THE T&R

BULLETIN

A JOURNAL FOR

RADIO EXPERIMENTERS

Vol. 14 No. 2 AUGUST 1938 (Copyright) Price 1/6

Convention Programme

Thursday, September 1st, 1938

*2.30 p.m. **VISIT TO ROYAL OBSERVATORY, GREENWICH.**

*3.15 p.m. **VISIT TO ALEXANDRA PALACE, B.B.C. TELEVISION STUDIOS.**

7.0 p.m. Gathering of members on R.S.G.B. Stand No. 10 at Olympia.

Friday, September 2nd, 1938

*9.30 a.m. **VISIT TO ALEXANDRA PALACE, B.B.C. TELEVISION STUDIOS.**

*1.30 p.m. **VISIT TO BROADCASTING HOUSE, LONDON.**

*2.15 p.m. **VISIT TO RESEARCH LABORATORIES OF THE GENERAL ELECTRIC COMPANY, WEMBLEY.**

6.0 p.m. **ANNUAL CONVERSAZIONE AND RUNNING BUFFET** at The Florence Restaurant, Rupert Street, W.1 (near Piccadilly Circus). Charge, 1/6 per head.

8.0 p.m. Display of Society films.

Saturday, September 3rd, 1938

10.0 a.m. **TECHNICAL DISCUSSION GROUPS** at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2.

11.30 a.m. **BUSINESS MEETING** at the I.E.E., London.

1.0 p.m. Informal Luncheon at Slater's Restaurant, 393, Strand.

1.50 p.m. **CONVENTION PHOTOGRAPH** outside I.E.E.

2.15 p.m. **PRESIDENTIAL GREETINGS** and presentation of Society Trophies.

2.30 p.m. **AIR COMMODORE C. W. NUTTING, O.B.E., D.S.C.,** Director of Signals, Royal Air Force, will speak.

2.45 p.m. **A TECHNICAL POT-POURRI,** by H. A. M. Clark, G6OT.

4.30 p.m. Tea.

6.15 p.m. **ANNUAL CONVENTION DINNER** at The Florence Restaurant, Rupert Street, W.1.

Tickets 6/- per head after August 20th.

* *Successful applicants for these visits have been notified from Headquarters.*

THE T. & R. BULLETIN

OFFICIAL JOURNAL OF THE RADIO SOCIETY OF GREAT BRITAIN

DEVOTED TO THE SCIENCE AND ADVANCEMENT OF AMATEUR RADIO

Hon. Editor: H. BEVAN SWIFT. General Editor: JOHN CLARRICOATS

Advertising Manager: HORACE FREEMAN

Vol. XIV. No. 2. AUGUST 1938

CONTENTS

HAIL OLYMPIA!

TWO features will stand out prominently at Radiolympia this year: the first, Television; the second, Short Wave Radio.

It is not within our province to comment on the policy which has been followed in introducing Television to the public, but we believe we shall be doing a service to our members, especially those living in the Provinces, if we direct their attention to the tremendous technical progress which has been made within the last twelve months. The standard of definition is remarkably high and from our limited observations the " interest value " of the actual television programmes themselves leaves little to be desired.

Whether it will be possible in the crowded booths at Olympia to demonstrate, in an entirely satisfactory manner, this new form of entertainment, is problematical, but we are quite firmly convinced that any sane person seeing Television to-day under normal dwelling-house conditions near London will be deeply impressed.

The strides made in Television technique may perhaps be greater than those which have taken place in the development of short-wave sound broadcasting, but no visitor to Olympia will fail to be interested in the progress of *amateur* short wave radio.

For more years than many of us care to remember it has been left to the R.S.G.B. to show the way to amateur radio at each succeeding Exhibition. We can remember the day not so long ago when our friends from Birmingham were about the only firm catering commercially for the needs of British amateurs.

Times have changed, and faces with them, but when Olympia opens its doors this year the Society will again be there to show the flag on behalf of the radio amateurs of Great Britain. Those ten hectic days mean a lot to the R.S.G.B., for not only do they provide us collectively with the opportunity of introducing our activities to the general public, but they also enable our London, Provincial and Overseas members to indulge in that most favoured pastime of all—rag chewing.

The R.S.G.B. stand has frequently been called " The Ham's Mecca "; no more apt description could have been coined.

One final word before we take off our coats on Stand 10. By hook or by crook make up your mind that you will be one of the *lucky* ones at the Dinner this year! J. C.

An H.F. Impedance Meter

By J. W. MATHEWS (G6LL) and F. CHARMAN (G6CJ)

DURING the past few years a great deal of attention has been paid by amateurs to aerial systems. This has necessitated a general consideration of methods of feeding a given aerial, and much literature has appeared on the subject.

All these articles give explicit instructions for calculating feeder lengths, position of matching stubs, etc., in order to obtain a correct match between the feeder and aerial. That a correct match is desirable no one will dispute, but in practice the realisation of this impedance match depends not merely on calculation but also on allowance for local conditions, and this can only be carried out experimentally.

It should be understood that, although an *approximate* match may be obtained by calculation, and even improved by trial and error, it is essential for the correct operation of an aerial, to have this match between feeders and aerial accurate. If this is not so, standing waves appear on the feeders, and the efficiency of the radiating system falls. The radiation of harmonics may increase as well as local interference.

For these reasons, then, it is desirable to construct some piece of apparatus which will indicate just when the feeders are correctly matched to the aerial.

For such a purpose some type of impedance meter is probably the most suitable. as this could be used not only for measuring the loss of transmission lines, but also the "Q" of coils, and efficiency of H.F. chokes. It will also assist in finding causes of loss in transmitters and receivers. There are in addition other problems in connection with aerials, apart from feeder matching, for which such a meter could be used.

Experiments carried out with an impedance meter of special design showed that all these measurements could be made with reasonable accuracy, and new facts concerning aerials have as a result been brought to light.

Choice of Type

An impedance meter must include a source of oscillation of the required frequency, and some means must be provided of indicating current or voltage in the unknown impedance.

At radio frequencies the two possible methods are either a bridge system, or some kind of resonance device. The R.F. bridge is extremely complicated and is not generally practicable for amateur use, therefore a resonance method has been chosen.

In the resonance method a tuned circuit is coupled to the source of oscillation, and the unknown impedance is applied either in series or parallel with the circuit.

Its effect on the current or voltage in the circuit is then compared with a standard resistance connected in the same way. If the unknown value is not a pure resistance, but an impedance in its general form, containing both resistance and reactance, then the reactance component can be found either by using calibrated inductances and capacities in addition to the calibrated resistances, or by observing the detuning effect on the circuit by the unknown.

In aerial measurements we are finally concerned in making our aerial or feeder a *pure resistance* load on the transmitter, and therefore the question of reactance is chiefly qualitative. All we need therefore are a number of calibrated resistances and a variable condenser which will indicate when the circuit is in resonance with or without the unknown.

Fig. 1 illustrates the general method: L_2 represents the output coil of an oscillator, while L_1 C_1 is a circuit tuned to resonance. By means of a switch the unknown impedance Z, or the standard resistance R may be connected across the circuit. The R.F. ammeter indicates the current flowing in the closed circuit, which rises to a maximum when the circuit is in resonance. When the switch is closed on Z or R, the current falls; if R is a pure resistance it will not affect the resonant point on C_1, although it damps the circuit and reduces the current in the meter. On the other hand if Z were a resistance and capacity in parallel, it would not only alter the resonant current, but also reduce

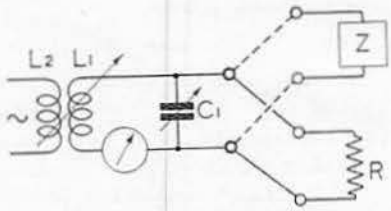


Fig. 1.

The basic substitution method of measuring impedance.

the capacity of C_1 at resonance. If the value of R is chosen so that the resonant current is the same in both positions of the switch, we know that Z is equivalent to R ohms in parallel with an amount of capacity equal to the change in capacity of C_1.

This is basically the system described by Messrs. Ladner and Stoner in *Short Wave Wireless Communication.*

The chief variations of this method are the means for indicating current. In Fig. 1 an ammeter is shown. This involves either a powerful source of oscillation, or else an extremely sensitive thermo-ammeter. Of these the former requires heavy duty resistances which must be perfectly non-inductive, while the latter is extremely expensive.

An alternative scheme would be to connect a valve voltmeter across C_1 whilst a third method would be to treat the oscillator as a miniature transmitter and use the feed meter as an indicator for the load circuit L_1 C_1.

The valve voltmeter method is no doubt the more sensitive and accurate, but the third method involves less apparatus and is generally simpler. For these reasons it has been chosen for a first attempt.

The method described by Mr. J. N. Walker in the June, 1938, BULLETIN (p. 666) is essentially the same and has already been used extensively, but this is aimed at finding the resonant point of the aerial itself. The use of a meter immediately extends the scope of measurement, and provides a means of making feeder adjustments and other quantitive measurements.

It should be noted that switches, and clips for resistances, or valve voltmeters, etc., connected across the load circuit, do not affect the measurement, as they are present all the time; so the method is simply a comparison of the unknown against a resistance.

One of the chief difficulties in H.F. resistance or impedance measurement has always been the provision of resistances which, besides being free from inductance and capacity, do not vary in value with frequency. With the introduction of the carbonised type of resistor this difficulty has been considerably reduced. *Dubilier* or *Erie* resistances being of low conductivity material do not suffer appreciably from skin effect, and their inductance is negligible for most purposes. There is of course a capacity between the ends. But this can be overcome by fitting them into clips which are permanently attached to the load circuit. This capacity does tend to affect the distribution of current in the resistor and so reduce its value at high frequencies. This is known as the "Boella effect," but is not important in the values of resistance employed on aerial measurements; e.g. a few thousand ohms up to 30 Mc.

The Adopted Circuit

A study of the circuit in Fig. 2 shows that the instrument consists of a conventional T.P.T.G. with parallel feed anode circuit, and its own power supply. A "backed-off" milliammeter is used in the feed circuit of the oscillator, a device which gives a much greater degree of sensitivity to variations of current, than the usual form of direct reading meter. It is this sensitivity which is required for the correct operation of the instrument. A 0-1 milliammeter is used in this position.

The term "backed off" is self-explanatory, the meter being arranged in a circuit with a battery and variable resistance, so that the current flowing through the meter when it is used in the normal way, can be cancelled by a reverse current from the battery. Thus small changes in current can be observed.

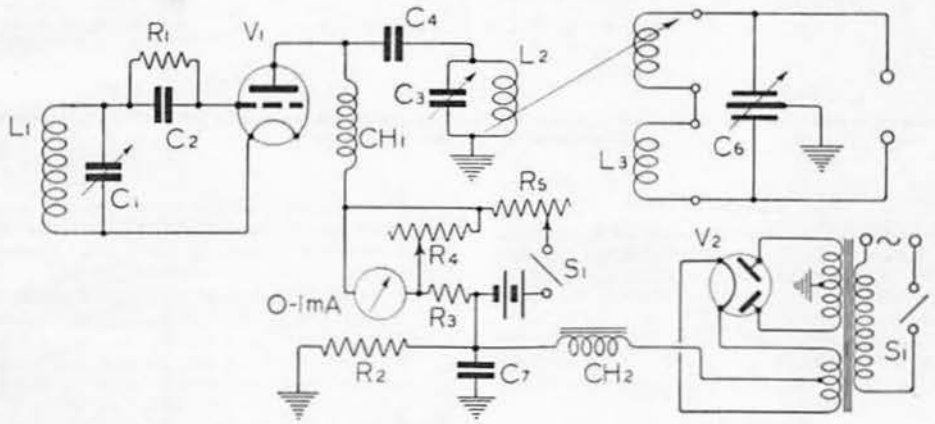


Fig. 2.
Circuit Diagram of H.F. Impedance Matching Meter.

