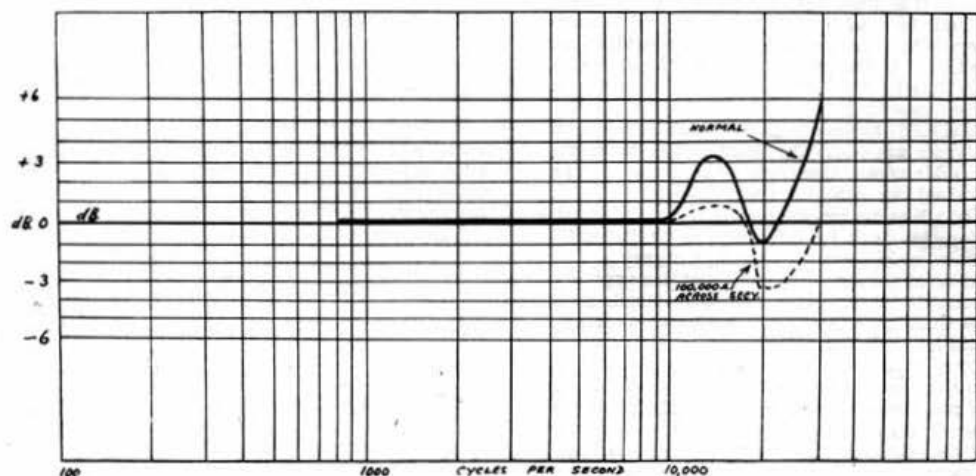


Fig. 2.

Showing effect on resonance curve of placing 100,000 ohms across the secondary.

## Cosmic Notes

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

### Sunspots

It has been impossible to make any sunspot observations at the writer's station since the notes for last month were compiled and the following details are from Science Service Research Aid announcements. Sunspots were particularly numerous on September 29 and 30 and October 1, the U.S. Naval Observatory recording over 270 on the first two of these dates. Tokio Observatory reported the central meridian passage of a large group of spots, visible to the naked eye, on September 28. No further large spots were reported up to October 26, the last date for which this data is available, but large solar prominences were observed on September 27, October 1, 6 and 17.

The International Astronomical Union's Quarterly Bulletin on Solar Activity has been received. Dates of central meridian passage of large sunspot groups during the 2nd quarter of 1939 are given as April 15, 26 and May 5, while many smaller groups are also recorded. Important chromospheric eruptions were observed on April 7, 16, 21, May 3, 4, 7, 13 and 24. On April 21, thirteen separate eruptions are reported.

### Magnetic Elements

Data for September 24 to October 28 is available. A

moderate disturbance occurred on October 3 and for a few hours during the morning of October 6. A more violent storm was experienced on October 13 and 14, lasting into the early hours of October 15 (see note under "Radio Conditions" in last month's Cosmic Notes). October 16 and 17 were also moderately disturbed and another period of disturbed conditions was recorded on October 19 during the morning hours.

### Radio Conditions

The F2 layer vertical incidence critical frequencies at Washington (local noon), for Wednesdays beginning September 27 were as follows:—11,000 kc., 13,000 kc., 11,800 kc., 14,000 kc., 13,400 kc. (The average for the same period last year was 11,600 kc.).

No unusual radio conditions have been noted from personal observations during the past month (i.e., to November 28). The writer would be interested to hear from any members in a position to send a brief monthly report on such conditions to assist in compiling the last paragraph of these monthly notes.

### Trade Reviews

The new range of *Denco* variable condensers are specialised products designed essentially for use on the high and ultra-high frequencies. The sole insulating material employed is Polystyrene, a material well known for its exceptionally low dielectric losses. The plates are shaped in a manner which gives both an even frequency spread over the dial and a very low minimum capacity. The employment of long bearings at both ends of the spindle results in a firm but smooth movement, free from sideplay, and enables the connection to the moving vanes to be made perfectly noise-free, even at the highest frequency.

The receiving models include both single and split-stator types. The former are available in capacities of 10, 25, 50, 75 and 100  $\mu$ F and the latter in overall

capacities of 12½ and 25 µF (25 and 50 µF per section respectively). An interesting feature is that for a slight extra cost, the end plates can be extended, thereby providing an integral low loss mounting. The normal Denco condenser occupies only 2¼ in. by 1½ in. panel space.

The 50µF single unit has been tested and found to give an excellent performance in every respect. It is priced at 4s. 6d.

Many other short-wave components are manufactured, all of them incorporating Polystyrene insulation, and readers will find the Denco catalogue interesting. It is obtainable for the cost of postage (2d.) from Denco, Warwick Road, Clacton, Essex. G5JU.

The following condensers have been received for review from Messrs. Wingrove & Rogers:—

#### C.801 (100 µF)

This is a sturdy little condenser which equals its American counterparts in every respect. Its small overall dimensions make it ideally suited for padding and trimming and the all ceramic insulation renders it specially suited for low loss I.F. tuning circuits (according to modern methods) and for U.H.F. operation. The condenser is fitted with screw-driver adjustment and the spindle is sunk about ⅛ in. below the metal bush to prevent accidental movement. This condenser marks a great step forward in the drive for all British equipment. It is available in maximum capacities of 10, 20, 50, 75 and 100 µF.

#### C.804 (10 µF)

This is similar to the C.801 except that an extended spindle is provided. It is especially useful for U.H.F. tuning and band-spreading and is available in the same capacities as type C.801.

G5HF.

### Trade Notice

Wright & Weaire, Ltd., inform us that due to Government requirements it has become necessary to restrict the output of their Ceramic switches to meet such needs; as a consequence ordinary commercial enquiries have had to suffer.

They suggest that if members could group their requirements and send a composite order of one common specification, a reasonable delivery date could then be quoted.

### Bees and Beds

Many years ago our advertising pages contained announcements concerning some first class honey made by one of our East Anglian members. Since then we can remember very few non-radio advertisements appearing in THE T. & R. BULLETIN but in this issue one of our members, who is the proprietor of a Private Hotel, draws attention to its merits and invites members passing through town to make use of the excellent facilities provided.

Mr. C. R. Green, the proprietor in question, holds the call G5LN and during the last war served with the Requisition Service attached to the Sherwood Foresters, and latterly with the King's Royal Rifles.

We hope that service members and others will show that the "pulling power" of this Journal extends beyond the radio industry.

## Standards of Radio Frequency\*

New Schedules of the U.S. Bureau of Standards Transmitter (WWV).

The Department of Commerce Letter Circular (LC-565), published on August 30, 1939, gives details of the times, frequencies, accuracies and other characteristics of these Standard-Frequency transmissions.

One very welcome alteration of the schedule is that the 5 Mc/s. transmission is now always on the air, day and night. The power is 1 kW. and the carrier is modulated with a standard musical pitch of 440 cycles per second. In Great Britain, this transmission is usually only heard in the early mornings, when the intervening path is in the late-darkness zone. The station call (WWV) is given at each even ten-minute interval throughout every hour, both by voice and by key. The audio and radio frequencies are emitted with an accuracy of better than one part in ten million.

The other standard frequency transmissions take place every Tuesday, Wednesday and Friday (except American national holidays), with a power of 20 kW. The frequency of these transmissions is 5, 10, or 20 Mc/s. according to the following schedule:—

15.00 to 16.30 G.M.T. on 5 Mc/s.

17.00 to 18.30 G.M.T. on 10 Mc/s.

19.00 to 20.30 G.M.T. on 20 Mc/s.

The Tuesday and Friday transmissions are unmodulated C.W. except for short pulses of 1,000 cycles tone marking 1 second intervals. Each pulse consists of five cycles of the modulation frequency and the modulation depth is 50 per cent. The time intervals are accurate to better than 0.00001 second.

The Wednesday transmissions are modulated 50 per cent. with the standard audio frequency of 1,000 c.p.s. Both carrier and audio frequencies are accurate to better than one part in ten million.

In addition to this service, data is broadcast on telephony, concerning ionosphere conditions (including vertical incidence critical frequencies), virtual height of the ionosphere layers, maximum usable frequencies for radio transmission, and information upon ionosphere disturbances. Values are given for the day of the broadcast and the night before. The information is intended as an aid in choosing optimum frequencies for radio communication. The frequencies employed for this service are as follows:—

18.30 to 18.35 G.M.T., 10 Mc/s.

18.40 to 18.45 G.M.T., 5 Mc/s.

18.50 to 18.55 G.M.T., 20 Mc/s.

Because of changing conditions upon the higher frequencies, it is likely that the 20 Mc/s. transmissions may be changed to 15 Mc/s. some time during 1940 and details of this change will be published when available.

The United States Bureau of Standards welcome reports of reception of these transmissions and of any special uses to which they are applied. The address is The National Bureau of Standards, Washington, D.C., U.S.A.

\* Summary prepared by S. O'Hagen (G2CR).

# THE MONTH "OFF" THE AIR—November, 1939

By ARTHUR O. MILNE\* (G2MI)

It seems that most of us are now settling down to our new mode of life. After all, there is much we can do with our receiving equipment which will mean that we shall be able to make more effective use of our transmitters when they come out of store. Just as a suggestion, why not tackle the beam aerial, described by G2IG in his excellent article last month? This can be tested quite satisfactorily with the receiver, in fact more accurately than with the transmitter.

So far, no more countries have gone off the air. Ken Warner has kindly supplied a list of all W.A.S. certificates so far awarded to British Amateurs. In order of award, they are: G5BJ, G6QS, G6NF, G6WY, G6BW (telephony), G6RG (28 Mc. telephony), G6WT (telephony), G16TK, G2ZQ, G6CL, G2MI and G8IG (telephony). The 6's seem to have that little something the others haven't got!

BRS2200 reports two new Pacific stations, KB6RSJ and KB6RWZ.

We have had a letter from HB9CE who explains that he has been called up for military service, hence the delay in the despatch of HB1CE cards. With his letter he enclosed some cards for the first few G's he contacted and promises that the remainder will be sent off as soon as possible. A full list of contacts has been lodged with ARRL so the card need not be sent to DXCC. The card is a beautiful piece of work with the call-sign and QRA in large type. He also tells us that the "LZIID" who was active in September and October was a Roumanian. This individual actually had the cheek to write to HB9CE and apologise for "having" to pirate LZIID's call! HB9CE intends to acquaint all those who were "taken in" by this latest example of brazen effrontery as soon as he has the time. LZ1AK is another bogus station.

BERS474, one of the operators at ZB2B, writes to say that there are several prospective R.S.G.B. members in his unit and asks for some forms. Good work! He was due to return to G just as war broke out and had applied for his call. He received a charming note from the G.P.O. regretting that licences were suspended but suggesting that he should renew his application after the war.

An old friend, Miles "G Collector" Weeks, W1WV, says DX men on his side of the American Continent are having a thin time. Incidentally, he is one of the victims of the phoney LZIID. He sends 73 to his many friends in Britain and we have asked him to forward some regular notes and news for this feature. More 73 to G Hams come from VK3BM and VK3HG via G8SB.

IIIR and U4AM are very active. TAIFX (!) has also put in an appearance on 14 Mc.