L1 ... *Grid Coil, Q.C.C.*
L2 ... *Anode Coil, R.V. Inductances.*
L3 ... *Load Circuit Coil R.V. Inductances.*
C1 ... *180 μμF "Scientific" Eddystone.*
C2 ... *.0003 μF Polar-N.S.F.*
C3 ... *100 μμF Microdenser, Eddystone.*
C4 ... *.001 μF Polar-N.S.F.*
C6 ... *2-gang (.0005 μF each section) J. B. "Baby."*
C7 ... *2 μF, 230v. A.C. Working, T.C.C.*
R1 ... *50,000 ohm, ½ watt, Polar-N.S.F.*
R2 ... *2-5,000 ohm, 2 watt, Polar-N.S.F. (in series)*
R3 ... *150 ohm, ½ watt, Polar-N.S.F.*
R4 ... *500 ohm variable, Type VC21, Bulgin.*
R5 ... *5,000 ohm Variable, Type VC29, Bulgin.*
Ch1 ... *H.F. Choke—Type 1010, Eddystone.*
Ch2 ... *20 H Smoothing Choke, Premier.*
S1 ... *Double Pole Toggle Switch, Bulgin S88.*
V1 ... *Osram MHL4, or an R.F. Pen. connected as a triode.*
V2 ... *Osram U10.*

Other Components:

Metal chassis, 12 in. x 8 in. x 5 in., Paroussi
Metal bracket ⌊⌋ shaped 4 in. x 4 in. x 2½ in., Paroussi.
Flush mounting Mains Plug P.20, Bulgin.
Mains Transformer, 200-0-200 and 4v. 1A.÷4v. 1A. Premier.
Two 4-pin Valveholders, baseboard mounting, Type 949, Eddystone.
One 5-pin Valveholder, baseboard mounting, Type 950, Eddystone.
One Extension Control, Type 1008, Eddystone.
Two Dials, Type 1077, Eddystone.
One Knob, Type 1076, Eddystone.
One 9v. Grid Bias Battery and Clips.
0-1 mA. Meter, Everett Edgcumbe.
Eight Stand-off Insulators, small, Q.C.C.
Three Stand-off Insulators, Midget, Eddystone.
Quantity 4 B.A. Screws and Nuts.

A variable resistance is also employed as a shunt across the meter, to prevent heavy currents from flowing, and to enable the meter to be shorted out, when it is not actually in use.

The meter is readily detachable, and may be used for many other purposes, including a field strength meter or valve voltmeter. With shunts it can be employed to read higher values of current, or with series resistances to read voltages. It should be realised, therefore, that in obtaining a milliammeter of this type, one is not acquiring a single meter, but many, and it is of such great utility that no amateur station should be without one.

As a safeguard, the resistance R_3, is connected in series with the meter, to prevent the backing off battery being accidentally placed across it, by careless use of R_4 and R_5.

The T.P.T.G. circuit was chosen because it is more stable than a single tuned circuit oscillator, such as for example the Hartley, and in preference to the E.C.O. which is not sufficiently sensitive to changes in anode current.

" backing off " of the meter, then two *Eddystone* dials, one controlling the two-gang condenser, and the other the oscillator tuning.

The switch in the bottom left-hand side is a *Bulgin* double circuit type ; this controls the A.C. mains input, and the battery used for " backing off " the meter. The latter, as can be seen from Fig. 5, is attached to the back of the chassis by clips.

The top panel carries the anode circuit of the oscillator, mounted on a U-shaped piece of aluminium, with a slot in the bottom. This permits the coupling to be fixed in any desired position by means of a screw and wing-nut. The split coil load circuit, tuned by the two-gang condenser below, and the clips for the artificial load, mounted between the output terminals, complete the top panel lay-out.

The meter is mounted on an aluminium bracket 4 ins. by 4 ins. by 2 ins., and this may be kept loose or bolted to the top panel as illustrated.

The connecting leads from the two-gang condenser to the split coil, may be taken through holes in

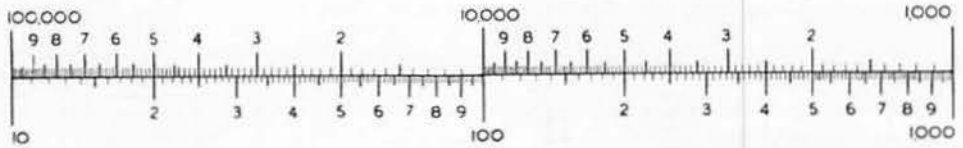


Fig. 3.

An inversion scale for conversion of ohms resistance to micro-mhos conductance. This simplifies calculations for parallel resistances.

Coupling

The anode circuit is variably coupled to the load circuit, which consists of two coils linked together at the centre, with the anode coil sliding between. The load circuit is tuned by a .0005μF two-gang condenser made by " J. B."

The leads from the load circuit are taken to two stand-off insulators, which form convenient terminals for connecting to the feeders, or artificial load.

Artificial Load

The artificial load consists of four sets of small metal clips wired in parallel, mounted between the two feeder stand off insulators on a piece of paxolin or fibre, and bolted to the aluminium chassis on insulating bushes. This fitting is easily identifiable in the photograph Fig. 4. The clips are made so that they will hold the $\frac{1}{2}$ watt type of *Dubilier* resistance, which has metal ends.

Lay-out

The chassis measures 12 ins. by 8 ins. by 5 ins., and is in the form of an open box, used in an inverted position.

The lay-out of the instrument is clearly illustrated in the photographs Figs. 4 and 5.

On the underside the power supply is seen at one end, and the oscillator at the other. Between these is the 2-gang condenser for tuning the load-circuit.

The front panel carries the controls—two knobs for the variable resistances, used to adjust the

the panel and soldered to the ends of the metal screws forming the terminal of the stand-off insulators used for mounting the coils. This makes a neat and effective connection.

The same procedure is adopted with the connections to the terminals holding the anode circuit coil.

The stand-off insulators forming the feeder terminals are so mounted as to be equidistant from the respective pair of insulators forming the coil supports. The reason for this is that if the shorting link between the two coils be removed, the feeder terminals may be connected thereto by merely disconnecting the leads from the ends of the coils and reconnecting at the inside terminals.

This allows the alternative of connecting the feeder, or unknown, in parallel if its impedance is high, or in series if its impedance is low. This has been found necessary to meet all conditions.

Operation

First see that the meter shunt R_4 is at a low value before the battery is connected or the instrument switched on. R_4 is the only safeguard against passing heavy currents through the sensitive meter, and should therefore always rest at a low value, only being opened up for actual measurements. The shunt should always be brought into use before any changes are made.

Switch on and set the oscillator frequency to that required for the measurements. The load circuit should be detuned and kept away while

this is done. The oscillator adjustment is exactly the same as for a TPTG transmitter—that is, working with the meter nearly shunted down, the feed is brought to a minimum at the same time as the frequency is set correctly.

Adjust R_3 and the battery voltage so that the meter reads zero. It may now be unshunted for observations, but remember to shunt again before switching off.

Now tune the load circuit to resonance with coupling very loose. Note the reading of the dial on C_6. Let us suppose it is 20°. Connect the unknown across the appropriate terminals, increase the coupling slightly to get a suitable reading in the meter, and check the frequency of the oscillator against the receiver or monitor. Note the new resonance reading on the dial of C_6. Let us suppose it is 15°.

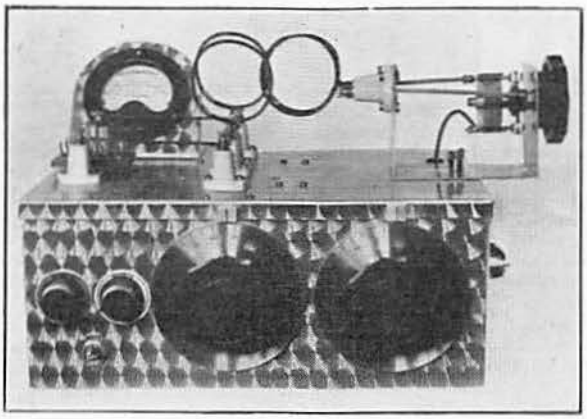


Fig. 4.
View of completed instrument. The adjustable coupling device is clearly shown. Note the position of the resistance clips in front of milliammeter.

Now remove the unknown, and try various values of resistance in the clips, until the meter reading is the same as with the unknown in circuit.

The first resistance tried may damp the circuit too much and the meter reading is then too low. The next higher value may be too great, in which case it should be left in and a still higher one added, and so on till the correct meter reading is obtained. The resultant of these resistances in parallel then represents the resistance component of the unknown impedance.

Suppose in our example that the meter reading was nearly enough correct with 1,000 and 2,000-ohm resistances in parallel. From the usual formula for parallel resistances this is equivalent to 667 ohms. The unknown impedance would then be equivalent to 667 ohms in parallel with the capacity represented by the change from 20° to 15° on the dial of C_6. If C_6 is calibrated, the actual value can be found, but for a large number of applications of the instrument (*e.g.*, setting an aerial to resonance) we are only concerned with a true resonant condition, in which case changes are made in the unknown circuit till the dial reading is the same in both cases.

If the change in capacity is positive with the unknown connected, instead of negative as in the case above, then the unknown is equivalent to a resistance in parallel with an inductance.

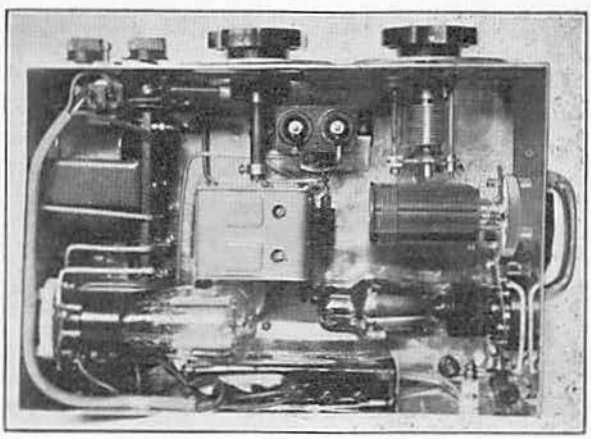


Fig. 5.
Underside view of the wiring and components. The coil shown fitted is for 14 Mc. measurements.

Frequency : Coupling

For sensitivity the coupling should be as high as possible between the load circuit and the anode coil. On the other hand, there are classes of measurement where it is very important to see that the frequency is not disturbed, and this may cause serious error if the coupling is too tight.

It is therefore necessary to have a calibrated receiver working in the vicinity of the oscillator, and this is used in conjunction with an absorption wavemeter to set and correct the frequency. When the load circuit is tuned to resonance the frequency is heard to change, but this change should not be more than, say, 20 kc. in 14 Mc. The frequency may be corrected by tuning the *anode* condenser C_3, *but if this correction affects the meter reading, then the coupling is too tight and must be reduced.*

Alternative Method

The method of connecting resistances in parallel may appear rather tedious, though with the aid of the artifice described below this may be considerably simplified. Instead of using paralleled resistances one may calibrate the meter readings against various values of resistance applied and then read off the curve the value corresponding to the load. It is important to remember, however, that such a calibration only holds good for a particular setting of the instrument, and must, therefore, be made for each individual measurement.

Parallel Resistances

There are two ways of dealing with the paralleled plug-in resistors. First, one may simply use them in terms of their nominal values and measure the actual resultant of the two or three which have been plugged in, by means of a D.C. bridge. This saves calculation at the time of the measurements, and also avoids difficulty due to ageing of the resistors.

(*Continued on page* 134)

The 'Utility' Two Valve Transmitter

By J. N. WALKER (G5JU)

PART 1

THIS article is written primarily for the benefit of beginners in the science of Amateur Radio and is therefore of a somewhat unusual nature in that not only is a practical description of a simple yet versatile transmitter given, but also a good deal of information on the reasons for the inclusion of various components and for the values assigned to them. With an increase in the number of BRS members taking out AA licences and of AA licence holders obtaining their G3 calls the transmitter described has been designed to fill the requirements of both. It will enable the AA man to learn a great deal about modern transmission practice whilst the transmitter itself is entirely suitable for the 10 watt man just commencing experiments with a radiating aerial. Further, allowance has been made for the probability of the input being increased to 25 watts.

The chief characteristics of a transmitter suitable for comparative beginners are:

a. Maximum efficiency. *c*. Simplicity.
b. Economy. *d*. Trouble free.
e. Not likely to become obsolescent.

To take these in detail, maximum efficiency is obviously desirable to enable the most to be made of the low input. Under such conditions, it is surprising what good work can be accomplished. In any case, those just taking up transmission should start with low power as the indications of correct circuit adjustment are easier to follow, the possibility of damage to valves and other parts through incorrect adjustment is much less and a proper idea of how much R.F. should result from any given circuit and input is obtained. It is fascinating to experiment with low power and get the most out of it, rather than increase the anode volts to a high value and obtain R.F. output without any idea of what is meant by efficiency.

Economy is essential (except in the rare cases where the pocket is deep), and this means using the minimum number of components. At the same time, it should be borne in mind that it is false economy to include parts not designed for their particular job, as this will result in lower efficiency. The components specified are considered to show the best value for money and to be thoroughly reliable for service in any climate and under any reasonable conditions. They are also easily obtainable. It is interesting to note that all the components are of British make. During the past few years the use of American valves and components has become popular but it should be realised that British manufacturers are now in the position of not only fully meeting the requirements of the British amateur but of doing so at competitive prices.

Simplicity can be carried to excess and it is claimed that the "Utility Transmitter" presents the happy medium whereby really good results are obtainable without a very involved circuit. The circuits used are well tried and can be relied upon to work consistently with the minimum amount of adjustment.

If, at a later date, it is desired to use more than the 25 watts of input power the P.A. valve selected will normally stand, the transmitter can, *without alteration*, be used as the exciter for a separate Power Amplifier.

The type of signal emitted is very important in these days of somewhat congested amateur bands. For C.W. communication it is only necessary to transmit a band-width of a few hundred cycles. A wider band not only causes interference with other stations but means that the power available is being wasted by being spread over a band of frequencies instead of concentrated in one peak frequency. A very clean, steady note is essential whilst the various circuits must not be too tightly coupled or a "band pass" effect will result. As will be seen, these points and advantages are taken care of.

Telephone operation falls in a class by itself and will be discussed in a later article, when it is hoped to describe a modulator built to match the transmitter. It is emphasised that the beginner should concentrate on learning the operation and adjustment of the transmitter proper and gain some experience with telegraphy before launching out into telephony experiments.

The question of appearance is important and has also been studied. The trend to-day is to use apparatus which, unlike the "haywire" gear of past years, is neat, compact and tidy. There is no doubt that when a transmitter is built on such lines and combined with efficiency, the ideal is being approached. The reader is probably familiar with the appearance of modern rack and panel transmitters, but will not be desirous of building a very elaborate job to begin with. The present design allows of the chassis being mounted in a rack and fitted with a panel, should this become necessary.

If independent meters were fitted, they would not be available for other purposes, whilst the cost would be greatly increased, so three jack plugs are fitted on the front panel and one 0/50 milliammeter (which should be of the moving coil type) will serve for adjusting and measuring the input to each stage.

The Valves

The design of any modern piece of radio apparatus necessarily centres around the valves incorporated in it and careful choice is necessary to ensure that the performance is as good as possible for a reasonable expenditure.

The first valve in the "Utility Transmitter" is a *Tungsram* APP4g, which is a Pentode specially designed for transmitting work. This valve has a (4 volt) indirectly heated cathode. As a tritet circuit is used, the latter feature is very desirable, since it makes it much easier (*a*) to wire up the cathode circuit, (*b*) to obtain good efficiency, and

(*c*) to obtain an output free from slight A.C. modulation. If such modulation occurs in the first stage, it will be impossible to transmit a pure note, as the Power Amplifier will amplify it.

The grid of the APP4g is brought out to a top cap, thus minimising the input capacity and increasing the input impedance, which is very desirable as it is in parallel with the crystal.

This valve is designed to work with 250 volts on both plate and screen and it can be definitely stated that at this voltage, it is more efficient than a 6L6 and produces all the R.F. normally required. A 6L6 gives no advantage until the anode voltage is run up to about 400. The fact that the Post Office use the APP4g in their large transmitters is a good recommendation.

The second valve, used generally as a Power Amplifier, is a 015/400, also of *Tungsram* manufacture, and was chosen for several reasons. The filament voltage matches that of the first valve, so that only one supply, giving 4 volts 3 amperes is required. The valve is of medium impedance and amplification factor, making it suitable for a wide variety of applications. It will work well with anode voltages of from 250 to 400, and does not require an excessive amount of grid bias. Although rated for an input of 25 mA at 400 volts for audio frequency work, this is very conservative and may be increased to over 50 mA at 500 volts under Class C oscillating conditions. At the price of 12s. 6d., it represents outstanding value in the smaller class of triode transmitting valves.

A triode valve has been selected because it is easier to obtain satisfactory results compared to a Pentode. The main advantage of the latter is that neutralisation is unnecessary, but to achieve it, the lay-out has to be very carefully designed, and extra screening usually has to be fitted. Trouble from parasitic oscillations is more likely to be encountered ; these are often difficult to detect but result in a poor output or note. Whereas the anode circuit of a Pentode must be carefully matched to the tank circuit and aerial load, greater liberties can be taken with a triode without detrimental effect.

Neutralising is of course necessary with the 015/400, but is a fairly simple procedure once experience has been obtained and, in the balanced circuit adopted, the neutralising adjustment " stays put " when the frequency is changed.

The Oscillator Circuit

It is now proposed to discuss the circuits in some detail. By using the tri-tet method (which enables the first valve to act as both oscillator and doubler) the need for an extra valve to perform the latter function is eliminated. The actual circuit shown in Fig. 1 is undoubtedly one of the most reliable and places less strain on the crystal than some of the others available. A 60 mA fuse bulb is inserted between the crystal and the control grid of the valve to give an indication of the radio frequency passing through the crystal. At some positions of C1 a glow may be observed in the bulb, but this can always be reduced to zero, or nearly so, by slightly reducing the capacity of C1, without appreciably affecting the output. Such a position should always be found and used. Note that the fuse bulb is inserted on the far side of the grid resistance R1, to avoid depriving the valve of bias in the event of the bulb filament breaking.

The value of the cathode inductance L1 which is always small compared to the fundamental crystal frequency may consist of a coil slightly smaller than that used in the anode circuit. C1 must be fairly large and should have a working capacity of at least .00015μF., the reason being that it must effectively by-pass from cathode to earth the second harmonic frequency generated in the anode circuit, whilst allowing the fundamental frequency to develop in the cathode circuit. Too small a capacity at this point will result in the output from the anode circuit being disappointing.

The cathode resistance R2 performs the function of developing a certain amount of bias from the voltage dropped across it through the passage of

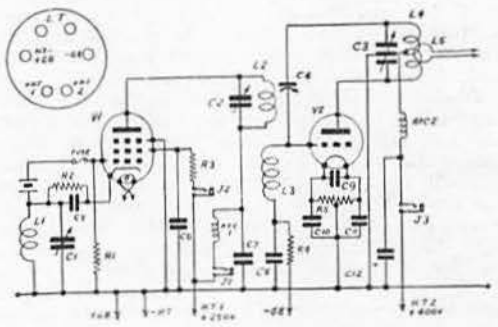


Fig. 1.

The circuit employed in the Two Valve Utility Transmitter.

C1. 250 μμF variable, Premier Trolitul.
C2. 60 μμF variable, type 1094, Eddystone.
C3. 50 x 50 μμF variable type 1081, Eddystone.
C4. 15 μμF variable, " Economy " type, Webb's Radio.
C5. .01 μF fixed mica type 340, T.C.C.
C6, 7. .002 μF fixed mica type 340, T.C.C.
C8. .0003 μF fixed mica type, 665 Dubilier.
C9, 10, 11. .002 μF fixed mica type, 665 Dubilier.
C.12. .002 μF fixed mica type M (1,500 volt test), T.C.C.
C13. 50 μμF fixed ceramic disc type, T.C.C.
R1. 20,000 ohms 1 watt type F, Dubilier.
R2. 250 ohms 3 watt type F, Dubilier.
R3. 5,000 ohms 1 watt type F, Dubilier.
R4. 10,000 ohms 1 watt type F, Dubilier.
R5. 30 ohms centre tapped, Polar.
RFC1. General purpose type 1010, Eddystone.
RFC2. Transmitting type 1022, Eddystone.
V1. Special pentode valve type APP4G, Tunsgram.
V2. Triode Transmitting valve type 015-400, Tungsram.

Other Components.

1 7-pin Ceramic Valveholder type S.W.V5, Clix.
2 4-pin Ceramic Valveholders type 949, Eddystone.
2 4-pin Coil Formers type 935, Eddystone.
3 Miniature Knob Dials type 1099, Eddystone.
3 Insulating Brackets type 1007, Eddystone.
2 Stand-off Insulators type 916, Eddystone.
3 Insulating Pillars type 1029, Eddystone.
4 Midget Insulators type 1019, Eddystone.
1 6-pin Socket type, Eddystone.
1 6-pin Lead Connector type 1031, Eddystone.
1 Switch Mains Double Pole type S88, Bulgin.
3 Closed Circuit Jacks (with insulating bushes) type J6 Bulgin.
2 Jack Plugs type P38, Bulgin.
1 Steatite A-E mounting type SW47, Bulgin.
1 Sheet Trolitul, 2 in. x 3 in., Denco.
Supply Coil Pins (type 21) and Sockets (type 8), Clix.
Supply N.P. Nuts and Bolts 6 B.A. x ¾ in(17), Bulgin.
6 B.A. x 1 in. (8), Bulgin.
4 B.A. x ½ in. (16), Bulgin.
1 60 mA fuse bulb and porcelain holder.
Crystal. Enclosed type (7 Mc.) with holder and base, Q.C.C.
Coils. See Text. Two required. R.V. Inductances.
Chassis. 16 in. x 8 in. x 2½ in. Sheet Iron. (Sprayed Grey), Metal Agencies, Bristol.
Valve socket connections are looking at inside of socket.

the total valve current, so preventing damage to the valve should the crystal for any reason fail to provide excitation. Whilst a value of 250 ohms is specified, it may be varied from 200 to 300 ohms without appreciable difference in performance.

A by-pass condenser must be provided across R2 and should be a mica type of fairly high value. Without C5, R2 will become much hotter than normal indicating that considerable current, other than the standing valve current, is passing through it, and this loss must be avoided. C5 and R2 must, of course, be electrically isolated from the chassis.

The grid resistance R1 provides additional negative bias by virtue of the passage through it of a few milliamperes of R.F. crystal current rectified by the diode action of the grid and cathode. The AP4g will pass between 20 and 25 mA total cathode current when properly adjusted.

In order to avoid the cathode and anode circuits inter-acting on each other thus causing instability, the coupling between them must be as nearly purely electronic as possible and to achieve this, the internal screening of the valve must be good and the screen itself kept at zero R.F. potential. The screen grid (G2) is fed from the H.T. line *via* the jack J2, which is inserted partly to enable the current flowing to be measured, and partly to allow the transmitter to be conveniently keyed, and thence *via* R3. The latter is in the nature of a decoupling resistance and since only about 3mA flows in this part of the circuit, the voltage drop is quite small, being only of the order of 15 volts. The screen grid therefore receives about 235 volts. Condenser C6 keeps the screen at earth potential as far as R.F. is concerned, and a larger value than that specified should not be used, because, when keying takes place, the charge across C6 has to be dissipated through the valve and if a comparatively high capacity were used, this action would take an appreciable fraction of a second, giving a "tail" to the note thus making it less easy to read. If this effect is found, a resistance of 100,000 ohms can be placed in parallel with C6 to enable the latter to quickly dissipate its charge. The suppressor grid (G3) which is brought out to a separate pin, is connected directly to earth and helps to improve the screening.

A fairly high L/C ratio is desirable in the anode circuit and the value chosen for C2 is 60 $\mu\mu$F. The coil L2 is wound on a low loss *Eddystone* D19 four pin plug-in former for convenience in quickly changing frequency. The anode by-pass condenser C7 is of .002μF. capacity, which is the optimum value for 7 and 14 Mc. operation, and provides a path to earth of low impedance. It is essential to keep the radio frequency currents out of the power supply leads and Choke 1, of the usual 2.5 microhenry type, is therefore included. Jack 1 enables the anode current to be measured and adjustments made. It must not be used for keying purposes as the valve will be damaged if H.T. is removed from the anode but maintained on the screen.

By shorting out the cathode coil L1, the first valve becomes a straightforward Crystal Oscillator. In practice, this is accomplished by slightly bending one of the rotor vanes of C1 so that, at full capacity, it makes contact with a stator vane and so short circuits the condenser.

The crystal itself is of *Q.C.C.* manufacture and is totally enclosed in a Keramot holder. This type of mounting is much to be preferred as it keeps the crystal free from dust and grease, which are bound to collect with an open holder, entailing frequent cleaning, if a falling off in performance is to be avoided.