GW51J, recently returned from Denmark, just in time in fact, remarks on the wonderful hospitality extended to him by the OZ amateurs. He gives some interesting details concerning the licence position there. The initial ticket costs about 18s.; a morse speed of 8 w.p.m. is required and the facilities are limited to 100 watts on 3.5 Mc. The receiving licence costs 9s. The full permit, which entitles the holder to use all bands, costs a further 9s. and requires a speed of 12 w.p.m. Most of Denmark is

on D.C. supply so the majority of stations are QRP, but with 40-ft. firs at 7s. 4d. each, it is not difficult to put up a good aerial.

Further to our notes last month regarding TAP, 2CDT mentions that this station solicits technical reports which are acknowledged, if accompanied by an International Reply Coupon. "Post Bag" talks, in English, are broadcast each Saturday at 20.15, the frequency being 9,465 kc. Input 20 kW. Address reports to "Correspondence Dept.," Radio Ankara, Turkey.

From BRS3572 comes a most interesting Bulletin supplied by the G.E. Co. dealing with their transmitters WGEA and WGEO, at Schenectady. WGEA, formerly W2XAD, operates on 21.5 Mc., 15.33 Mc., and 9.55 Mc. WGEO, formerly W2XAF, is on 9.53 Mc. Receiving aerials should be directed to lat. 42 degrees 47 minutes North. Long. 74 degrees West. The effective carrier power, using replacable filament amplifier valves and the Alexanderson panel aerial, is about 600 kW. along the beam!

HH2MC was heard on November 26, so evidently the Haitians, who were closed down in September, are back. The Cubans are also active again. It is nice to hear of someone coming on again! D4BUT is still very active. What a marvellous job, just work hams for the duration! It is only fair to say that we have not heard him try any propaganda or funny stuff. He appears to work straightforward ham contacts, as in peace-time, despite rumours to the contrary. VO1J, who gave QRA as A. Brown, 176 Penayweail Road, Neufundland, was a queer

## D.X. PERSONALITIES—No. 6.



Bill Atkins (W9TJ), one of the leading DX men in the U.S.A. Bill has 135 countries worked to his credit.

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



sounding signal on 14 Mc. with a T1 note on November 26.

The bands were very active during the weekends of November with the A.R.R.L. sweepstakes contest, and also during the latter part of the month, with the "Radio" DX Contest, which has raised the most wonderful flock of bogus calls it is possible to imagine.

2AOU has received a card from OX7ZI, that should make a few mouths water! G2DH is getting rather worried, in common with many others, concerning the fate of cards sent to the DXCC last August and not yet returned. He also wonders if anyone has had a card from KB6ILT yet.

BRS2763 adds another one with KF6OWR. Also CR6XX who gives his QRA as BOX 77 Mossamedes, but F8GO, PAOKX, LX1X, LX1SS, ZE8F, SA9BB, ZZ1A, ZZ2B, XX1M, QX5YF, Q5F, OG2SY, TO7FH and EN5 all, be it noted, called by W's, sound rather like someone's idea of a joke—either American or mid-European in origin.

### QSL Bureau

Running the QSL Bureau has its funny moments. Recently two cards arrived from a Chilean for two GW amateurs. Just to make sure, each card bore the legend "Pse QSL dear ob. You are my first GW"! The response to last month's QSL appeal has been most gratifying, but why did most of the members who collected their cards, send only one envelope? It simply means that when a few more cards accumulate, these same folk have to be shaken up again. Cards are still arriving in considerable quantities and there is no difficulty in sending cards abroad, provided that they go *via* the Bureau.

Another point, it would be much appreciated if members provided their own stamped addressed envelopes and not send postal orders for the purchase of same. There is quite enough work to do as it is without the extra burden of addressing dozens of envelopes. By the way, don't forget to put your call-sign on ALL correspondence sent to the Bureau. You would hardly credit the number of stamped envelopes, etc., which are received with no mention of the sender's call-sign. This necessitates a hunt through the call book or a telephone call to Clarry. Have a heart, Chaps!

### Sign-off 1939

In conclusion, we should like to thank you for the large number of appreciative letters we have received concerning this feature. We have something

to live up to and will do our best. Please forgive us if we do not reply individually. The best of luck and 73 to all of you at home and overseas, and a Merry Christmas, despite old "N." "Be of good cheer" and "Lift up your hearts," quotations we admit, but excellent advice all the same.

### DX Century Club

After having held the lead in the DX Century Club Roll of Honour for nearly two years, "Ham" Whyte (G6WY) has at last been displaced by W6GRL who has obtained 147 confirmations to the 144 standing to the credit of our Champion DX worker. Considering the difference in licensed power between U.S.A. and British Isles amateurs, we think "Ham's" record is something to be proud of. Let us hope it will not be too long before we see his name at the top of the list once more.

Other prominent British amateurs in the list are G2ZQ (136), G6RH (131), G5BD (115), G5RV (114), G5BY (114), G2DH (113), G6CL (112).

## The 28 Mc. Band

By NELLY CORRY (G2YL)

UNDER present conditions it is difficult to judge conditions accurately, but from reception of amateur signals in the Americas and commercials in other continents it seems clear that conditions during November were inferior to those of a year ago. On nearly every afternoon W's could be heard, and occasionally stations in Europe and South America were audible, particularly at week-ends. On November 13, 14 and 25 there were almost complete fade-outs, and on November 15 BRS3003 heard the "Hissing Phenomenon" for half a minute at 14.19 G.M.T. Just previously to this UK3AH was a good signal, and HA1K was S7 on phone (unusual for November), but shortly after the "Hiss" the European signals faded out and W's were heard quite well.

Normally reception of VK and VU stations is good at this season of the year, but now that these are all closed down, signals from Oceania and Asia are extremely rare. Those reported recently are K6MVB heard on October 31 by BRS3179, KA1ME heard by BRS 3571, and U9AW (possibly harmonic) heard on November 12 by BRS2763. In Africa OQ5AB appears to be the only station still active on this band, and he could be heard working W phones on a good many afternoons.

South American stations were heard spasmodically during November, and those reported were CE3AG, CE3CZ, HC1JB, LU5AB, LU7BK, LU9AX, PY1DS, PY2AC, PY2AK, PY2MI, PY5AQ and YV1AQ. Twenty-two stations in Central America and the West Indies were logged, the most consistent being HI7G, TI2RC and TI3AV. Others were heard from CO, HP, K4, K5, TG and XE; all except a few K4's used phone exclusively. Ship stations reported were W5FTA heard by BRS3179, and NY4AD heard by BRS3003 on November 26. The latter said he was in a U.S. naval vessel operating in the Caribbean Sea.

W stations using c.w. are now almost as inaudible as G's, but phones from all districts were heard on several days, and W6's came through particularly well during the first week of November. BRS2763

### UNIQUE



Jimmy Ferguson sets a new fashion in QSL cards.

reported exceptional conditions at about 16.00 G.M.T. on November 24, when W6NLS and W7ACD were outstanding signals and W6POZ was the strongest W6 he had ever heard.

A few European signals were reported on about 12 days and included EA7BB, HA1K, LXIUU (not in the Call-book so possibly bogus), four U3's and a few 14 Mc. harmonics. I must take back my remarks in last month's Notes, as apparently D4BUF is the genuine article, and the "Rare Country" pirates are *not* pretending to be "Belligerents" but have coined some new calls, e.g., OS5D, TO7SH, VL1A and ZZ1A.

Reports were received this month from 2BGN, BRS2763, 3003, 3179 and 3571, and I should like to take this opportunity of thanking them and all other 28 Mc. stations who have reported this year, and wishing them a really happy Christmas and the best of luck in 1940. Thanks are specially due to BRS3003 and BRS3179 who have both reported each month for well over a year.

## The 56 Mc. and 112 Mc. Bands

By CONSTANCE HALL (G8LY)

THE latest Journals from the U.S.A. contain an account of a two-hour, two-way "solid" contact on 112 Mc., between W9WYX and his radio partner W9VTK, the distance being in excess of 120 miles. This was not a freak contact but the result of several months' preparation, after house to

house contacts with local amateurs had proved a success. W9WYX set up a Yagi, on a 60-ft. tower in Genoa, using 6L6, 807, 809, HK24's P.P. powered from a gas-driven generator in a truck, while 9VTK was situated at 14,460 ft! He used 42, 6V6G, 807 powered by Vibrapacks. Contact was made on schedule, S3 signals becoming S9 after slight adjustments. 224 Mc. work is now contemplated.

In September a 56 Mc. Relay and Contest resulted in a 1,000-mile relay, and another of 325 miles with an "answer back." Every district was covered and it is anticipated that such relay-contests will keep 56 Mc. activity high.

WIDEI predicts certain periods when 56 Mc. will open up and he arranges schedules accordingly; he expects that good days for W1 to W9 work will fall 27 days apart. He finds his twelve element beam 60-ft. high better than his rhombics, when the band is wide open, the latter being better when the band is just opening or closing.

Aurora skip, giving 200-400-mile contacts, is anticipated during 1940 by some amateurs in America, as this may be a year of maximum ionospheric disturbance and Aurora; the last such year was 1930.

News that 2DDD is contemplating construction of a receiver for 112-56 Mc. work, using three Acorns, shows enthusiasm. 2BIL is now a Service Operator, which we hope indicates another 56 Mc. radiating station in the future! The writer, and GW2NG, send the season's greetings to all, and thank especially those who have contributed news to these columns.

## A Week of Amateur Radio in Liechtenstein

By F. BECH (HB9CE)

WHY such a noise about an HB? Many who heard the run on HBICE last August and did not know the full story will have asked themselves that question. The answer is that this time the HB really had more than usual interest, because it emanated from a station in Liechtenstein—a country not heard every day of the week.

As the writer received so many enquiries asking for details it was felt that the only satisfactory way of answering them would be to offer a few notes on the activities of the station.

Firstly perhaps some remarks about Liechtenstein itself may not be out of place. This small country, situated between Switzerland and ex-Austria, has about 10,000 inhabitants and is governed by a Prince. It is today the only remaining monarchy using the German language. Its economy is very closely connected with Switzerland and a Customs and Postal Union joins the two countries. Liechtenstein is a very beautiful country, and is an example of how a people can live happily even without guns!

A visit to Liechtenstein with a portable transmitter had long been planned, and after having found a good QRA, HB9AT (a real old-timer) and the writer stowed the instruments in the former's car, and drove to Triesenberg, a village situated on the slope of a mountain and almost 3,000 ft. above sea level. The apparatus was installed in the top room of a small rural hotel. An old broadcast aerial about 100 ft. long, which our host declared was so bad that it could no longer be used for broadcast reception,

was discovered and used for both transmitting and receiving. The transmitter was a home-made portable rig using an 89 as C.O. and an RK39. The receiver normally in use at HB9CE—an HRO—did yeoman service during the whole stay. The power supply at the home station is provided by a gasoline generator, but at the Liechtenstein site we were fortunate in possessing electric current.

As the QRA was situated in mountainous country, there was some scepticism as to conditions, but the very first contacts soon put an end to all doubts, for the whole 14 Mc. band was alive with calls for HBICE.