The Power Amplifier Circuit

There are several ways in which the output from the oscillator could be applied or coupled to the Power Amplifier, the most common being (*a*) capacitative, (*b*) link, (*c*) inductive, either fully tuned or aperiodic. If capacitative coupling were used, it would be necessary to experiment to find the correct size, which would probably vary with frequency. The tuned anode circuit becomes also the tuned grid circuit, whilst the coupling condenser and one end of the grid choke would be at high R.F. potential. The losses so introduced are avoided if the grid coil (L3) is wound separately and coupled to the anode coil (L2). A popular and efficient method of doing so is by means of link coupling, which consists of winding one or two turns around the low potential ends of the coils and joining them with a pair of wires, either twisted or parallel and close together. The disadvanatges are that as L3 is quite separate to L2, an extra coil holder and extra coil formers for each band are necessary. Another condenser will be required to tune L3, taking up additional room on the chassis.

L3 may be coupled to L2 by letting the fields of the coils interest directly, but this calls for an arrangement whereby one of the coils can be physically moved in relation to the other.

The method actually adopted is the aperiodic type and avoids the disadvantages mentioned. L3 is wound on the same former as L2 and the number of turns are adjusted so that, with the internal capacity of the valve, it resonates broadly over the frequency band in use. No extra tuning condenser is required and as the current flowing in the winding is low, it is permissible to use thin wire. The grid condenser is connected at the low potential end of the winding and no radio frequency choke is necessary in series with the grid resistance R4. The spacing between the two windings is such that sub-optimum coupling results—that is to say, the tuning of the anode circuit remains sharp or "peaky," because it is not too heavily loaded, whilst, at the same time, plenty of drive is passed on to the grid of the Power Amplifier valve.

The grid condenser C8 is purposely assigned a comparatively low value, as the current passing is small, whilst the time factor is important because the condenser must not be capable of holding a large charge. The bias for this stage is derived chiefly from a dry battery but R4 also serves a useful purpose by providing some extra bias, which increases as the drive to the valve increases, due to the increased grid current flowing through R4. This is as it should be.

Across the filament of V2 is a 30 ohm resistance, the centre tap of which is earthed to the chassis. This enables a better balance to be preserved than would be obtained by using a tap on the transformer filament winding. Each side of the filament is by-passed to earth *via* C10 and C11. Even with these precautions, it is still possible for stray R.F. current to pass through the filament, indicated by the latter becoming slightly brighter when the key is pressed. Connecting C9 *directly* across the filament terminals,

(*Continued on page* 134.)

A Frequency Meter for the Amateur Station

By R. W. Addie, G8LT.

ONE of the most necessary pieces of measuring equipment in any amateur station is a frequency meter which can be relied upon to hold its accuracy over long periods, and which can be brought into use quickly without having to move from the operating position. For these reasons the heterodyne meter is to be preferred to most other types, and it is proposed to describe in some detail an instrument which has given every satisfaction over a long period and which can be constructed in the average amateur workshop.

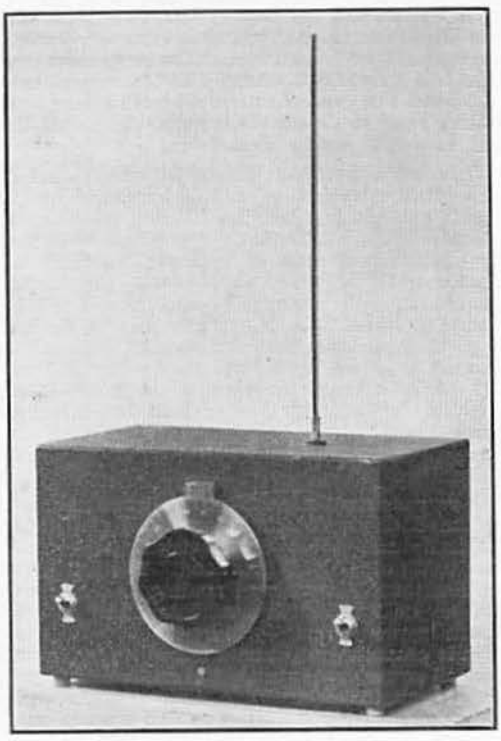
Circuit Description

The circuit employs a *Mazda* AC/VP1 in an electron-coupled oscillator. The only reason for the use of the above valve was that a new one was to hand, but any good HF pentode will give satisfactory results. This type of oscillator possesses very good harmonic generating properties. Power is supplied from an old H.T. eliminator whose transformer has been fitted with a 4v-0.6 amp. filament winding. The most satisfactory H.T. voltage has been found to lie between 45 and 60 volts.

The signal emitted with this value gives an S9 indication on the meter of an adjacent communications receiver and a good heterodyne is obtained with all strengths of received signals.

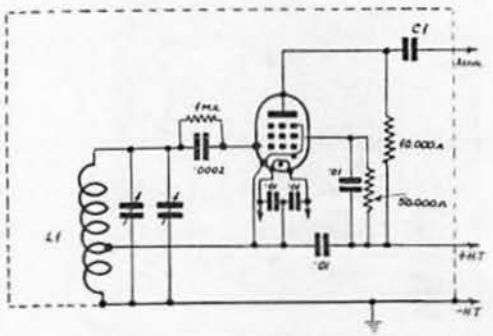
Construction

The cabinet, which is entirely home-made, is constructed from four pieces of stout gauge aluminium sheet: one piece forming the back, bottom and front; two others—the ends and the top—are separate. The overall dimensions of the meter are: 10" × 6" × 5½". The ends have flanges, and these are drilled and tapped 6BA for bolting into place in the U-shaped frame formed by the large sheet after bending. The top is bolted with 4BA countersunk brass screws into two strips of brass angle which are similarly fixed inside the top along the back and front. This arrangement is very rigid. The whole is then given a thick coat of crackle finish paint and allowed to dry in a hot atmosphere.



Front view of meter with its pick-up aerial rod attached.

The next operation is to wind the coil to suit the condenser in use. The author, contrary to usual practice, decided to have the fundamental on 3.5 Mc. extending to 3.65 Mc. with the idea that, on the 7 Mc. harmonic, the range would be 7 to 7.3 Mc., this stretching over the complete dial. By this means calibration on the higher frequency bands



Circuit diagram of frequency meter using the Electron Coupled Oscillator method.

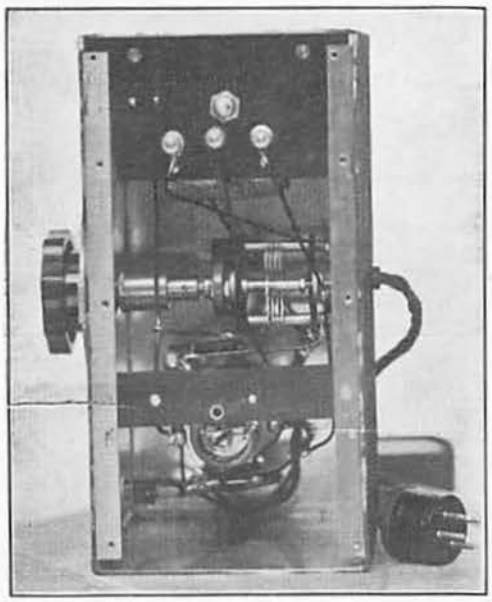
would not be cramped, and it is nearly always possible to calibrate a good superhet or other receiver fairly accurately over 1.7 Mc. and the remainder of the 3.5 Mc. bands. The coil is wound on a 1" diameter bakelised former and has 50 turns of D.S.C. wire close wound on it of such a gauge as to occupy about ¾" of winding space and tapped at 20 turns. After winding this should be given a coat of "trolitul" or other coil compound. The above values will, of course, require to be adjusted by winding on more turns than required and then removing bit by bit until the desired number of kilocycles per division are obtained.

A "*J.B.*" short wave tuning condenser with three rotor plates was employed after two of the latter had been removed. This gives a maximum capacity of about 13.5 μμf. and a minimum of about 2.5 μμf. as measured against a standard. Any good condenser having two bearings, provided it is rigidly constructed, may be used, but some care should be exercised in the choice. The coil and parallel capacity may also be altered to suit any particular tuning condenser. This parallel capacity can be any small air spaced condenser having a maximum value of 100 to 150 μμf., but

its spindle should be slotted to facilitate presetting. In view of the large shunt-to-tuning capacity ratio, the resulting curve for the meter is very nearly a straight line.

An *Eddystone* vernier dial with incorporated slow motion drive (No. 1085) is mounted centrally with two *Bulgin* S.P.S.T. toggle switches on either side. One of the latter, controls the filament, while the other switches the H.T.+. The condenser stands on an *Eddystone* adjustable bracket directly behind the drive.

It is important to see that the front panel is true and has no " waves " in it, otherwise the vernier will show a gap between itself and the dial and there is a chance then of the condenser spindle becoming strained. The coil and padding condenser are mounted firmly on a small platform of ebonite carried by a strip of angle brass bolted to the left end of the cabinet. The valve itself has its holder bolted to the bottom of the box and to the right of the condenser while the anode components and the small rod aerial are fixed to a cross-brace of ebonite, which is in turn secured to the two



View of underside of frequency meter showing location of components and method of wiring.

brass angles holding the lid. In this manner the valve is supported at both ends as can be seen in the photograph showing a plan view of the meter.

A word would not be amiss regarding the coupling condenser C1 to the aerial. This should have a very small capacity in order not to load the oscillator appreciably and so keep the note a pure T9. A very simple condenser can be made with two 0 BA soldering tags separated by mica washers and clamped up with a 6 BA bolt. This radiator, which projects through an insulating bush in the lid is a piece of 10" copper rod. It is convenient to taper the bottom end of this slightly so that it may fit a small socket from which it may be easily removed when required.

The resistors are 1 watt types to prevent any serious localised heating, while all the fixed condensers are *T.C.C.* type " M " mica. Wiring should be carried out in 14 gauge copper conductor —old aerial wire being very suitable, as it is semi-hard drawn and helps towards rigidity. If thin wire is used the components are liable to move due to handling and vibration. Long leads should be avoided and wherever possible components should be fixed in place and not left to " dangle " in the wiring. Care taken in this respect will be amply repaid by consistency of performance later. Small rubber feet on the bottom of the cabinet are helpful in reducing vibration.

Calibration

For the satisfactory calibration of such a meter a 100 kc. bar and oscillator are highly desirable. A receiver, of which the rough calibration is known, is then used to pick out the correct harmonics. The meter filament should be left running for 20 minutes before any attempt is made at calibration so that components will have attained an even temperature. The bar oscillator is coupled to the receiver and the 7.0 Mc. harmonic tuned in without the beat note. The meter condenser is then set a few degrees off maximum capacity and the padding condenser rotated with a trimming tool until a low beat is heard in the receiver. At this point the lid should be screwed into place and zero beat obtained by the meter tuning. This reading should be noted. The 7.1, 7.2, 7.3 harmonics are similarly determined. Next, the receiver is tuned to the 14 Mc. band. Since the position of the 14.0, 14.2, and 14.4 Mc. harmonics will be known from the previous readings obtained, the harmonics between these positions will give 7.05, 7.15 and 7.25 Mc. respectively. If desired, this process can be repeated through the 28 Mc. band to determine further points, but this will, as a rule, not be necessary.

If no bar is available, points can be obtained by zero beating stations of *known* frequency on the amateur bands but here let a word of advice be offered. It is the author's experience that in a large number of cases of stations who glibly announce their frequency as 7——.00, their actual frequency may be removed by as much as 5 or 6 kc. from the stated value, generally due to the fact that their crystals are not totally enclosed or because they are trying to get the last milliwatt out of an already overdriven oscillator. Good use may be made of the excellent R.S.G.B. calibration service which is open to members, and through which meters such as this may be sent for calibration.

A very serviceable graph may be drawn on a sheet of graph paper 40"×27", on which 1"=10 kc. vertically and 1"=5 dial divisions horizontally, this being on the 7.0 Mc. band. The instrument as described is capable of reading to the nearest 0.5 kc. on 7 Mc. with consistency, and on other bands in proportion.

It is proposed, in the near future, to incorporate a small power supply inside the meter using a very small mains transformer, a 12Z3 rectifier and a 16 μf. smoothing condenser. The normal anode current of the valve when oscillating is barely 1.5 mA.

National Field Day, 1938

FIRST WIN FOR NORTHERN IRELAND

NATIONAL Field Day has now become an established institution in the lives of hundreds of radio amateurs not only in the British Isles, but also in many distant lands. The more we reflect upon the successes achieved year after year, the more we admire those who, often in the face of great difficulties, assume the responsibility of producing the necessary equipment, and other sundry impedimenta which goes to make up an N.F.D. station. In particular we think of those who live in the scattered areas of Great Britain where the task must severely test the fortitude of all concerned.

We have very little time for " arm chair " critics of N.F.D., our advice to them is " get out to your local station and by your example show how to do the things which you criticise." We believe that view is shared by the vast majority of members, many of whom can claim to be good operators as well as good companions.

Before Zero Hour

When on the morning of June 11 we tuned across our receiver dial and heard nothing but a few local stations on both 7 and 14 Mc. we had visions of another fade-out coming along to spoil the thrills of DX working, but fortunately the period of poor conditions passed off before zero hour and although " the world " did not " pour in," most of the 14 Mc. stations had a fair measure of success in that direction. The 7 Mc. band also brightened up and allowed a goodly number of European contacts to be made.

The two lower frequency bands 1.7 and 3.5 Mc., appear to have behaved quite normally for the time of year, though it is worthy of record that on the former frequency a W8 was heard at 3 a.m. by G5PAP (District 8).

The Leaders

Congratulations to Northern Ireland on their first N.F.D. win. Their total score of 612 points was 24 higher than that registered by the runners-up, District 15, but this margin would have been narrower if the old method of scoring had been in vogue. Both of the leading Districts owe much to the success of their 14 Mc. stations, but as an examination of the table will show the consistent scoring at the other stations in each of the Districts concerned contributed considerably to the high position both hold.

District 4 put up an excellent performance by scoring 574 points to finish third, whilst District 8, always well to the fore, were only 13 points behind.

District 17 take fifth place due very largely to an outstanding performance by their station at Cranwell which, with a total of 172 points, captured the replica for 3.5 Mc. stations.

One of the winning crews. Personnel at GI5QX, the 14 Mc. station in Northern Ireland.

Hold it!
G6LI at G6GHP.

G6RBP operating in District 5 sprang a surprise by leading the 7 Mc. stations, although the District total was rather low.

Eire, taking advantage of the new scoring system, managed to beat last year's winners (District 8) for the 1.7 Mc. replica, whilst District 15 are recompensed for having to take second place in the table by winning the 14 Mc. replica.

The Gear Used

Brief details of the gear used at the leading station on each band are given above :—

1.7 *Mc.*	EI6F	None given.	
	G5PAP	Trans.	UHX 10 Harvey.
		Rec.	Super Skyrider.
		Aerial	132 ft. end fed.
		Power	Petrol driven generator.
	G2CXP	Trans.	CO-PA.
		Rec.	1-v-1.
		Aerial	W3EDP type.
		Power	300 v. motor generator.
	GI5HVP	Trans.	CO (6L6G).
		Rec.	1-v-1.
		Aerial	Marconi.
		Power	300 v. dry batteries.
3.5 *Mc.*	G8FCP	Trans.	CO-PA (T20).
		Rec.	13 valve battery superhet and 1-v-1.
		Aerial	130 ft. end on.
		Power	240 v. Milnes unit, 450 v. motor generator, L.T. accumulators.
	G5JOP	Trans.	CO-PA (TZ 05/20).
		Rec.	0-v-1.
		Aerial	132 ft. end on.
		Power	H.T. dry batteries, L.T. accumulators.
	G5VBP	Trans.	E.C.O. PA (6L6's).
		Rec.	7 valve superhet.
		Aerial	134 ft. end on.
		Power	12 volt generator.
7 *Mc.*	G6RBP	Trans.	CO-PA.
		Rec.	1-v-1.
		Aerial	66 ft. with low impedance feeders.
		Power	A.C. generator off 24v. accumulators.
	G6LKP	Trans.	CO (RK23)—PA (T40).
		Rec.	H.R.O.
		Aerial	66 ft. doublet.
		Power	Dry batteries.
	GM8AHP	Trans.	CO-PA (DO24).
		Rec.	S.S. super.
		Aerial	67 ft. Zepp.
		Power	500 v. dry batteries.
14 *Mc.*	G6CJP	Trans.	CO-FD-FD-PA.
		Rec.	H.R.O.
		Aerial	136 ft. matched impedance.
		Power	Generator and battery.
	GI5QXP	Trans.	CO-FD-PA.
		Rec.	T.R.F.
		Aerial	99 ft. Hertz.
		Power	Dry batteries.
	G5JZP	Trans.	CO-FD-PA (809).
		Rec.	0-v-1 and 0-v-2.
		Aerial	Windom.
		Power	Motor generator.

A Glance at the Logs

G5PAP was the only 1.7 Mc. station among the leaders to score with a foreign contact—OZ2PX being worked at 2353 G.M.T. G5KLP, the District 17 station, had a contact with F8RJ and G2JLP had the distinction of working both OZ2PX and F8RJ.

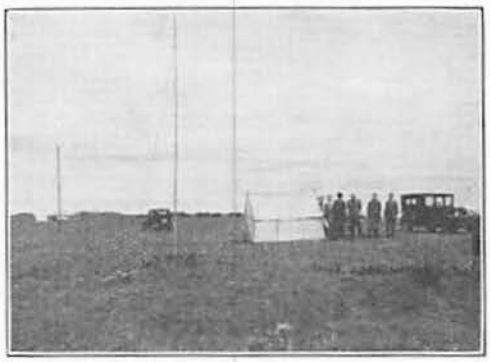
Belgium, Germany, Holland, Denmark, Czechoslovakia, Switzerland, all appeared in the 3.5 Mc. log of GI5SJP, while G5VBP (District 15) included contacts with Norway and Latvia. HA2FX was worked by G8FCP at Cranwell and F8ME by G6NZP at Portsmouth.

The 7 Mc. stations had to content themselves mostly with European contacts, the outstanding exceptions being G6LKP, who recorded a QSO at 0420 G.M.T., with W2IDP and G6RBP, who worked W1FPP at 0135 G.M.T.

The DX achieved on 14 Mc. was little short of miraculous bearing in mind that conditions were not really first class. GI5QX began in great style by working VK2AJK, VE2ZN, VU2BG, U1HM, W2ELY, LU4NB and SU1A before midnight, following this W.A.C. by contacting CX2AJ and ZL4DQ during the night. SU1H was added at 1030 G.M.T.

G6CJP registered its first contact with PK1MF and followed this with VK2AJK, SU1H, VE2AX, ZC6AQ, VU2FXP, SU1A, W1CVA, ZB1R, U5HE and W2FF before 2400 G.M.T. Two W's, ZL3JA, CX2AJ and VQ4KTF were bagged during the early hours of Sunday, W1KHE was the only DX contact on the Sunday afternoon, but ZB1PP and ZB1T gave welcomed Empire contacts earlier in the day.

G2IOP near Southwell in Nottinghamshire, had the distinction of working XU8RL within an hour of the start. They also raised 10 W's during the night, and in addition VU2BG, SU1H, ZB1R, CT2BD, ZL2QM, LU9BV, SU1A and ZB1T.



Leaders on 1.7 Mc.
EI6F, the Eire station in County Wicklow.

G6WAP contacted HC1JW, while G6GHP had contacts with VP1AA and FA8DA. GW5BIP showed the way to work the States—nine W's being raised between 2240 and 0155 G.M.T. In all, this station had 14 QSO's with North America.

Last year's leading 14 Mc. station (G5JZP) again did well, VQ3HJP, VK2AJK, VK5JS, SU1H, VU2FS, LU3DH, W8JHW, VE1AU, ZB1R, CN8AH, W3EQZ/P and VE3HI being worked before midnight. During the early hours CX2AJ, OA4AB, ZC6AQ and several W's were added to the log. The station finished third amongst the 14 Mc. stations.

Space does not permit a more detailed survey of the logs, but sufficient has been written to show that plenty of DX was workable.

Faked Calls

Two examples of faked calls must be recorded, first VR6AB which was alleged to be a station at Pitcairn, and G2PGP alleged to be a British portable. The latter call is held by McMichael Radio. Several districts suffered due to the unsportsmanlike behaviour of the persons concerned.

Northern Ireland lost points through contacts with these "pirates," but as they had only allowed 3 points for contacts with EI and GW, their final score was only one less than submitted. G6CJP also lost 10 points through VR6AB, but this has not affected their position as 14 Mc. leaders.

General Comments

The prevalence of harmonics and strong overtones was commented upon by many operators. In the London area S9 signals were heard on 7 Mc. from stations in the North working on 3.5 Mc., whilst certain 7 Mc. signals were logged on 3.5 Mc.

A tendency existed to omit the frequency band symbol at the end of each call, which in view of the previous paragraph is a point to be carefully noted in future years.

No serious complaints have been made about the type of signal emitted at any specific station due, we believe, to the fact that those responsible have realised that a "clean" transmission is most desirable during this event.

The new scoring method certainly helped both Northern Ireland and Eire, but most of the Scottish stations do not appear to have benefited very greatly from the changes, although their C & D. Districts did very well indeed.

Co-operation

The thanks of the Society are due to the Swiss and Dutch amateur organisations who again co-operated in a splendid manner. The HB portables in particular did splendid work and collectively earn the praise and thanks of every British Isles N.F.D. operator.

Then, too, our thanks are extended to the operators of the two SU portables who gave valuable points to our 14 Mc. stations.

ZB1P, 1R, 1T, VU2FV and VQ4KTF and many others in different parts of the world also did their share. We regret that closer co-operation with the A.R.R.L. was not possible because we learnt too late that they were also staging a Field Day during the week-end. Possibly next year a Trans-Atlantic Portable Field Day event can be arranged.

Check Logs

We record our thanks to all who furnished check logs, including G2BL, 5TI(P), 6OQ, 6XL(P), VQ4KTK, SU2TW(SU1H), ZB1P, D3GXO. In addition, Mr. B. W. Mainprise, G5MP, who was in Switzerland at the time, sent a list of 14 British portables heard on 1.7 Mc. The average strength was S7. He reported that G51U "was considerably above all and his power input would be interesting to know." According to R.S.G.B. records G51U is not licensed for 1.7 Mc. operation, so possibly a "pirate" was at work. G5MP also reported the reception of GTM (one of the police radio stations). He was using a 3-valve receiver and short aerial above the roof.

G6LI forwarded a very detailed account of the gear used at G6GHP, which we hope he will prepare later in the form of an article for publication.

(*Continued on page* 134.)

NATIONAL FIELD DAY, 1938

How the Districts Finished

Position.	District.	Band in Mc.				Total.
		1.7	3.5.	7	14	
1	N. Ireland	92	141	167	212	612
2	15	77	154	138	219	588
3	4	81	143	149	201	574
4	8	99	158	154	150	561
5	17	66	172	158	159	555
6	7	71	118	174	175	538
6	16	78	113	145	202	538
8	10	91	126	169	151	537
9	12	83	152	141	124	500
10	Scot. C	73	72	143	200	488
11	,, B	61	131	161	133	486
12	5	66	124	179	103	472
13	Eire	105	87	147	128	467
14	13	93	101	153	117	464
15	Scot. A & E	80	128	168	77	453
16	2	81	101	140	119	441
17	1	77	120	134	76	407
18	14	1	109	167	120	397
19	6	70	104	108	107	389
20	3	40	148	114	90	392
21	19	82	68	102	126	378
22	9	42	110	135	30	317
23	Scot. G	144		67	101	312
24	18	—		139	117	256
25	Scot. H	—		157	82	239
26	,, D	—		156	63	219
27	,, F	—		117	—	117

Field Strength Measurements and Polar Diagrams

By E. SHACKLETON (G6SN).

Here is an article which will appeal to all who wish to carry out field strength measurements. In an early issue the author will deal with the construction of a meter similar to the experimental model described below.

IN spite of the number of articles describing varied and sundry aerials little has been written on the subject of taking actual field strength measurements and producing polar diagrams of aerials. Most of the Handbooks dismiss the subject lightly by giving a diagram of a diode meter which may be satisfactory for neutralising a transmitter, but is quite inadequate for producing a useful polar diagram of an aerial.

On the way to the recent P.D.M. at York this year, Mr. F. W. Garnett (G6XL) said that he could not find any gear sensitive enough to take measurements from his beam aerials. He suggested the use of an H.F. stage in front of the usual diode meter. This started a train of thoughts, and brought to mind some polar diagrams made with G2DR when readings were taken from a 200-watt, 160-meter transmitter up to a distance of about eight miles. Unfortunately, the circuit diagram of this apparatus has been lost, but Fig. 1, which has been drawn from memory, will explain its function. It consisted of an aperiodic screened grid H.F. stage coupled to a triode valve voltmeter employing reaction and having a resistance network in the anode circuit to balance out the standing anode current in the absence of a signal. Thus the microammeter "M" only showed the current rectified by the valve due to the voltage developed across the tuned grid circuit by the signal voltage. The use of reaction made the apparatus much more sensitive at long distances from the transmitter, but at the same time it made the adjustment extremely critical. It was not possible to leave the apparatus set for more than a few minutes at a time. In practice it was necessary to adjust both the reaction and the tuning before every reading was taken. The aerial consisted of an 8-ft. length of ½-in. diameter copper tube mounted vertically. The apparatus was both heavy and bulky since a six-volt accumulator and two separate H.T. batteries were essential.