Apologies for the shortness of our replies are due to some of the amateurs who contacted us, but in order to work as many stations as possible, high speed QSO's were the order of the day.

In general, discipline was excellent, but there were a number of operators who thought they would get a quicker reply by sitting on our frequency! Another particular kind of DX specialist caused some annoyance by terminating his contact with a request to "please look for my friend . . . on my frequency," only to call us a little later with exactly the same chirp and the same play of the key, using his friend's call-sign!

Our station was in action almost continuously, for nine days, during which time we consumed 21 kilowatt hours of electricity, two pencils and 20 packets of cigarettes! Although 580 contacts were obtained 500 of which were with the U.S.A. it was only

(Continued on page 280).

# ENJOY WORLD-WIDE LISTENING this XMAS

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## RANDOM REMINISCENCES

By UNCLE TOM

*The original Old Fossil has come out of cold storage to deliver a few of his Avuncular Aberrations in time for Christmas.*

WELL, well, nephews and nieces! Wherever you may be, one thing is quite certain—you are not misbehaving yourselves on the one-time amateur bands. I suppose each of you has shifted your own particular misdemeanour to whatever job in the Fighting Services or the Home Defence Forces you may be doing. Rumour has it that Somewhere in Kent a once well-known ham has been in severe trouble with the A.F.S. for over-modulating a high-pressure hose, with dire results to all within 50 yards or so; and the tales I hear of the dummy transmitter (complete with rubber-contact key), in a certain Air Raid Wardens Post in London must be heard to be believed. The particular bloke responsible for this is — (censored) and the other night he — (censored) a — (censored) from (Oh, Heck, what's the use?).

It's no good attempting to soliloquise in the old way—firstly, because there's no longer a Shack to do it from, and secondly, because so many things have happened this year that almost everything pre-1939 has been completely forgotten.

My own little year has been fairly eventful, what with two months in the U.S.A. among the W2's and W9's, the removal of all transmitting gear from the Shack by the G.P.O., and (the following day) the blowing-up of all that was left by a nice direct hit from a particularly juicy flash of lightning. Since the latter was interesting while it lasted, I might as well ask whether any other amateur has had personal experience of it. I shall never cease thanking the G.P.O. for carting away the valuables first! The antenna (not very large or high) was earthed by a wire which just came inside the shack—from the lead-in tube along the window-frame and out again.

The antenna caught a direct packet—eyewitnesses say that a huge burst of sparks shot upwards like a rocket—and the entire length of copper wire and five Pyrex insulators just disappeared. The wire inside the shack remained, but apparently part of the discharge hopped over from it to the receiver case. From this it went down the mains lead to the switchboard, at which point it completely disintegrated a five-amp. tumbler switch, left a three-amp. fuse absolutely intact, and then carried on along the lead which normally goes to the power-point on the skirting.

This lead was about a foot away from the said point, but apparently it formed a nice arc across, set fire to the skirting, and popped off every fuse in the house (lighting and power) except the 3-amp. one that it actually had to pass through! When we opened the fuse boxes downstairs, approximately a hundredweight of soot fell out on to the floor.

Later on, when the receiver was examined, it was found that all the mains wiring in it was burnt out, and the on-off switch reduced to a cinder, but all the R.F. and I.F. circuits were intact.

Incidentally, this isn't all one of my little fairy-stories: it is a true account in every detail of the result of the Great Storm on the day on which war was declared. Believe it or not!

And now I may as well reminisce about the States, seeing that they now appear to be the sole survivors of amateur radio. Unfortunately mine was a business trip and I didn't have anything like the time I should have liked to meet the gang—but what free time I did have was well filled. Special honours and thanks to W2IOP (Larry le Kashman), during the New York part of the job, and to W9AA (Cyrus Read), in Chicago. These lads certainly know the meaning of hospitality, and you can take it from me that none of the tales we have heard have been exaggerated. There was one tense moment when someone came out with some very bitter remarks about Uncle Tom and his professed hate for the "New-Country Collector," but things were soon diverted into other channels.

At the World's Fair, W2USA was not in full working order, but a combined station run by W2MQ and W2KU under various call-signs was keeping the flag flying. Everyday a crowd of W2's and W8's blew in, occasionally a few W9's and W6's would turn up, and on really rare occasions a foreigner would sign the book. All the gear was commercial, and I should imagine that W2USA became a really imposing rig when things were finally straightened up. W2IOP, by the way, used 600 watts or so to a typical modern rig, home-brew, and has a collection of cards that are the envy of most of the New Yorkers.

In Chicago I rang up W9AA, who appeared at the hotel almost by magic and showed me round several of the local stations, including the two tremendous rigs run by Mrs. Bourke (W9DXX) and Mrs. Mida (W9LW). W9AA's own shack was very interesting on account of an instantaneous band-switching device that he was working on. This would give him several spot-frequencies in any of the bands in a matter of two seconds. Licence No. 1, on the wall, is also quite an attraction! Cyrus Read has the honour of holding the first W9 call and of still being active on the air.

Well, to get back to ourselves:—If any nephews and nieces like to let me know, in a general way, what they're up to, I will gladly spin a little story around it all once a month. I don't mean the genuine experimental side of radio—others will look after that—but any interesting doings that would be amusing to the rest of the members. As long as I have a free half-hour once a month I'll gladly patch a few paragraphs together and try to make a story out of them. Send the dope to Uncle Tom, c/o The Secretary, and we'll see what happens. Meanwhile, Merry Christmas to everyone, and 99's to the Black-Out and the petrol coupons.

# BRITISH ISLES NOTES AND NEWS

## DISTRICT 1 (North Western)

The D.R. sends greetings to his T.R.s and members, especially those in the Services at Home and Overseas, and hopes that we may soon be working our own gear again.

*Cumberland.*—The District Scribe is pleased to have a report from G8RZ. There has been no meeting and no individual reports. The membership is rather scattered and with restricted bus and train services it makes it difficult to travel in order to keep in touch. 8RZ states that there has been little activity at his station but on the assumption that the war is to last for about three years he is preparing to make a great circle map!

*Burnley.*—G31Y is with the R.A.F., "somewhere in France," and reports that he has met 8GG. 3KT is busy with receivers. 8TD was married immediately before the outbreak of war, which interrupted his honeymoon. 5ZN is busy with the local A.R.P. service.

*Blackburn.*—At the last meeting an interesting discussion took place on a special circuit arrangement and thanks are due to G2HW and 6WH for their contribution to the success of the meeting.

Local members send their Christmas and New Year greetings to their first T.R., ZD2H (formerly 2QN), and to all members.

*Manchester and Liverpool.*—What about it?  
G6TW via G6CX.

## DISTRICT 4 (East Midlands)

The District meeting on November 5 brought nearly forty members to Nottingham for a further very interesting lecture by Mr. D. H. Thomas of Nottingham University. G2XS (D.R. for East Anglia) sprang a pleasant surprise on us by coming from King's Lynn for a personal chat. Taking things all round our first war-time meeting was a great success.

There will be a special effort on December 17 at The Wolds Hotel, Loughborough Road, West Bridgford. Dinner will be served at mid-day, after which judging will take place of a brand new competition for the best item of Station Equipment. This will be followed with a show of films. One of our oldest and best known members (who insists on remaining nameless) has very kindly donated £1 as an addition to the first prize in the competition and it is hoped that some instructive gear will be displayed. Tea will be available for those who require it at the end of the proceedings and the D.R. would like to see as many as possible turn up for this, the final meeting of the year.

Our heartiest and best wishes to all at home or abroad for a Happy Xmas and even Happier New Year.

G2RI.

## DISTRICT 6 (South Western)

Things in general appear to be settling down to a more or less routine existence, and at last the D.R. is able to devote a little time to radio matters. He wishes to apologise for having missed a report in the last two issues, but hopes now to be able to carry on as usual. Since the war started letters have been received from only one T.R. (North Devon), but we should very much like to know what is happening

in the other areas. If the T.R. is not now available, perhaps another member would be good enough to write from time to time.

*Torquay.*—Owing to the fact that most members are rather young, very few are left in this area; it would therefore be quite hopeless to arrange meetings. We should, however, be glad to hear from local members, and to meet those who come home on leave. The D.R. has had visits from G6RF and G3JD.

In the intervals between carrying out other duties, the D.R. has been conducting receiver experiments, and local members will no doubt be amused to hear that he is in process of building a fresh one! 51F is also carrying out similar tests.

In North Devon we have to report that G3GH has temporarily left the District. In recording our regret we thank her for the excellent work she has done in her area and hope that it will not be long before she is back with us again. In the meantime G3BO is doing his best to carry on, so perhaps members attached to that area will please communicate with him.

Congratulations to Miss P. Bryan (G5YL) upon her recent marriage to Mr. Alec Price. Her QRA for the time being remains unaltered.

G5SY.

## Forthcoming Events

- |         |   |
|---------|---|
| Dec. 16 | District 13, 3 p.m. Brotherhood Hall, West Norwood.   |
| .. 17   | District 4. Lunch 12 noon at the Wolds Hotel, Loughborough Road, W. Bridgford. Followed by Competition and Film Display (see District 4 notes).   |
| .. 30   | Annual General Meeting. 2 p.m. at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2. Lecture by Mr. E. L. Gardiner (G6GR). Subject "A Novel Double Super-heterodyne Receiver." |
| .. 31   | District 12, 3 p.m. at G2YD, 46 Friars Avenue, Friern Barnet Lane, N.20. Book to "Orange Tree," Friern Barnet.  |
| Jan. 1  | District 14 (Chelmsford Section), 8 p.m. at G5RV, "Arvika," Galleywood Road, Chelmsford.  |
| .. 2    | District 5 (Bristol Section) 7 p.m. at Antelope Hotel, Broadmead.   |
| .. 12   | District 7, 2 p.m. at G2YL, "Redholm," Walton-on-the-Hill, Tadworth, Surrey.  |

## DISTRICT 7 (Southern)

A meeting will be held at G2YL, "Redholm," Walton-on-the-Hill, Tadworth, Surrey, on Sunday, January 14, at 2 p.m. In pre-war days this meeting, attracted a record number of members from this and adjoining Districts, but owing to the black-out, and the fact that many are absent with the services it will be difficult to estimate the number likely to

attend this time. We ask everyone who wishes to come along to drop a card to G2YL in advance. The invitation is open to members from other Districts and, in order that those who live at a distance may get away before the black-out, tea will be served at 3.30 p.m.

**Reading.**—A very welcome letter from G5AO reveals that the R.A.F. seems to have taken the Reading gang practically *en bloc* as G5AO, 8TH, 2AYP, 2BKD, 2BHS, 2FZI, 2FXD, 3RW, and 5RP are all in that service. 2FPD is with the R.A.O.C.

**Portsmouth.**—Monthly meetings are still being held on Sunday afternoons and details can be obtained from G2XC, 34 London Road, Witley, Portsmouth.