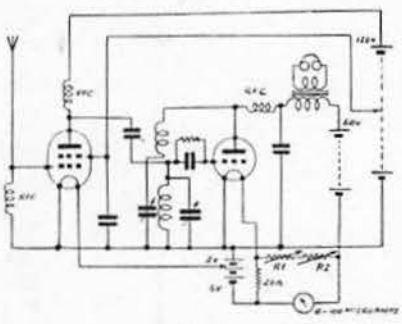
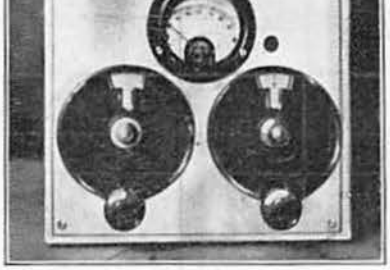


Fig. 1.
Original circuit developed by the author.

General Principles

In spite of its many weaknesses, some simplified apparatus on the lines just mentioned seemed a likely starting point for further experiments. It was proposed to use the gear principally on 14 Mc., later on 28 Mc., and probably on 56 Mc., consequently a tuned H.F. stage was considered essential, an aperiodic stage giving little or no amplification on the higher frequencies. "Acorn" type valves, at least for the H.F. stage, would have been advisable, but financial considerations ruled out their use. Reaction was tried in the first instrument, but was found entirely unnecessary. To obviate the need for two H.T. batteries and a six-volt accumulator, the compensating resistance network in the triode

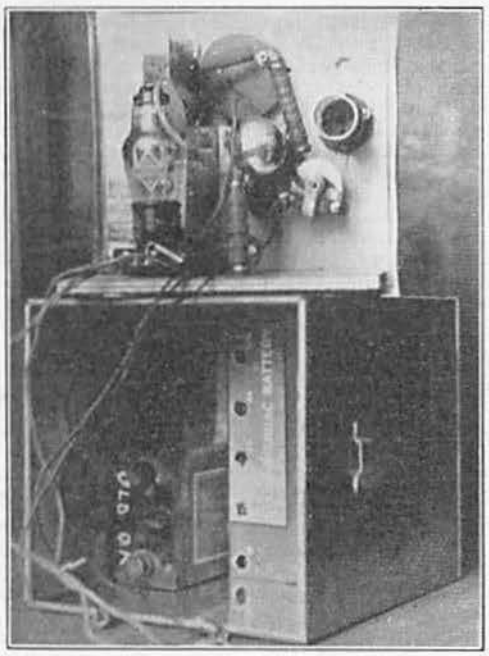


Front of meter. The ebonite bush for the aerial is immediately above the right-hand dial.

valve anode circuit was omitted, which meant that in the absence of any signal the meter would read nearly full scale, and that the readings would decrease with an increase of signal voltage. Whilst this state of affairs is not desirable, it is quite satisfactory in practice. Some attenuator, preferably calibrated, could be provided in the anode circuit, but is hardly necessary. The circuit finally adopted is shown in Fig. 2, which is practically a simple two-valve receiver without reaction. The only component at all critical is the grid leak, which should have as high a resistance as possible. With the 10 megohm resistance as shown in the circuit, the meter reading drops from 1.1 mA. to 0.3 mA. in a strong field. Too low a resistance will increase the minimum reading restricting the usable portion of the meter scale. The meter in actual use is an old *Weston* galvanometer type 375, with the pointer reset from centre zero to the left hand. As altered, the meter has a full-scale reading of 1.2 mA., but the damping is too low for satisfactory readings. When connecting up, the H.T. lead to the triode valve should be

adjusted till the meter reads nearly full scale. From past experience with this type of apparatus, no switch has been fitted in the battery cricuit since all switches are liable to have a relatively high, and worse, a varying resistance, which is fatal for this purpose.

As will be seen from the photographs, the apparatus is built into a 4-lb. biscuit tin. The various components are mounted on an "L"-shaped plywood framework, one side of which is screwed to the underside of the lid. This makes a strong, neat arrangement, giving good accessibility. The batteries are carried loose in the bottom of the box. By good fortune, a standard "square" 120-volt battery just fits into the tin, leaving sufficient room for a reasonable-sized accumulator.



Interior of Field Strength meter showing batteries.

The aerial is a 4-ft. length of ¼-in. diameter copper tube which passes through an ebonite bush in the lid and fits into a socket inside. The aerial should preferably be made in sections so that a shorter or longer aerial can be used as required. It should be mentioned that a *totally screened case* of some sort is *absolutely essential* for any type of signal measuring gear. No signal must be able to reach the meter except *via* the aerial.

Carrying the gear at first presented a problem. A single leather strap was tried, but became distinctly unpleasant after only a few minutes. Ultimately an old Sam Browne belt with two cross-straps was pressed into service, and this has proved ideal, for with it the set can be carried for hours without any discomfort.

Results Obtained.

A short trial with the gear produced results which exceeded the writer's wildest dreams. With 20 watts in the final P.A. stage, half-scale deflection was obtained at about 200 yds., but measurable readings can be taken under favourable conditions on a lobe up to nearly a quarter of a mile. A word of warning: do not expect to get a perfect diagram "like those in the book," or you will be sadly disappointed! The major lobes should be clearly defined, unless, as has happened, they are missing due to another aerial distorting them. Local conditions have a very disturbing effect on the ground wave (which is of course what we are measuring). A few pairs of telephone wires between the meter and transmitter will often cause a complete wipe-out even though it is known that excellent results are obtained in that direction. Metal lamp-posts have a local but severe attenuating effect, whilst iron railings, trees, particularly when in leaf, buildings, B.C.L. aerials, and even wire netting should be treated with suspicion. It is said that in one of our northern cities the B.B.C. engineers were very perplexed to find a series of blind spots at regular intervals down the centre of a main road. There were no telephone wires or other likely signs of screening, and it was eventually found that the blind spots coincided with the sewer or cable duct man-hole covers in the centre of the road.

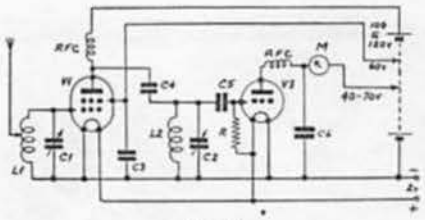


Fig. 2.

Circuit of Simple Field Strength Measuring Set described.

L1, L2, C1, C2.—To suit frequency.
C3.—.005 μF mica.
C4, 5.—.0001 μF mica.
C6.—.01 μF paper.
R.—10-megohm or higher.
M.—0-1 milliammeter.
V1.—2v. Screened Grid.
V2.—2v. Triode (H.L. type).

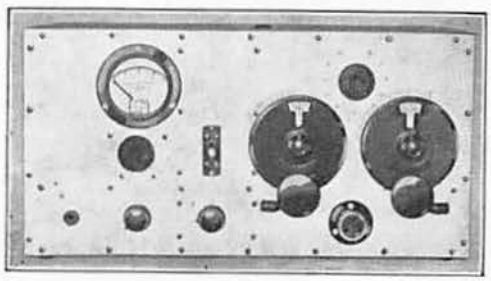
Before commencing to take a polar diagram it is advisable to make a preliminary survey of the district, taking note of any likely sources of screening. It is as well to have some accurate map of the district on which the results can be marked, and for this purpose the 1/2500 scale (25 ins. to the mile) Ordnance Survey map is ideal. To those who do not know this map, the wealth of detail will be a revelation. All buildings, roads, streams and fields are reproduced accurately to scale. The length of a 66-ft. aerial would be .316 in., so that it can be accurately drawn on the map. A polar diagram on one of these maps will cover about 6 ins. square. Instead of marking the readings directly on to the map, fold the map round a board about one foot square, and pin a piece of tracing paper over the map on to which the polar diagram can be drawn. The tracing can be kept and compared with diagrams from other aerials.

Readings can be taken in two ways, either by trying to follow a contour of some predetermined meter reading or else by plotting a series of similar meter readings along a number of roads or paths. The first is the simpler and more reliable method,

but it is not always practicable. Usually it is only possible to take a limited number of points, the remainder having to be filled in by guesswork. For this reason it is advisable to take a second series, and possibly a third at different meter readings. By comparison it is then usually possible to draw a fairly accurate diagram.

Practical Tests

To illustrate the usefulness of this gear some tests carried out on G8UQ's aerials will be of interest. Two aerials are in use, a 66-ft. Zepp. running north-south, and a 33 ft. 6 in. " Y " match running east-west. Both supported from the same mast at the north-east corner, where they are only about 10 ft. apart. Tests showed that the Zepp. aerial was deflecting the lobes of the " Y " match aerial about 35 degs. to the west. On the other hand, the north-east lobe of the Zepp. aerial was very weak indeed. Unfortunately it was not possible to move either aerial so that these tests canot be considered complete. The tests did, however, suggest the interesting possibility of using the " Y " match aerial for South America instead of for South Africa for which country it had not been too satisfactory. The first time this aerial was tried four Argentina



Thermal Agitation Type of Field Strength Measuring Gear.

The two large dials control the aerial and oscillator circuits respectively. Above these dials is the R.F. attenuator switch, whilst the two I.F. attenuators can be seen to the left of the dials. Below, reading from left to right, are the telephone jack, valve voltmeter grid bias potentiometer, gain control, and, between the dials, the power supply socket. The bush for the aerial socket can be seen in the centre on top of the case.

stations were contacted, and gave an average of S6 with an input of only 25 watts.

Mention must be made of an article published in "*Q.S.T.*" for January, 1937, entitled " Wide Range Resonance-Type Frequency Meters with Sensitive V.T. Indicators," by Wolcott M. Smith. Four valve voltmeter circuits are illustrated and described in detail, the author giving the particular properties of each. Unfortunately this article was not available at G6SN when the writer made his apparatus.

G.P.O. Equipment

For those who wish to obtain more accurate and sensitive field strength measuring apparatus there is an instrument designed by the Post Office Engineering Department. This apparatus is described in detail in the *Post Office Electrical Engineers' Journal* for April, 1935, and is entitled " A Field Strength Measuring Set Using Thermal Agitation Noise as the Calibration Source," by A. H. Mumford, B.Sc. (Eng.), A.M.I.E.E., and P. L. Barker, B.Sc. (Eng.), A.M.I.E.E.

The standard practice in estimating field strengths is to compare the reading obtained with that from a local oscillator, the output of which is accurately known, and which can be varied over a wide range by means of suitable attenuators. It is obvious that the weak point in this method is the local oscillator. Further, at the higher frequencies the design of the attenuators presents serious difficulties. The designers of the Post Office apparatus have overcome both these difficulties in an ingenious yet simple manner. They use a super-het. and utilise the thermal agitation noise in the first tuned circuit as known input, for comparison purposes. They then place two of the attenuators in the I.F. amplifier where the frequency is relatively low (110 kc.), so that the design of the attenuators presents few difficulties. It is stated in the article that this instrument can be used on the higher frequencies.

The apparatus is remarkably sensitive, and can be calibrated to read decibel increments against a standard level of 1 microvolt per meter. An instrument of this type was demonstrated at the 1936 Radio Exhibition at Olympia, and as the writer was then engaged in plotting a large polar diagram he approached the Post Office for permission to use their circuit. The Post Office not only granted this permission, but also, very kindly, supplied complete drawings together with the specification of the instrument. Up to the present it has not been used on any frequency higher than about 2,000 kc., although it has been used on the 1.75 Mc. transmissions of some local stations.

Trade Notes

The House of Webb's receive and deserve the congratulations of all British radio amateurs for their foresight in publishing their new catalogue. Catalogue is hardly a fair term to use for such a beautiful production, printed as it is on art paper, but readers need have no fear that this latest contribution to British amateur radio literature is a dry as dust list of prices. From front page to last the book is full of essential data of the type which every amateur needs.