**Weybridge.**—A most enjoyable meeting was arranged by G6NK at Addlestone on November 12 and as this was so successful a second was fixed for December 3. It was decided that as this part of the county served the greatest number of available members, meetings should alternate between Addlestone and Weybridge instead of being held at Guildford as in pre-war days.

**Guildford.**—G8CV who writes from a "very comfortable billet in a French village" still seems to be brass-pounding although not under the call F8CV! The attention of local members is drawn to the fact that for the duration it has been decided to join forces with Weybridge for monthly meetings.

G5WP.

#### DISTRICT 9 (East Anglia)

The outbreak of war resulted in two District members (2APD and 2FAO) just missing their full calls, as both had passed the morse test. They have the consolation, however, of knowing that they should be among the first post-war transmitters.

News has been received from the *Great Yarmouth* T.R. who reports that several members are busy on National Service, among them being G3RW and 2BXJ. The former is also finding time to instruct a local boys' club in the intricacies of the morse code; 2FAO is constructing a new amplifier with noise suppression and variable tone control stages; 2BIC is with the Royal Air Force and is training for the duties of Sergeant Observer.

At *Beccles* 2APD is listening to 14 Mc. DX on his new Trophy 8 receiver, and G3RK is designing midget portable receivers.

Any further news of happenings in the District will be appreciated by the Scribe as it will enable him to build up a more substantial report on our curtailed activities.

G2XS.

#### DISTRICT 12 (London North and Hertford)

Twelve members were present at the meeting held at G5FA on November 26, when numerous "Ham" topics were discussed. G6CL gave us a short chat about Radio during the last War.

G6QM has kindly promised to look after the collection of QSL's for all members of District 12 who are on active service. All communications should be addressed to him direct at 74 Hawthorne Road, Hornsey.

G8DR, who is with the R.A.F., has had the good fortune to run across quite a number of amateurs. His friends in North West London will be interested to hear of his forthcoming marriage on December 23, at St. Albans Church, Golders Green, at 2 p.m. We offer our congratulations and wish him the best of luck. G2CV will be best man.

G2GO (T.R. for Potters Bar), would like to hear from members in or near that area so that local meetings can be arranged.

The next North London meeting will be held at G2YD, 46 Friars Avenue, Friern Barnet Lane, N.20 (Telephone No. Enterprise 2747), at 3 p.m., on December 31. Trolley bus 521 to the "Orange Tree" and then ten minutes walk along Friern Barnet Lane.

We take this opportunity of wishing all members wherever they may be a Happy Xmas and lots of luck.

G5FA.

#### DISTRICT 13 (London South)

A meeting attended by 25 members was held at the Brotherhood Hall, West Norwood, on November 25. This was the first held in the District since August and it is hoped that these monthly gatherings will continue. It was agreed to hold the next meeting on December 16 at the same time and place. The D.R. was delighted to see so many members of the District obviously intent on doing all in their power to keep Amateur Radio alive. The suggestion was made that future meetings should be held in Central London instead of West Norwood but it was felt that the latter place is more suitable, as everyone in South London is familiar with the Brotherhood Hall and how to get there. Before leaving the subject of the meeting may we thank the gentlemen who very kindly persuaded the caretaker to produce tea all round. In view of all the rag-chewing this was doubly welcome.

Notes should in future be sent to the T.R.s who will in turn forward them to the D.R. The D.R. hopes to be in London for some time at any rate and is doing all he can to keep things going although a twelve or thirteen hour day at the office makes time rather scarce. In conclusion may we extend to all members, wherever they be, every possible good wish for Christmas and may we all meet again very soon under happier circumstances.

G2WV

#### DISTRICT 14 (Eastern)

*Chelmsford.*—G5RV after visiting G8PB while the latter was on weekend leave, learned that many of those in the R.A.F. Wireless Section are discussing and designing their new rigs which they intend to build after the present "spot of bother" is over. That's the spirit! 6LB continues work on his new receiver which should bring them in when it is completed—providing they are there! 2SA reports that he is storing his 40-ft. pole in a shipyard, to prevent unnecessary weathering, until it is wanted again; he and 5RV miss their 3.5 Mc. Sunday morning skeds of eight years' standing! BRS3650 is taking the local morse practice with great determination. Chelmsford members wish to record their appreciation of Council's decision to carry on the Society's activities during war-time.

*East Essex.*—The following are known to be serving in H.M. Forces:—G5XI (T.R.), 6CT, 6VS, 5UK, 2MY and numerous BRS and A.A. calls, whilst 2LC, 2SO, 2KH, 5VQ, 2GU, 3OA, 6IF and others are active on the "Home Front." The acting T.R. (2SO), who is anxious to keep up meetings, is willing to hold an "At home" at his QRA some time in December, either on a Saturday or Sunday afternoon, and would be pleased to hear from anyone

interested. Dr. Gee, 2UK, late of this District, paid a lightning visit recently from Boston, Lincs., but unfortunately only had time to call upon 2SO. We congratulate both G2UK and 6IF on their recent marriages. The D.R. sends 73 to all members for Xmas and 1940.

G6UT.

### DISTRICT 15

#### (London West, Middlesex and Buckinghamshire)

There is little further news this month and reports have only reached us from G5SR and 8KZ. It is understood that G8IH has answered the call to the colours, while 2IJ is working at a Post Office station. Several members are also engaged on D.F. work. The D.R. apologises for not having been able to arrange district meetings yet. What offers for a Saturday or Sunday? G4HF has recently been entertaining the troops in France.

G6WN.

### DISTRICT 16 (South Eastern)

*Canterbury.*—Mr. W. T. Barker (G3NQ), who has offered to act as T.R., will be pleased to hear from civilian or service members living in or near the town, with a view to arranging local meetings. Communications should be addressed to 10 Burgate Street, Canterbury (Phone, Canterbury 2744).

*Ashford.*—The local Club are determined to keep in contact for the duration, and a recent meeting was attended by G2JV, 2QT, 2KJ, 3SL, 8AK and 2CJT. Meetings will be held at 81 Beaver Road on the second Monday in each month.

Congratulations are offered to G2JV and 2KJ who were recently married. G6SY has accepted an important Government position.

### DISTRICT 17 (Mid East)

Owing to restricted activity there is very little to report but the Grimsby and District Short Wave Society is carrying on and following the example set by Headquarters.

At the last meeting which was well attended, the officers for 1940 were elected and plans made for the Annual Dinner. 2BYS kindly offered to place his recording apparatus at the disposal of the Society, an offer which was gladly accepted and much appreciated. Most of the local members are putting in much time on their receivers and preparing apparatus which will be useful when the ban on transmission has been removed.

2DNI has been called for military training and is at present "somewhere in the South of England."

At the time of writing nothing has been received from the other areas in this District and the D.R. would much appreciate a few words from any member and particularly those in the Services.

G5GS via G6AK.

### DISTRICT 19 (North Eastern)

Only two reports have come to hand since the beginning of the war. Members are asked to please note that reports of meetings or other functions will be welcomed for inclusion in these columns.

*South Shields.*—The T.R. reports that an attempt will be made shortly to get local members together again.

*Stockton-on-Tees and Middlesbrough.*—Meetings are now being held every Friday night at members homes. Those wishing to attend should write to G2FO, 36 Raby Road, Stockton-on-Tees, for the

venue of the next meeting. Local members express their thanks to G2IG for his excellent article on a Stationary Rotary Beam Aerial. This provoked a lengthy and interesting discussion at the meeting held at the QRA of G6ZI on November 24.

The D.R. takes this opportunity of wishing all members a very happy Christmas.

G2FO.

### Northern Ireland

The first District Meeting of the War was held at Thompson's Restaurant, Belfast, on Friday, November 24, when there was a small but representative attendance, reflecting the abnormal times which have been inflicted upon us. We were glad to welcome Mr. J. C. Graham (GM3TR), who is now Air Traffic Control Officer at the Belfast Harbour Airport.

After tea, the 14 Mc. replica of the N.F.D. Trophy was presented to Mr. J. N. Smith on behalf of the operators of G15QXP, who did such a fine job of work under his guidance. Mr. Smith, in replying, regretted that the whole team could not be present, but expressed the hope that when the Contest was possible again we should see the big Trophy itself once more in Northern Ireland.

Reference was made to those who were known to be on Active Service, and to the large number of GI's who are engaged on work of National Service. Local members do not appear to have found it possible to carry out the suggestions of Council in regard to war-time experimental work. Several were absent when the Post Office took over their gear and the selections made for "internment" had their amusing side in several instances—except to the Ham concerned!

Mr. T. P. Allen (GI6YW) has kindly taken over the GI QSL Bureau in the absence of Lieut. Martin (GI5HV), who is now in the R.N.V.W.R. He will deal with any outstanding batches in the usual way.

### Scotland

News is still scanty and no word had reached us from several Districts at the time of writing.

"A" District.—At the November meeting members were informed of the difficulties encountered by the Committee in trying to organise something of interest for future gatherings. After discussion it was decided to arrange informal chats, and a few lectures. Lectures will be given shortly by GM6WD and 2CHN, details of which will be announced. Owing to the uncertainty of the precise date of publication of THE BULLETIN, will members please note that future meetings will be held on the third Sunday of each month in the Coffee Room of the Y.M.C.A. Residential Club, 100 Bothwell Street, Glasgow, at 2.45 p.m. We again repeat that any R.S.G.B. member, service or otherwise, who may be in Glasgow on these dates will be made welcome.

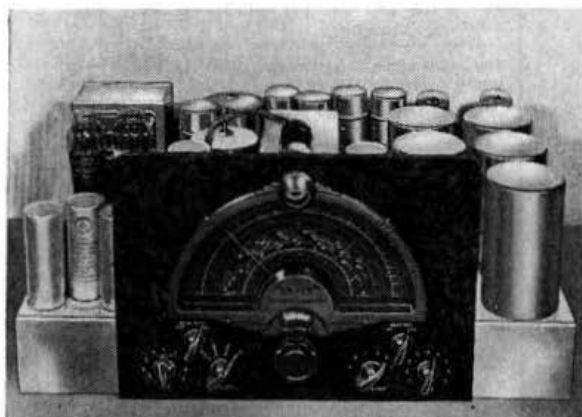
"B" District.—At a meeting on November 5 future action was discussed. In view of the large proportion of members who are either away or likely to be away shortly, it was decided to suspend meetings for the time being. Mr. D. J. Simpson (GM6VO) has been elected to succeed Mr. R. M. McRobb (GM5LF) as D.O., and it is hoped that members will help him to keep things going in the District.

"H" District.—A meeting will have taken place by the time this appears in print.

GM6ZV.



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DESIGN DATA FOR SIX SHORT-WAVE RECEIVERS.

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## HEADQUARTERS CALLING

### Extract from Defence Regulations, 1939

In pursuance of the powers conferred upon him by the Defence Regulations 1939, the Postmaster General has issued an order prohibiting the acquisition or supply of wireless transmitters and certain other electrical apparatus except under the authority of a Post Office Permit.

Applications for permits should be made on special forms which can be obtained from any Head Post Office.