It would be a little presumptious to draw attention to any particular feature, but we may be excused perhaps for writing in eulogistic strain about the illustrations. Throughout the book will be found clear photographs or line drawings of practically every important component or instrument described. There need be no excuse now for anyone buying something from *Webb's* without having a clear mental picture of what it looks like.

The Quick Reference Valve Chart showing socket connections viewed from *both top and bottom* will prove of immense value to all users of American type valves.

Our firm advice is write to-day for your copy, but note the address—*Webb's Radio*, 14, Soho Street, London, W.1. The book will be sent free of charge, another instance of the enterprise of this go-ahead company.

What's NEW

Combined Radio and Television at 29 Gns.

" His Master's Voice " Model 904 Table Television at 29 gns. comprises a combined all-world 3-waveband (16·5–50, 200–570, 725–2,000 metres) 6-valve superhet receiver, and a television receiver of the superhet type giving a picture on a screen 4" × 4¾". Viewed from a short distance this picture has all the qualities as regards clarity and definition that have made " H.M.V." High Definition Television famous. Several

persons may comfortably view the screen and the whole receiver is compactly mounted in a walnut finished cabinet of the table type. This set may be obtained on hire purchase at the rate of 6/4 a week. Thus " His Master's Voice " have brought Radio-Television within the reach of all.

. . .

Push Button Automatic Tuning

Seven models of the total new season's " H.M.V." range of 35 Radio Receivers and Radiograms have the new " H.M.V." Push Button Tuning. Two different forms of this are offered. On the Model 657 (illustrated), a 6-valve superhet receiver at 17½ guineas, covering four wavebands (13–30, 30–90, 195–570, 725–2,000 metres) eight push buttons are provided together with one which enables the tuning unit to be operated manually. Other features include a fluid-light visual-tuning indicator and a large tuning

control of the finger-spin type, coupled to a vertical pointer moving across a large rectangular scale on which wavelength calibrations, station names and alphabetical short wave station indicators appear. The figured walnut cabinet is a very attractive piece of furniture.

. . .

New Hyper-sensitive Pick-up on Radiograms

An amazing new " H.M.V." pick-up discovery which lends a new beauty to the reproduction of records is fitted as standard to the new " His Master's Voice " Radiograms, and to new editions of existing models, viz., 801, 660 and 582. By its exceeding lightness of touch on the record, the new pick-up considerably extends record life, and the "H.M.V." Silent Stylus needle used in connection with it is of chrome plated steel, giving frictionless contact with the record. You

will be amazed when you hear this new device. It is, of course, exclusive to " His Master's Voice " radiograms.

. . .

AC/DC Receiver for 105/255 Volts

Six instruments in the " His Master's Voice " range are operative from either AC or DC mains. They are particularly useful for districts supplied with DC mains, and especially for those DC areas where change over to AC mains is likely to take place in the near future. They comprise two table models at 11½ and 14½ guineas, and four radiograms from 21 gns. to 35 gns.

Model 456 AC/DC model at 14½ guineas, which we illustrate, is a six-valve all-world superhet, covering wavebands 16·5–52, 197–570 and 725–2,000 metres, and enclosed in a most attractive walnut cabinet.

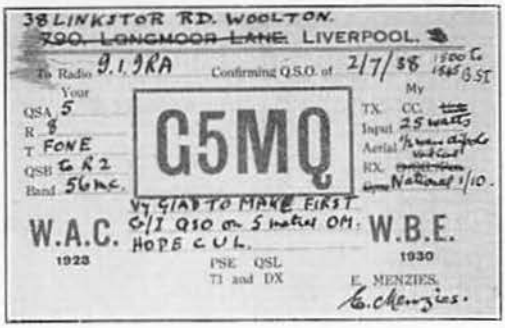
. . .

and many other new features of the same technical excellence — the product of the largest and finest-equipped Radio Factories in the world, and of 40 YEARS' SOUND EXPERIENCE

Five Metres Yields to Persuasion!

By G. A. MASSEY* (GW6YQ).

Being a Record of the First G-I 56 Mc. QSO



JULY 2, 1938, marked the passing of yet another milestone on the road of 56 Mc. communication—a weary road, travelled by many, with its end always seemingly just beyond the horizon. Its very perverseness doubtless provides the incentive to persist in one's endeavours, so that it is heartening to recall that at last something worthwhile has been achieved in the matter of 56 Mc. DX.

While there is little reason to doubt that a number of 56 Mc. contacts, each over distances approximating to 1,000 miles, have, from time to time, been made, it is not definitely known that any distance greater than 125 miles has previously been covered by European Amateur two-way communication. This latter was effected by GW6AA and G2DC, both working as portable stations with self-excited transmitters and super-regenerative receivers. Parenthetically, it may be here interpolated that figures quoted relative to distances represent mileages measured one way only, in a straight line, between two stations. They are not, therefore, directly comparable (without the incorporation of the appropriate multiplier) with the figures deduced by some claimants, whose system would seem to involve measurement of the return journey.

This lamentable state of affairs was abruptly terminated, and previous conceptions of DX convincingly shattered by G5MQ, of Liverpool, and the Italian station I1IRA located in Northern Italy. For very sound reasons, it is not politic to divulge this station's identity in detail. Without the assistance of any prearranged schedule, these stations maintained unbroken QSO from 15.00-16.00 B.S.T. on frequencies within the 56 Mc. band. Signals from both stations peaked at S7 with fading to S5, the Italian and G5MQ both using MCW and 'phone. The measured distance between them is rather more than 800 miles.

It is, therefore, of interest to consider the gear used in the effecting of this historical QSO. At G5MQ, the transmitter is controlled by a 7,010 kc. crystal. A 6A6 is used as oscillator and first frequency doubler, followed by two straight frequency doubling stages, each employing 6L6 valves, resulting in a drive on 56,080 kc. The plate voltage on all these stages is 300 volts, screen voltage for the 6L6s being obtained from a divider across the supply. The latter voltage is considerably higher than that normally recommended, being actually 250 volts. The P.A. is a T55 *Taylor* tube, neutralized in the usual manner, and with a plate voltage of 500 volts. Incidentally it may be noted that for certain experiments quite disassociated from Amateur Radio, an identical transmitter has been run for long periods with the final plate voltage increased to 1,100 volts.

The modulator unit comprises an MH4 speech amplifier driving an MHL4, which is transformer coupled to two PX25As in push-pull, Class A. The microphone is fed into the MH4 on speech, or replaced by the output of a small valve audio-oscillator for MCW operation. The station is situated in country which has a mean altitude of 250 ft. above sea level, and reasonably in the clear. To the critical observer it would appear to have no especial qualifications such as to particularly commend it as an ideal location for the pursuit of 56 Mc. work.

Considerable experiment in aerial systems for use on ultra-high frequencies has resulted in the conclusion that the simplest system is likely to prove the most effective for general amateur use at the present time. While the efficiency of certain well-designed beam arrays is beyond dispute, their usefulness would seem to be limited only to certain specific purposes. The aerial used for both transmission and reception comprised nothing more complicated than a vertical dipole, suspended at a height of 30 ft. above ground, and centre-fed by a twin tightly-twisted feeder made from 3 mm. rubber-covered flex. The resulting feeder impedance approximates to 80 ohms, while its length is 60 ft. Feeder lengths up to 150 ft. have been used at G5MQ, with only negligible reduction in aerial current. It is a point of interest that this aerial system gives a comparatively weak signal at short ranges, but is the only system on which any European signals have been heard.

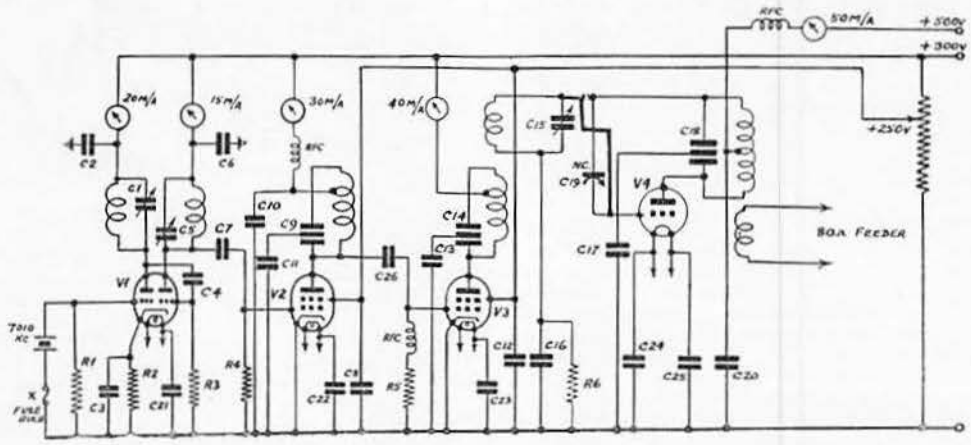
The transmitter layout differs in no way from that accepted as standard practice on the lower

---

* *Based on information supplied by G5MQ, and with the assistance of a personal knowledge of his station.*

frequencies, except that great care has been taken to treat each stage, complete with its associated by-passing capacities, as an individual unit. All return leads are brought directly to the cathode pin of the appropriate valve, and each stage has been adjusted for maximum output before the addition of a subsequent stage. In this connection it is to be noted that it is possible to use too high an inductance value in the F.D. tank circuits, while the superiority of the 6L6 over the 6L6G as a frequency doubler is very marked. A super-regenerative *National* 1/10 completes the receiving equipment, and has proved an eminently efficient

The Italian station I1TKM has previously been heard at G5MQ for a brief period, when his signals suddenly peaked to S7 and as suddenly vanished. In addition, at 20.30 B.S.T., July 2, 1938, following upon his QSO with I1IRA, a station signing the prefix HB was heard, but was fading too rapidly to permit of his being identified. On July 7 another Italian 'phone station was heard speaking rapidly in his own language, and obviously in communication with another station, but repeated calls from G5MQ failed to attract his attention. It is known also that I1TKM has been logged on two occasions by GW2NF on a super-regenerative receiver. A

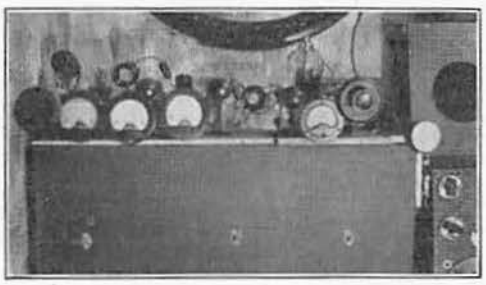


The Transmitter used by G5MQ for his European record 56 Mc. Contact with Italy.

C1, 5, 15		20 μμF.
C9, 14		20 μμF series gap.
C18	...	10 μμF series gap.
C4, 7, 26		100 μμF
C19	...	10 μμF.
		All other condensers .01 μF.
R1	...	25,000 ohms 1 watt.
R2	...	400 ohms 5 watt.
R3	...	50,000 ohms 1 watt.
R4, 5		100,000 ohms, 1 watt.
R6	...	10,000 ohms, 10 watt.
x	...	150 mA. fuse bulb to prevent excessive crystal excitation.
V1	...	6A6.
V2, 3	...	6L6.
V4	...	T20 or T55.

and satisfactory performer on the weakest of signals.

While all details of the equipment used at I1IRA are not as yet available, such information as is to hand indicates that he also was using a vertical dipole erected in a garret. A long-lines oscillator provided the drive to two *Taylor* T20 valves running at 130 watts input, with tone and speech modulation. Coincidentally, a home-built replica of the *National* 1/10 receiver was in use at this station for reception.



A view of the 56 Mc. equipment in use at G5MQ

feature of the erratic appearances of these DX signals is the tremendous QSA they attain for short periods, so that failure to hear them would appear to be an impossibility on the crudest of super-regenerative receivers.

In acclaiming this fine example of Amateur achievement, which, it is anticipated will be the precursor of still greater DX, it remains only to be recorded that this contact has been confirmed by letter and cards exchanged in a manner such as to exclude any possibility of a hoax, and its authententicity is endorsed by The Secretary, R.S.G.B.

One cannot but be moved by the wealth of information which has been published appertaining to the construction of C.W. transmitters and straight receivers, and that their very existence as highly refined products of the technician cannot be questioned. That they have, or are likely to have, any marked value as forming, in conjunction, a practicable means of 56 Mc. communication, has yet to be demonstrated.

A.R.R.L. QSO Party

Mr. Robert Jardine (G6QX) has won the award for Europe in the first A.R.R.L. QSO party held on January 8 and 9, 1938.

The award consists of a black and silver call-sign brooch, button-hole type. Congrats., Bob!