The following is an extract from the Order:—

"No person shall, except under the authority of a permit granted by the Postmaster General for the purpose, sell, purchase, let, hire, supply, dispose of, acquire or distribute any of the undermentioned articles:

- (a) Wireless transmitters which are designed to be used or are capable of being used for communicating by wireless telegraphy, wireless telephony, or wireless television or for the purpose of indicating position or direction (such as navigational beacons or landing beacons) or for the purpose of the remote control of machinery.
- (b) The following articles intended for use as parts of wireless transmitters, namely: high frequency inductors, spark coils, quenched and rotary spark gaps.
- (c) Any wireless receiving apparatus which is designed to be used also as a wireless transmitter or which can be adapted for the purpose of being used as a wireless transmitter by the operation of a switch or by the changing of screwed or plug connections.
- (d) Line carrier telegraph equipment or line carrier telephone equipment.
- (e) High frequency equipment (being equipment which generates or uses high frequency current at frequencies greater than 10,000 cycles per second and having a maximum output exceeding 10 watts) including such equipment intended for use in connection with furnaces and medical apparatus.
- (f) Electronic valves capable of an anode dissipation exceeding 10 watts.
- (g) Piezo electric quartz plates or piezo electric tourmaline plates cut to oscillate at any specified frequency."

### 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.

### A.R.R.L. (QST) Subscriptions

Due to the alteration in sterling exchange, the annual A.R.R.L. Subscription rate is now 15s. per annum. Members who have, in the past, subscribed

direct to the A.R.R.L. or have purchased copies of QST from booksellers would be well advised to pass their renewal instructions through the Society in view of the present difficulty of sending money out of the country.

That this arrangement is appreciated has been shown by the very large number of members who have within recent weeks asked Headquarters to renew their subscription.

### Overseas Subscriptions

One or two members resident in British Dominions have written advising us that they have experienced difficulty in transmitting their subscriptions to us.

As a result of enquiries we can state that no objections will be raised provided the member in question makes it clear that the money is required for an annual subscription to a *scientific society*.

We shall be glad if those who have encountered difficulty in this respect will write to us immediately. In the meantime we would again ask overseas members to remit their renewal subscriptions promptly when due so that no delays will occur in sending THE BULLETIN to them.

### Censorable Countries

We feel it is desirable to record that copies of this Journal sent to members resident in Neutral countries (excluding the Americas and a few others) have to be despatched *via* the War Office Postal Censorship Dept.

BULLETINS for these members are sent direct to the Censor from our Temporary Office under Postal Permit B305.

Should any overseas member fail to receive a particular issue we would ask him to notify us. Sea mails to certain parts of the world are not quite so frequent as in peace-time, but the delays should not be serious.

### 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 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.

### Service Photographs

We shall be pleased to consider for publication photographs of members serving in H.M. Forces. Photographs should be sharply defined and the names and call signs of those depicted either written on the back or on a separate slip of paper

# ON ACTIVE SERVICE

## THIRD LIST

We are indebted to Ft./Sgt. A. E. Lambourne, G5AO, for sending us the rank, name and call sign of amateurs serving in his unit under Ft./Lt. H. A. M. Whyte, G6WY.

Every care has been taken in preparing the list but as mentioned in our last issue much of the

information reaches us through indirect channels. We shall be glad to hear from any member in the Services whose name has not yet been published.

The present list contains information received up to December 2, 1939.

Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
A.C.2 P. A. Achurch*	R.A.F. ...	G2PA
Cpl. J. Adams ...	R. C. of S.	G15AJ
A.C.2 J. C. Aldred ...	R.A.F. ...	G8UQ
A.C.2 B. D. Alexander*	" ...	2COX
A.C.2 A. W. Atkinson	" ...	G6KN
— P. F. Atkinson*	R. C. of S.	G4FJ
P.O. Tel. E. A. Babbs	R.N.V.(W)R.	1633
A.C.2 P. E. L. Bailey*	R.A.F. ...	2CGN
A.C.2 R. H. Bailey ...	" ...	2CQU
A.C.2 J. P. Barnes ...	" ...	2949
A.C.2 J. W. Barnes*	" ...	2DHK
A.C.2 W. C. Barnes*	" ...	G3JO
A.C.2 G. Beaumont*	" ...	G4OY
Tel. R. Beardow ...	R.N.V.R.	G3FT
Bdr. R. V. Beeker ...	R.A. ...	GW3WY
A.C.2 A. E. Beeson ...	R.A.F. ...	G4PD
Sgt. T. S. Bell ...	R. C. of S.	3515
A.C.2 F. W. Benson*	R.A.F. ...	G5GJ
Pte. T. Bingham ...	R.A.O.C. ...	3656
A.C.2 J. Blofeld ...	R.A.F. ...	2CFO
L.A.C. W. Blyth ...	" ...	GM5YX
Sgt. E. S. Booth ...	" ...	G8OR
F./O. F. A. Boyce ...	" ...	G6DK
Tel. M. Brown ...	R.N. ...	G3DL
A.C.2 I. D. Bruce ...	R.A.F. ...	2BLG
A.C.2 J. D. Budd*	" ...	2BKD
A.C.2 R. W. Brewer*	" ...	G3FL
A.C.2 G. A. Bryan ...	" ...	G8BN
A.C.2 E. J. Buchan*	" ...	G4QA
L.A.C. G. Bull ...	" ...	2AYP
L./Bdr. R. Bullock ...	R.A. ...	2HHX
A.C.2 K. Bunker*	R.A.F. ...	2DFY
— W. Burrows*	" ...	G5PZ
Tel. A. P. Kerford-Byrnes.	R.N. ...	G6AB
Dvr. J. Cairns ...	R.A. ...	G3UC
A.C.2 D. Cameron*	R.A.F. ...	2BKC
Pte. W. E. Caughey*	R. C. of S.	2DZG
— H. J. Chater ...	R.N. ...	G2LU
A.C.2 K. B. Cherret*	R.A.F. ...	2DID
A.C.2 S. W. Clark*	" ...	2AMW
Sig. J. Cleghorn	R. C. of S.	GM3BZ
Tpr. W. W. Cock ...	Royal Glos.	G3HN
Lt. C. A. Henn-Collins	R. C. of S.	G5ZC
A.C.2 S. R. Cooke*	R.A.F. ...	2CTC
Gnr. P. A. Congreve ...	R.A. ...	G3BV
A.C.2 W. Croxall*	R.A.F. ...	2FRT
A.C.2 S. Clarke ...	" ...	2BKW
Capt. E. H. Cox ...	R.A. ...	G3CT
Sig. R. E. T. Dabbs ...	R. C. of S.	G2RD
A.C.2 J. L. Danks*	R.A.F. ...	G5DS
Tpr. A. S. Davey ...	R.A.C. ...	2CIX

Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
Sig. B. McK. Davidson	R. C. of S.	3011
A.C.2 A. G. Davies ...	R.A.F. ...	G2PC
A.C.2 W. R. Day*	" ...	2FQZ
Sig. V. Delnevo ...	R.A. ...	G3HC
Corp. H. Doherty*	R. C. of S.	Op. G16YM
A.C.2 E. R. Dolman ...	R.A.F. ...	2DCG
Pte. R. H. Dore*	R.A.O.C. ...	2FPD
A.C.2 J. J. Downie ...	R.A.F. ...	2935
Gnr. D. W. Dunnet ...	R.A. ...	3112
Sig. L. W. Dymond ...	R. C. of S.	G3HW
A.C.2 W. R. Eadie ...	R.A.F. ...	GM4JO
A.C.2 C. B. Ellwood*	" ...	2FSO
L.A.C. F. B. English ...	" ...	G6AZ
A.C.2 G. Eustace*	" ...	2FXD
Capt. K. Morton Evans	Welch Regt.	GW5KJ
A.C.2 S. Eyre*	R.A.F. ...	2FZU
L.A.C. J. R. Fennessy*	R.A.F. ...	G5ZI
A.C.2 A. B. Starkes-Field.	" ...	G6YG
2nd Lt. G. G. Eastwick-Field.	R.A. ...	2FNM
Sig. C. J. R. Francis ...	R. C. of S.	3661
A.C.2 A. W. Frazer*	R.A.F. ...	G3OW
A.C.2 A. J. Frisby ...	" ...	2398
— J. Fulton ...	R.N.V.(W)R.	2DYO
Tel. S. Garnett ...	" ...	G4AW
Gnr. J. D. Gillies† ...	R.A. ...	2FZT
A.C.2 W. H. Graham ...	R.A.F. ...	G4BJ
A.C.2 D. E. Gray ...	" ...	GM3LG
Sig. K. J. Grimes ...	R. C. of S.	2649
A.C.2 W. L. Grummitt*	R.A.F. ...	2CMP
A.C.2 S. T. Hall ...	" ...	G3BR
Tel. D. W. Harris ...	R.N. ...	G3RF
A.C.2 J. C. Harvey ...	R.A.F. ...	2CQJ
A.C.2 S. C. Hedges ...	" ...	2C5H
A.C.2 L. A. Hensford ...	" ...	2BHS
L.A.C. B. Herbert ...	" ...	G2WI
A.C.2 R. T. Hewson*	" ...	G3RH
A.C.2 W. A. Higgins ...	" ...	G8GF
A.C.2 F. Hill ...	" ...	2FZI
Tel. W. H. Hodgson ...	R.N. ...	G3BW
Tel. J. Holden ...	R.N.V.(W)R.	GM3SF
P./O. J. B. Hum ...	R.A.F. ...	G5UM
L.A.C. F. J. Ireland ...	R.A.F. ...	2FFX
Tel. D. C. Jardine ...	R.N.V.(W)R.	G5DJ
L.A.C. W. Johnson ...	R.A.F. ...	G2IN
Mai. F. E. B. Jones ...	R. C. of S.	G2YX



Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
A.C.2 I. Kedge ...	R.A.F. ...	2AIW
War. Tel. W. D. Kieller	R.N.V.(W)R.	G6HR
Cdt. M. P. King ...	R. C. of S.	G4GY
A.C.2 A. E. Knight* ...	R.A.F. ...	G6IB
Pte. H. F. Knott ...	R.A.M.C. ...	G3CU
A.C.2 J. H. Knowles*	R.A.F. ...	2FXS
Sgt. E. J. Laker ...	" ...	G6LK
A.C.2 G. A. Lambourne*	" ...	2DQI
A.C.2 R. G. Lane ...	" ...	2BYA
— F. E. Lane ...	R. C. of S.	2AGZ
Pte. J. W. Larmour*	" ...	2BNM
A.C.2 E. F. Lawden ...	R.A.F. ...	G3SS
Lt. R. J. Leaman, B.Sc.(Eng.).	R.A.O.C. ...	2CHQ
A.C.2 A. Leese ...	R.A.F. ...	G3UP
Gnr. R. B. Lever ...	R.A. ...	G8QS
L./Cpl. J. M. Lowden	R. C. of S.	G18MI
A.C.2 W. L. Lowson*	R.A.F. ...	2BFV
Cdt. I. P. Mackay ...	R. C. of S.	G8AY
Cpl. T. Maitland ...	" ...	G15SQ
A.C.2 J. P. Male ...	R.A.F. ...	GM6IS
A.C.2 P. A. B. Malvern	" ...	G8DA
— J. Mann ...	R.N.V.(W)R.	G3XL
Lt. W. H. Martin ...	" ...	G15HV
Tel. J. E. Maxwell ...	" ...	G13ML
A.C.1 D. Mayes ...	R.A.F. ...	GM3CG
L.A.C. F. G. Maynard	" ...	G4OU
A.C.2 L. G. Mays ...	" ...	2CWR
A.C.2 T. McAvenna ...	" ...	3455
Cdt. J. J. Macbeth ...	R. C. of S.	GM3CG
Cpl. F. A. McBrinn ...	" ...	G14OB
A.C.2 I. D. McDermid	R.A.F. ...	2689
Ft./Lt. F. McDowell ...	" ...	G15MZ
A.C.2 J. McKelvie ...	" ...	3294
A.C.2 C. N. Meade* ...	" ...	2DTY
Temp. Prob. Sub. Lt. V. G. Mellor.	R.N.V.R.	G5MR
Tel. G. P. Millar ...	R.N. ...	GM3UM
P.O. T. G. Miller ...	" ...	3389
L./Cpl. J. Millie ...	R. C. of S.	GM8MQ
Sgt. R. A. Morgans ...	R.A.F. ...	G4GV
Pte. M. Morris ...	Royal Berks Rgt.	2BZK
Sapper G. E. Munro ...	R.E. ...	2BKF
A.C.2 R. Nicholass* ...	R.A.F. ...	G8BJ
A.C.2 T. J. Norton ...	" ...	G4KZ
A.C.2 N. F. O'Brien ...	R.A.F. ...	G3LP
A.C.2 B. A. Parsons ...	R.A.F. ...	GW4FW
A.C.2 N. H. A. Payne	" ...	G8FV
A.C.2 K. R. Peattie ...	" ...	2FQG
A.C.2 J. R. Garrett- Pegge.	" ...	G3MI
A.C.2 F. Perkins* ...	" ...	2BXH
A.C.2 C. H. F. Pomeroy*.	" ...	2DUH
Lt. A. Pryor ...	Army Dental Corps.	2FTR
A.C.2 C. F. Ranft ...	R.A.F. ...	G5RF
A.C.2 E. Ratcliffe* ...	" ...	2DXA
A.C.2 T. Read* ...	" ...	2FFQ

Rank and Name	Regiment or Branch	Pre-war Call or B.R.S.
Tel. L. R. Richardson	R.N. ...	3558
Sig. E. T. Roach ...	R.F.R. ...	G4LG
A.C.2 G. A. Roberts*	R.A.F. ...	2FNC
Ldg. Tel. J. Roberts ...	R.N. ...	2620
A.C.2 N. H. M. Ross ...	R.A.F. ...	2DYP
Sgt. H. F. Rubery* ...	R.A.M.C. ...	2COF
A.C.2 B. E. P. Sadler	R.A.F. ...	G2RC
Sig. J. P. Saywood ...	R. C. of S.	2BIG
Gnr. S. P. Shackleford*	R.A. ...	2HAX
Sgt. S. F. Sharpe ...	R.A.F. ...	BERS14 (VU2WZ -2FS)
A.C.1 A. N. Simmons	" ...	G3AD
Tel. W. H. Smith ...	R.N.V.(W)R.	G2SZ
A.C.2 H. G. Smith* ...	R.A.F. ...	2FQH
A.C.2 S. G. Smith* ...	" ...	2ALS
A.C.2 P. G. Spary* ...	" ...	2FVU
A.C.2 L. G. Spencer ...	" ...	G4LX
Gnr. F. H. Spencer ...	R.A. ...	G4AH
Sig. G. L. Stockley* ...	R. C. of S.	G8UX
Tel. W. F. Stratton ...	" ...	1640
Pte. T. P. S. Summerton	R.A.O.C. ...	G3AA
Sig. I. H. J. Taylor* ...	R. C. of S.	2FPJ
L.A.C. C. L. Thomas ...	R.A.F. ...	G2NT
Lt. E. J. G. Tucker ...	R. C. of S.	G15DX
A.C.2 J. Turnbull ...	R.A.F. ...	2845
A.C.2 G. Walker* ...	R.A.F. ...	2AWR
Pte. J. Wallace* ...	R. C. of S.	2FDL
A.C.2 D. L. Werschker	R.A.F. ...	G8WR
Cdt. D. Westwood ...	R. C. of S.	G8WF
A.C.2 A. E. Whitehead*	R.A.F. ...	G2PR
A.C.2 K. B. Whittaker*	" ...	2FXL
A.C.2 W. G. R. Wilby	" ...	2BSU
A.C.2 F. B. Wilford ...	" ...	G4IO
A.C.2 J. P. Williams*...	" ...	2CPV
Sgt. E. S. Wilson ...	" ...	G5CW
A.C.2 E. Wood* ...	" ...	2CZY
A.C.2 J. Wood ...	" ...	G3VG
L.A.C. G. A. V. Wood*	" ...	2FKD
Pay./Lt. E. O. Woodward	R.N.V.R. ...	G2YW
A.C.2 F. E. Wyer* ...	R.A.F. ...	G8RY

\* Non-Members. † Recorded as R. C. of S. in List 1.

‡ Recorded as R.E. in List 2.

### Wireless World Diaries

Copies of this very useful pocket diary (reviewed in our last issue) are now available from Headquarters, price 1s. 8d., post free.

### Norwegian Activities

Mr. L. R. Heyerdahl (LA6A), one of our oldest members in Norway, informs us that LA licences were cancelled on September 20. We understand, however, that the Norwegian Government may later permit operation on the higher amateur frequencies

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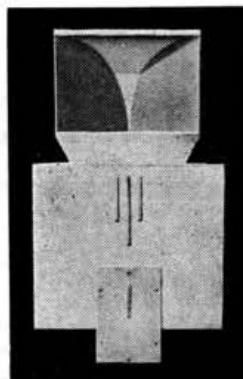
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## INDEX TO DISPLAYED ADVERTISEMENTS

|                                                              | Page              |
|--------------------------------------------------------------|-------------------|
| A.C.S. Radio ...                                             | 277               |
| Automatic Coil Winder and Electrical Equipment Co., Ltd. ... | 242               |
| Bernard Jones Publications, Ltd. ...                         | 272               |
| British Mechanical Productions, Ltd. (Clix) ...              | 272               |
| Brookes Measuring Tools ...                                  | 278               |
| Candler System Co. ...                                       | 266               |
| Denco ...                                                    | 278               |
| Electradix Radios ...                                        | 266               |
| Erie Resistor Ltd. ...                                       | 243               |
| Erskine Laboratories Ltd. ...                                | 271               |
| Excelsior Hotel ...                                          | 277               |
| General Electric Co., Ltd. ...                               | Cover ii          |
| G5NI (Birmingham) Ltd. (Radiomart) ...                       | 241               |
| Peto-Scott Co., Ltd. ...                                     | 258               |
| Piezo Crystals, Ltd. ...                                     | 278               |
| Premier Radio Co. ...                                        | 276               |
| Quartz Crystal Co., Ltd. (Q.C.C.) ...                        | 272, 277          |
| R.S.G.B. Sales ...                                           | Cover iii         |
| Standard Telephones and Cables Ltd. ...                      | 242               |
| Stratton & Co., Ltd. (Eddystone) ...                         | 257, 265          |
| Voigt Patents Ltd. ...                                       | 277               |
| Webb's Radio ...                                             | Cover i, Cover iv |



## Civil Defence

Members engaged on Civil Defence work are invited to send brief details to Headquarters, who are preparing a list for record purposes and *not* for publication.

The following particulars only are required:—Name, Branch of Civil Defence, Call Sign or B.R.S.

## 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.

## 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.

## Deputy D.R. for South-east England

With the agreement of Mr. W. H. Allen (Representative for District 16) who is on active service, Council has been pleased to appoint as his deputy, Mr. W. A. Scarr (G2WS), 8 Beckenham Grove, Shortlands, Bromley, Kent.

Mr. Scarr was, until recently, D.R. for the East Midlands and as one of our senior members has a wide experience of Society activities.

T.R.'s and others responsible for local activities are cordially invited to write to G2WS who hopes to visit many centres of activity in the District during the next few months.

## DX Century Club and B.E.R.T.A. Claims

It is hoped to announce shortly that for the war period British Isles members who have already had cards from 75 or more countries approved by the A.R.R.L. may submit further cards for the DX Century Club to the Society instead of sending them to the U.S.A.

The Council has been pleased to advise the A.R.R.L. that B.E.R.T.A. claims from U.S.A. and Canadian amateurs may, during the war, be approved by them.

## W.B.E., H.B.E. and B.E.R.T.A. Certificates

Members are advised that they may still claim for any of the certificates issued by the Society. Power guarantees should always be submitted when claiming transmitting awards.

## Radio Ltd.

We have been asked by the Publishers of *Radio* to point out that the recent circular which they sent to our members, soliciting subscriptions, was written before the information reached them that the Council of the Society had decided to carry on publication of THE T. & R. BULLETIN.

We can assure our West Coast friends that their kindly thought to keep members informed of technical progress is much appreciated.

Subscriptions to *Radio* can, as hitherto, be sent via the R.S.G.B., the present annual rate being 17s. 6d.

## Returned Bulletins

Every month we receive back a number of BULLETINS which cannot be delivered because the member in question has moved without notifying Headquarters.

It is our intention in future to publish a list of members whose BULLETINS have been returned in the hope that other members may be able to assist us in tracing them.

The first list appears below:—

- J. S. Bamford, Manor Farm, Leasingham, Sleaford, Lincs. (G5JB).
- H. Benford, 21a Vincent Gardens, Dollis Hill, London, N.W.2 (2BPD).
- R. Bottomley, 108 Erithway Road, Green Lane, Coventry (G6TZ).
- G. C. Carter, 119 Lowther Road, Bournemouth (BRS3015).
- W. R. Eadie, 15 The Loaning, Whitecraigs, Renfrewshire (GM4JO).
- J. P. Edwards, 3 Autumn Crescent, Horsforth, Leeds (G3WH).
- Cpl. Halligey, R.A.F. (G8PI).
- R. G. Lane, "Lynn," Glendale Drive, Burpham, Surrey (2BYA).
- C. L. Lester, 6 Warwick Way, Whipton, Exeter (BRS3302).
- D. W. R. McKinley, National Research Council, Ontario, Canada (VE3AU).
- J. D. Nicholls, The Link, Little Walden Road, Saffron Waldron (BRS3325).
- R. A. P. Patterson, 2 Dundee Road, Forfar, Angus (2CCC).
- W. J. Richardson, 3 Fire Station, College Road, Erdington, Birmingham (2DSA).
- G. H. Scarfe, 78 Windermere Road, Durban, South Africa (ZS5BW).
- R. Winckler, 215 Victoria Avenue, Hull (BRS3592).

The addresses given are those shown on our records.

## New Members

- W. A. BAKER (G4KB), 31 Moorsyde Avenue, Walkley Estate, Sheffield, 10.
- E. T. LEA (BRS3720), 66 Burma Road, Clissold Park, London, N.16.
- F. R. SCOTT (BRS3721, 2CZH), 140 Seymour Avenue, Morden Park, Morden.
- F. M. G. HUTTON (BRS3722), 14 Park Close, Eastbourne.
- S. R. RICHARDS (BRS3723), 10 Pentyre Terrace, Lipson, Plymouth.
- L. J. MILLER (BRS3724), Fern Cottage, Five Oaks, Billingshurst, W. Sussex.
- G. BAILEY (BRS3725), 424 Uxbridge Road, Shepherds Bush, W.12.
- R. A. WOODAGE (BRS3726), 115 Norfolk Avenue, Sanderstead, Surrey.
- I. L. KEDGE (BRS3727, 2BKS), c/o Mr. Bowden, 74 Wood Lodge Lane, West Wickham, Kent.
- S. J. GILBEY (BRS3728), 28 Fairholme Gardens, Finchley, N.3.
- J. W. BOOTH (BRS3729, 2AJB), 33 Buller Street, Grimsby, Lincs.
- C. E. ALLEWAY (BRS3730, G6KL), 70 Shaggy-Calf Lane, Slough, Bucks.
- D. H. THOMAS, M.Sc. (BRS3731), University College, Nottingham.
- G. C. A. ZEDY (BRS3732), 6 Norfolk Park Cottages, Maidenhead, Berks.
- P. W. JINKINGS (BRS3733), 266 Highlands Boulevard, Leigh-on-Sea, Essex.
- T. P. JEFFERSON (VS4AJ), c/o Sarawak Oilfields, Ltd., Miri, Sarawak.

## W.B.E., H.B.E. and B.E.R.T.A. Certificates

The following certificates have been issued since the last list appeared:—

| W.B.E. (Telegraphy) |               |     |         |
|---------------------|---------------|-----|---------|
| Name                | Call Sign     |     | 1939    |
| S. Stephenson       | ... G3KS ...  | ... | July 29 |
| W. Musialowicz*     | ... SP1YX ... | ... | Aug. 4  |
| K. C. Lay           | ... G5LY ...  | ... | " 4     |

| Name                        | Call Sign | 1939    |
|-----------------------------|-----------|---------|
| V. Dameron ...              | W8HGA     | Aug. 4  |
| R. H. Karl* ...             | W9DHT     | " 9     |
| Tan Koon San ...            | PK4KS     | " 9     |
| R. Van Beginne* ...         | ON4FF     | " 9     |
| E. von Ruthi* ...           | HB9CX     | " 9     |
| H. G. Smith ...             | G3BU ...  | " 14    |
| B. Nielsen ...              | OZ2PX     | " 14    |
| L. T. Robinson* ...         | W6WO      | " 15    |
| A. Magerat* ...             | ON4PZ     | " 17    |
| R. T. Biggs ...             | G3IQ      | " 17    |
| E. J. Longtime ...          | W1IOZ     | " 18    |
| E. J. Gerdon* ...           | W7GUU     | " 21    |
| E. J. Napier ...            | G8FA      | " 21    |
| K. B. Warner ...            | W1EH      | " 23    |
| W. P. Hagestad* ...         | W7ENW     | " 31    |
| D. Westwood ...             | W8WF      | " 31    |
| G. B. Costa* ...            | W6NEQ     | Sept. 5 |
| H. D. Ackling* ...          | VK2PX     | " 5     |
| A. Newall* ...              | G3QV      | " 5     |
| Capt. F. B. Westervelt* ... | K6QYI     | " 11    |
| M. A. Royaux* ...           | ON4KM     | " 13    |
| G. R. Chiffey ...           | G3ZJ      | " 22    |
| Rev. A. B. Trewin ...       | G2AT      | " 28    |
| J. G. Cowan* ...            | VK2ZC     | " 28    |
| A. Chadwell* ...            | VE3QP     | " 28    |
| R. B. Ferguson* ...         | W6PEY     | " 28    |
| J. Matyn* ...               | ON4JZ     | " 28    |
| F. T. Hine* ...             | VK2QL     | " 28    |
| S. A. G. Cook ...           | G5XB      | Oct. 16 |

*W.B.E. (Telephony)*

|                        |       |          |
|------------------------|-------|----------|
| R. C. Higgy* ...       | W8LFE | Aug. 9   |
| Tan Koon San ...       | PK4KS | " 9      |
| S. Stephenson ...      | G3KS  | " 11     |
| T. R. White ...        | G8TX  | " 12     |
| R. P. Walker-Alexandra | VS7RA | " 17     |
| A. Vella ...           | ZB1L  | " 23     |
| E. V. Neal ...         | G8GP  | Sept. 28 |

*W.B.E. (28 Mc.)*

|                     |       |          |
|---------------------|-------|----------|
| C. G. Allen ...     | G8IG  | Aug. 23  |
| A. C. Haussmann ... | W8DST | Sept. 11 |

*H.B.E.*

|                   |         |         |
|-------------------|---------|---------|
| G. de Buren ...   | HB9AW   | Aug. 9  |
| W. T. Pickard ... | G8KP    | " 9     |
| C. G. Allen ...   | G8IG    | Sept. 5 |
| H. Beaumont ...   | G5YV    | Oct. 16 |
| N. Hughes ...     | BRS2768 | " 19    |

*B.E.R.T.A.*

|        |                   |       |         |
|--------|-------------------|-------|---------|
| No. 69 | W. Musialowicz*   | SPIYX | Aug. 4  |
| " 70   | R. C. Higgy*      | W8LFE | " 9     |
| " 71   | W. T. Pickard     | G8KP  | " 9     |
| " 72   | J. F. Egan*       | W2FLG | " 22    |
| " 73   | A. G. Brown*      | VK3CX | " 22    |
| " 74   | W. F. Wadsworth   | VE5ZM | " 25    |
| " 75   | Miss M. Mackenzie | VK4YL | " 29    |
| " 76   | H. D. Ackling*    | VK2PX | Sept. 5 |
| " 77   | F. J. Hine*       | VK2QL | " 5     |
| " 78   | Z. Willison       | W8JAH | " 28    |
| " 79   | G. H. B. Gray     |       |         |
|        | (Telephony)       | VK4JP | " 28    |
| " 80   | G. Brown          | G5BJ  | " 28    |
| " 81   | H. Beaumont       | G5YV  | Oct. 16 |
| " 82   | J. M. Kirk        | G6ZO  | " 20    |

\* Denotes non-members.

**Stray**

Mr. H. G. Cottis, G3OA, 2 St. Mary's Cottages, Hart Road, Thundersley, Essex, will be pleased to hear from any Society member who cares to write to him at the above address.

**Magazines for Members with the B.E.F.**

With reference to the paragraph published in our last issue we now have the names and addresses of several members serving abroad who would appreciate receiving magazines. We shall be pleased to hear from those willing to communicate with service members in this connection.

**Humour Corner**

One of our Service members asks whether we can devise a scheme whereby "hams" in the Services can recognise one another at sight. We recommend a Society emblem be tattooed on a vulnerable spot, but the feminine side of Headquarters suggests blue ribbon round the ankles!

**POWER SUPPLIES—(Continued from page 250)**

without batteries when the load is constant, it is better to employ them to charge batteries, except in the case of the large EG800 machine. It will be noticed that the ampere output is high and, therefore, to secure the fullest advantage, the batteries should be of high capacity. Two advantages accrue—the generator will run at maximum efficiency and charging can be carried out less frequently. The actual capacity of the cells (at the 10 hour rate) should be at least 100 ampere hours—up to 150 a.h. will be better when circumstances permit.

When, on occasion, it is desired to draw an exceptionally heavy load, the engine should be in operation so that current is drawn from both dynamo and batteries, without imposing an excessive current drain on either.

When any charging or lighting plant is installed, it will be advisable to include switches to control the supply of electricity to different points and metres to show the current flowing on charge or discharge. A cut-out is, of course, essential and is included in the specification of the *Johnson* machines. Much could be written on these subjects but they are all fully covered in the Instruction Book issued with the plants and details of the precautions necessary in fitting up the exhaust outlet pipe are also described. Prices and further information may be obtained from the British agents.

**A WEEK OF AMATEUR RADIO IN LIECHTENSTEIN**  
(Continued from page 264)

possible to work a small proportion of those who called us. To those who were disappointed we can only express the hope that we may meet them on some other occasion from Liechtenstein.

Some amateurs have enquired why we were not using a fancy call-sign; to them we would point out that as Liechtenstein comes under the Swiss radio regulations, an HB call is also valid there.

Every QSL card received will be answered, but for the information of those who do not QSL we would state that copies of the 18 log sheets have been sent to the A.R.R.L.

It was our intention to visit Liechtenstein for recreation, but we returned home in order to take a rest from our holidays! Nevertheless, the great thrill the DX man receives from such an experience more than compensates for the lack of free time, and to all who made our brief excursion into the tiny Principality so memorable, we say "Thank you."

## EXCHANGE AND MART.

**FOR SALE.**—New Frequency Meter, cost £6 15s., sacrifice £3. Brush Xtal Fones 12s. 6d., two new 6a6's 2s. 6d. each. Ferranti MC O-150 Voltmeter, 1,000, OPV 15s. Ex.: 2AGP, 36 Mill Lane, Leigh, Lancashire.

**FOR SALE.**—1939 R.M.E. 69 Receiver and D.B. 20 R.M.E. black, crackle speaker to match, A.C. 230, indistinguishable from new, cost £55, owner has no mains. Reasonable offers to: W. Wedge, 33 Tong Forge, Shifnall, Salop.

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

**HALLICRAFTERS SKYRIDER 5-10 Brand** New, used only few times 4.4 to 11.1 Metres, 8 Tubes, Noise Silencer. Cost £20.—£14. No offers. National 1-10. Pack, suitable for 1-10 or larger receivers 100 m.a. at 250 volt., 6.3 v. fil. £2 10s. Cossor Oscilloscope, model 3332. 4½-in. Tube, variable sweep frequency, etc., hardly used, cost £20.—£14. Frequency Meter Monitor, self-contained power supply for A.C. mains. Range 4.4 to 6.2 metres. Diode Monitor for phone, high quality 0.5 milliammeter. Tubes H.L.2K.S.G.215 S.W.U.4. Rectifier. Aluminium case, 50s. Box of Transformers and Chokes, including Philips 6.3 volt Filament, Thordarson Class B Driver for Audio, several Ferranti Audio, several Mains Chokes from 45 up to 150 m.a., nine in all, worth at least £5.—£1 10s. Box parts for Ultra Short Receivers, etc. Much new,

Condensers, Coils, Bases, Valveholders, several special valves, dials, knobs, couplings and drives and dozens of high-class condensers, etc. Guaranteed more than £10 worth, £3 10s. Box Insulators, 10 Glazed Bee Hive Stand-offs, 6 smaller white Stand-offs, 6 Transposing Feeder Blocks, all above new, and several assorted, £1 worth for 7s. Ward Leonard A.C. Antenna Relay D.P.C. Over as new, 15s. MANSELL, Woodfield, Madresfield Road, Malvern.

**"HAM-AID"** QSL's. Admired by everyone for colour and design. Samples from G6XT.—TILLOTSON BROTHERS, Commercial Street, Morley, Yorks.

**OLDTIMER-G6MN** for 1st Grade Clear Type QSL's and Log Books. Send for Samples. G, AA, BRS.—G6MN, Worksop.

**WANTED** Gramophone Amplifier 3 to 5 watts output with or without power pack. G4MH, "Thornleigh," Station Road, Thornton, Blackpool.

### Patent and Trade Mark Agents

**GEE & CO.** (H. T. P. Gee, Mem. R.S.G.B., etc.), 51-52 Chancery Lane, London, W.C.2 (two doors from Govt. Patent Office). Phone: HOLborn 4547 (2 lines). Estd. 1905. Handbook free.

**KING'S PATENT AGENCY, LTD.**—B. T. King, A.M.I.E. (2BKT), Mem. R.S.G.B., Regd. Patent Agent, etc., Wardrobe Chambers, 146a, Queen Victoria Street, London, E.C.4. Handbook and Consultations on Patents and Trade Marks free.—Phone: City 6161. Fifty years' references.

## there is still time . . .



to send a copy of The Amateur Radio Handbook and one of our New Emblem Call-Sign Badges to your pal on active service.

The Handbook will enable him to while away many a tedious hour and the Badge will provide a happy souvenir of days gone by.

*SEND YOUR ORDERS PROMPTLY  
so that we can execute them in time for Christmas*

### PRICE LIST

|                                |   |     |             |
|--------------------------------|---|-----|-------------|
| THE AMATEUR RADIO HANDBOOK     | - | 3/- | (Post Free) |
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| LAPEL BADGES                   | - | 1/6 | (Post Free) |
| BROOCH BADGES                  | - | 1/6 | (Post Free) |
| MEMBERS NOTEPAPER (100 Sheets) | - | 3/- | (Post Free) |

All Communications to:—

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

The New

# HALLICRAFTER SKYRIDER

MODEL SX24

AS REVIEWED IN  
THE NOVEMBER  
ISSUEBuilt-in  
Frequency  
Meter Tuning**£24**Including tubes and crystal  
but less speaker110 TO 250 VOLT A.C.  
OPERATION

Speaker £4 - 12 - 0

GENERAL COVERAGE  
43.5 to .54 Mc. (6.8 to 555 metres).4 BAND POSITIONS  
9 TUBES. 6SK7 R.F. amplifier,  
6K8 first detector and oscillator,  
6SK7 first I.F. amplifier, 6SK7  
second 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"  
depth 10½".

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.

**FREQUENCY METER TUNING.** The tuning dials are accurately calibrated throughout the bands, and maintain a high degree of accuracy throughout, bringing in signals on their frequencies as indicated on the dials.

**BUILT-IN NOISE LIMITER.** The noise-limiting circuit is of recent development, highly efficient in reducing noise level on the ultra high frequencies.

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# REPORT

## OF THE ACTING HONORARY TREASURER

---

In the absence of the Honorary Treasurer—Viscount Carlow, who is on active service—I have the honour to present the Society's accounts for the year ended September 30th, 1939.

It is gratifying to be able to report that in spite of a marked falling off in subscriptions during the last six weeks of the financial year, Income shows a slight balance over Expenditure. If the war had not intervened it is certain that a surplus in excess of £100 would have been recorded.

It will be noted that the stock of reprinted Amateur Radio Handbooks (amounting to 2,700 copies) has been valued at £208, this figure has been based on printing costs less advertising revenue. With the importation of American publications considerably restricted the Council are of the opinion that no serious difficulty will be encountered in disposing of the stock which has already been very considerably reduced since the end of the financial year.

For the convenience of members the Income and Expenditure Account has been arranged to include the 1937-8 figures, from which it will be seen that several major items of expense shown last year have not recurred.

During the year ahead it will be necessary for the Council to study most carefully every aspect of the Society's finances, and as has already been indicated the numerous far-reaching economies which were made immediately after war was declared, should enable the Society to continue its important function.

Due to the war the Council were reluctantly compelled to dispense with the services of three junior members of the staff, whilst arrangements have been made to close down our Central London office thereby affecting savings in these two directions amounting to approximately £350 during the year 1939-40.

Nett *T. & R. Bulletin* costs have averaged £96 per month but with the larger size issues it should be remembered that this total includes an average expenditure of £24 per month for postages.

The financial position of the Society is entirely satisfactory and provided the present support is continued the Council have little fear concerning the future.

(Signed) H. A. M. CLARK,

*Acting Honorary Treasurer.*

INCORPORATED RADIO SOCIETY OF GREAT BRITAIN.

**BALANCE SHEET as at 30th SEPTEMBER, 1939.**

| LIABILITIES.                 |             | ASSETS.                                |             |
|------------------------------|-------------|----------------------------------------|-------------|
|                              | £ s. d.     |                                        | £ s. d.     |
| <b>SUNDRY CREDITORS—</b>     |             | <b>FURNITURE AND FIXTURES (At</b>      |             |
| Sir J. Causton & Sons, Ltd.— |             | Cost, less Depreciation)—              |             |
| Reprinting The Amateur       |             | As at 30th September, 1938 ..          | £123 17 8   |
| Radio Handbook .. ..         | £322 15 4   | Purchased during year ..               | 3 0 0       |
| Printing and Posting The     |             |                                        | 126 17 8    |
| T. & R. Bulletin (Septem-    |             | Less—Depreciation written off          | 10 0 0      |
| ber issue) .. ..             | 78 12 1     |                                        | 116 17 8    |
| Radio Amateur Call Book      |             |                                        | 1 0 0       |
| Company .. ..                | 35 12 10    | <b>TELEPHONE DEPOSIT .. ..</b>         |             |
| American Radio Relay League  | 14 13 6     | <b>SUNDRY DEBTOR (PARIS ADVER-</b>     |             |
| Evans Spencer & Company—     |             | <b>TISING, LTD.)—</b>                  |             |
| Blocks—The T. & R. Bulletin  |             | The T. & R. Bulletin .. ..             | 213 5 1     |
| (September issue) .. ..      | 10 10 7     | The Amateur Radio Handbook             | 90 15 0     |
| Printing, Stationery, Tele-  |             |                                        | 304 0 1     |
| phone, etc. .. ..            | 33 4 1      | <b>INVESTMENT (At Cost)—</b>           |             |
|                              | 495 8 5     | £1,000 3½% War Loan .. ..              | 1,049 16 9  |
| <b>ACCUMULATED FUND—</b>     |             | (Market Value at 30th September, 1939, |             |
| Balance 30th September, 1938 | 1,415 13 11 | £885).                                 |             |
| Add—Excess of Income over    |             | <b>CASH—</b>                           |             |
| Expenditure for the year ..  | 7 12 4      | At Bankers and in Hand .. ..           | 183 6 3     |
|                              | 1,423 6 3   | On Deposit at Bank .. ..               | 49 17 7     |
|                              |             |                                        | 233 3 10    |
|                              |             | <b>STOCK ON HAND (At Cost)—</b>        |             |
|                              |             | The Amateur Radio Handbook             |             |
|                              |             | (Reprint) .. ..                        | 208 16 4    |
|                              |             | Badges .. ..                           | 5 0 0       |
|                              |             |                                        | 213 16 4    |
|                              |             |                                        | £1,918 14 8 |
|                              | £1,918 14 8 |                                        |             |

I have audited the above Balance Sheet dated 30th September, 1939, and have obtained all the information and explanations I have required. In my opinion such Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Society's affairs, according to the best of my information and the explanations given to me and as shewn by the books of the Society.

JOHN OCKLESHAW, F.C.A.,  
Chartered Accountant,  
Honorary Auditor.

Dewar House,  
11 Haymarket, London, S.W.1.  
18th November, 1939.

Passed by Council, 12th November, 1939.

Signed by—  
ARTHUR E. WATTS, President.  
H. A. M. CLARK, Acting Hon. Treasurer.  
D. N. CORFIELD } Members of Council.  
J. W. MATHEWS }  
JOHN CLARRICOTS, Secretary-Editor.

**INCOME AND EXPENDITURE ACCOUNT for the year ended 30th September, 1939**

| EXPENDITURE.                              |             | INCOME.                        |             |
|-------------------------------------------|-------------|--------------------------------|-------------|
| 1937/38                                   | 1938/39     | 1937/38                        | 1938/39     |
| To nearest                                | £ s. d.     | To nearest                     | £ s. d.     |
| 162 To Rent and Office Cleaning ..        | 162 7 0     | 2,738 By Subscriptions .. ..   | 2,667 5 2   |
| 939 .. National Insurance and Salaries .. | 1,005 3 1   | 238 .. Profit on Sale of       |             |
| 12 .. Electric Light and Gas .. ..        | 8 12 8      | .. Society's Publica-          |             |
| 21 .. Telephone .. ..                     | 23 18 2     | .. tions, Badges,              |             |
| 46 .. Sundry Expenses, including          |             | .. Books, etc., ex-            |             |
| .. Trophies and Miniatures ..             | 40 4 1      | .. cluding The                 |             |
| 9 .. Income Tax .. ..                     | 10 6 3      | .. Amateur Radio               |             |
| 196 .. Printing, Stationery and Certi-    |             | .. Handbook .. ..              | £95 7 11    |
| .. ficates .. ..                          | 187 7 11    | .. The Amateur Radio           |             |
| 136 .. Postages .. ..                     | 131 12 4    | .. Handbook .. ..              | 43 12 4     |
| 31 .. Convention Expenses .. ..           | 13 14 9     |                                | 139 0 3     |
| 44 .. Hire of Hall and Refreshments       | 31 14 3     |                                |             |
| 1,045 .. T. & R. Bulletin Expenses, less  |             | .. Bank Deposit Interest .. .. | 0 4 10      |
| .. received from Advertising ..           | 1,159 8 5   | 35 .. Interest 3½% War Loan .. | 35 0 0      |
| 2 .. Subscription B.S.I. .. ..            | 2 2 0       | 95 .. Deficiency 1937/38 .. .. | —           |
| 88 .. Travelling Expenses .. ..           | 47 7 0      |                                |             |
| 119 .. Radio Exhibition .. ..             | —           |                                |             |
| 23 .. Films for Display .. ..             | —           |                                |             |
| 190 .. Telecommunications Conference      | —           |                                |             |
| 33 .. District Representatives Con-       |             |                                |             |
| .. ference .. ..                          | —           |                                |             |
| 10 .. Depreciation — Furniture and        |             |                                |             |
| .. Fixtures .. ..                         | 10 0 0      |                                |             |
| — .. Balance being excess of Income       |             |                                |             |
| .. over Expenditure for the year          |             |                                |             |
| .. to Balance Sheet .. ..                 | 7 12 4      |                                |             |
|                                           |             |                                |             |
| £3,106                                    | £2,841 10 3 | £3,106                         | £2,841 10 3 |