The B.E.R.U. Contests, 1938

XZ2DY-G2LB-2AOU, THE WINNERS

ON a previous occasion we have lamented the fact that the results of the ever popular B.E.R.U. Contest cannot be made known immediately after it has finished, whilst interest is still maintained at concert pitch, but such a desirable condition is impossible. This year the Awards Committee have devoted many hours to the checking and cross-checking of entries and the results of their findings are given in the tables and information which follow.

The support given to the B.E.R.U. Contests—particularly the Senior event—is always much higher than the entries indicate, due, it is believed, to the inherent reluctance of many amateurs to fill in a printed form. Whilst the total number of entries is a little down on 1937 we can trace no desire for a curtailment of the Contest, but the Council of the R.S.G.B. are alive to the fact that the concentration at week-ends during February is not entirely satisfactory.

As a result of correspondence with interested members it will probably be decided, for 1939, to run the two transmitting events concurrently over a nine days' period commencing at midnight on a Friday and concluding on the following Sunday week. It is appreciated that if this arrangement is made a limiting factor of x hours must be stated. The present view is that 75 hours would be a reasonable maximum operating period. The Junior award under this scheme would go to the member scoring the highest number of points with a power of 25 watts or less.

Council are also to consider opening the Contest to all British Empire amateurs irrespective of the fact that they may not be members of an Honorary Affiliated B.E.R.U. Society. In such an event the trophies would only be eligible to members but certificates would be awarded to the leaders irrespective of membership or otherwise in R.S.G.B.

The Technical Aspect

The present Contest will probably be remembered especially for the fact that for the first time Beam aerial systems really came into their own. Most of the leaders erected some form of directive array, or when omni-directional aerials were used special care was taken in matching the aerial to the final amplifier.

The technical advances which have been made almost universally can to a great extent be attributed to Contests. British Empire amateurs, no less than their American cousins, have been quick to realise the importance of stabilised transmissions directed to given parts of the globe.

On the reception side progress has been no less rapid. Almost every competitor in this year's B.E.R.U. Contest employed a highly selective receiver, many of them, it is sad to reflect, being of foreign origin.

The critics of B.E.R.U. or for that matter any International DX Contest, would do well to remember that if it had not been for the institution of such tests progress in the development of transmitters and receivers would have been slower.

Throughout the world to-day can be found amateur built stations which are being operated with the precision and efficiency of commercial counter-parts. Rapid band changing has been brought to a fine art, whilst the overall performance of the gear has improved by leaps and bounds.

Off-Frequency Operation

Off-frequency operation more than anything else leads to discontent in Contests because a station who wilfully or accidentally operates outside the specified amateur bands is placing himself in an unfair advantage. We are well aware that in isolated parts of the Empire off-frequency operation *can* be accidental, but in the British Isles and Dominions where facilities are at hand to check crystals and frequency meters there should be no reason for even one transmission taking place out of the bands.

At the conclusion of this Contest the Council were very concerned to find that several overseas stations had been reported off-frequency, but in view of the fact that the Society has no control over the operating arrangements at such stations it has been decided for this year to accept their entries.

Certain British Isles stations were also reported off-frequency and five have been disqualified. Disqualifications did not take place unless an official notification had been received from the G.P.O., or at least two Society observers had given a report.

One or two British Isles members who had been reported off-frequency by the Band Monitoring Group withheld their entries.

British Isles stations heard in the "buffer widths" were not disqualified on this occasion, but a general warning is now given that this tolerance will probably not be shown in future.

Incomplete Entries

In accordance with Rule 11 several entries were disqualified because the forms had not been completely filled in. The Awards Committee have repeatedly drawn attention to this matter in past reports.

The Senior Event

Having thus generalised it is appropriate at this stage to raise a cheer for the leader in the Senior Contest.

Burma springs the big surprise of the year by producing for the first time a Trophy Winner. To Mr. F. J. Mustill, XZ2DY, located at Maymyo, goes the honour of placing his country on the amateur radio map, for with a score of 951 points he held a commanding lead over his nearest rival, Mr. W. R. Hamilton, ZL4DQ, of Dunedin.

Mr. Mustill had 90 odd contacts in 15 zones, scoring "maximums" with Great Britain and Eastern Australia.

The runner-up had nearly 150 contacts, but unlike the winner he continued to work Australians and British Isles stations long after he had made his 15th contact with each of those zones, in fact his log shows 54 VK contacts and 43 with G, GI, GM and GW. Mr. Hamilton worked 17 zones.

Mr. Henwick, ZT2Q, of Port Elizabeth, filled the third place with a score of 870 gathered from just over 100 contacts with stations in 19 zones. A contact with ZB1H which would have given him 20 zones was not confirmed.

TABLE 1.—SENIOR TRANSMITTING CONTEST.

Position.	Name.	Call.	Input Power in Watts.	Points.
1	F. J. Mustill	XZ2DY	120	951
2	W. R. Hamilton*	ZL4DQ	100	882
3	R. G. Henwick*	ZT2Q	50	870
4	W. F. Meyer	ZU6P	50	812
5	R. J. Beatson	VK4BB	80	797
6	Miss M. MacKenzie	VK4YL	50	784
7	J. G. McIntosh	VU2LJ	10/12	756
8	F. Charman	G6CJ	50	749
9	A. D. Gay	G6NF	150/200	744
10	W. A. Wilson*	ZL2CI	100	717
11	J. MacIntosh	VS1AA	95/100	716
12	G. Brown	G5BJ	240	709
13	H. J. Buckley*	ZS5U	48	692
14	J. Mead	VK6LJ	65	685
15	F. W. Garnett	G6XL	50/100	683
16	W. B. Stirling	GM6RV	40/50	682
17	L. M. Mellars	ZL1AR	95/100	654
18	R. F. Cohen*	VK2TF	150	619
19	G. E. King	ZE1JF	50	617
20	G. B. Butler*	ZL2FA	100	597

* Non-Member, R.S.G.B.

TABLE 2.—JUNIOR TRANSMITTING CONTEST.

Position.	Name.	Call.	Input Power in Watts.	Points.
1	T. Martin	G2LB	25	880
2	F. Charman	G6CJ	25	827
3	K. Rudkin*	VK2DG	24.7	810
4	R. J. Beatson	VK4BB	25	761
5	J. S. Nicholson	VU2JP	20	734
6	C. J. McClelland	G6AG	25	672
7	C. B. Dowden	VE1HK	25	658
8	W. B. Stirling	GM6RV	22–25	632
9	F. H. Cooper	G2QT	25	624
10	L. A. Deane	VK5LD	20–25	605
11	J. H. Emmerson	G8HA	10	570
12	M. H. Meyers*	VK2VN	25	549
13	A. Tibbits	VP2AT	25	548
14	A. R. Gilding	VU2EO	10	547
	A. H. Ridley	ZE1JV	25	547
16	E. R. Cook	ZT6AQ	25	540
17	R. W. Rogers	G6YR	25	535
18	H. W. McNeill	VO3X	15	472
19	V. de Robillard	VQ8AF	25	454
20	W. H. Tittley	ZT5V	25	442

* Non-Member, R.S.G.B.

TABLE 3.—RECEIVING CONTEST.

Position.	Name.	Call.	Points.
1	M. G. Bourke	2AOU	1,075
2	E. W. Trebilcock	BERS195	1,000
3	R. J. Lee	BRS1173	979
4	P. Seymour	2AZX	963
5	I. C. Fletcher	BRS2908	951

South Africa provided the fourth leader in the person of Mr. W. F. Meyer, ZU6P, of Johannesburg. His score of 813 was obtained from 91 contacts in 17 zones.

Australia take the 5th and 6th positions, Mr. R. J. Beatson, VK4BB, leading Miss Madeline MacKenzie, VK4YL, by a mere 13 points. Mr. J. G. McIntosh, VU2LJ, of Assam, finished 7th with 756 points, whilst the 8th position was taken by Mr. F. Charman, G6CJ, who with a total of 749 just succeeded in depriving our Vice-President, Mr. A. D. Gay, of the Colonel Thomas Trophy. G6NF had extremely bad luck; one of his contacts (that with VP9BF) being disallowed by the judges. Incidentally, only five points separated the two English leaders after their scores had been re-adjusted.

Last position in "the upper ten" was filled by Mr. W. A. Wilson, ZL2CI, of Wellington, with a score of 717.

VE3WA had a score of 864, but in accordance with Rule 11 his entry was disqualified.

The position of the first 20 stations in the Senior Contest are set out in Table 1; the following is a list of all other accepted entries in order of merit with their scores:—

21, W. R. Sheward, ZS1AN, 596; *22*, L. A. Deane, VK5LD, 590; *23*, A. Tibbits, VP2AT, 589; *24*, S. R. McDowell, VU2FV, 584; *25*, J. Regnaud, VQ8AA, 582; *26*, E. R. Cook, ZT6AQ, 575; *27*, F. H. Cooper, G2QT, 558; *28*, A. R. Gilding, VU2EO, 540; *29*, C. B. Dowden, VE1HK, 539; *30*, D. C. Dunn*, VK2EG, 532; *31*, A. C. Freeman*, VK2AS, 528; *32*, E. M. Gauci, ZB1H, 518; *33*, M. Chitty, G5IU, 516; *34*, W. S. Pennel*, ZS1Z, 514; *35*, D. A. Richardson, ZS1B, 493; *36*, C. C. Newman, ZB1J, 480; *37*, R. E. M. de la Pole, VS7RP, 478; *38*, A. H. Ridley, ZE1JV, 462; *39*, A. G. Lapworth, G6DL, 451; *40*, S. Comach*, VE2EE, 435; *41*, J. W. Mathews, G6LL, 415; *42*, D. D. Marshall, G22MA, 413; *43*, G. M. Salt*, ZL1CK, 411; *44*, H. Biltcliffe, G5HB, 410; *45*, C. Roach, VE1EA, 401; *45*, E. J. Lake*, VK4EL, 401; *47*, N. I. Bower, G5HZ, 387; *48*, W. H. Tittley, ZT5V, 382; *49*, R. A. Bartlett, G6RB, 379; *50*, M. Brooke, VE5QP, 374; *51*, J. Lees, G2IO, 352; *52*, T. D. O'Farrell*, EI6F, 347; *53*, W. G. Ryan, VK2TI, 343; *54*, F. T. Hine*, VK2QL, 335; *55*, S. W. Thorpe, ZS1AH, 331; *56* D. H. Duff*, VK2EO 327; *57*, R. O. Davidson, ZS4D, 320; *58*, A. G. Fowler, GM8SV, 318; *59*, R. D. Carter*, VE3QD, 306; *60*, A. E. Walz*, VK4AW, 304; *60*, E. R. Radford, G2IM, 304; *62*, L. H. Wood*, ZL1CU, 278; *63*, J. Wyllie, GM5YG, 297; *64*, H. D. Ackling*, VK2PX, 291; *65*, A. R. Stansfield, VO4Y, 289; *66*, R. H. Rowe*, ZL3GR, 288; *67*, R. Campbell*, VK4RC, 286; *68*, J. S. Nicholson, VU2JP, 282; *69*, H. Bushell*, VK2AHG, 277; *70*, R. B. Wood, ZU6V, 272; *71*, J. C. Foster, GM2JF, 267; *72*, R. L. Cunningham, VE1AS, 258; *73*, V. de Robillard, VQ8AF, 254; *74*, R. W. Bailey, G2QB, 248; *75*, R. J. Gratton, G6GN, 245; *75*, E. G. Ingram, GM6IZ, 245; *77*, E. A. Donovan*, EI2M, 232; *78*, A. Reid, GM5YN, 231; *79*, J. Davies, G2OA, 193; *80*, J. Fairley, G2IX, 174; *81*, G. H. Scarfe, ZU5D, 167; *82*, H. A. M. Whyte, G6WY, 161; *83*, P. L. Lowth, VQ2PL, 158; *84*, H. C. Turner, G5OJ, 147; *85*, C. A. Butler, G2YB, 144; *86*, R. F. Galea, ZB1E, 137; *87*, J. H. Fraser*, VK2AFJ, 120; *88*, J. Lunt, ZT1Q, 119; *89*, S. C. Pleass, ZT6K, 119; *89*, F. Clow*, VE2KA, 119; *91*, W. T. Pickard, G8KP, 118; *92*, A. S. Grant*, VE1EP, 116; *93*, F. J. Skiffington*, VO1M, 107; *94*, C. T. Malkin, G5IV, 103; *95*, L. F. Viney, G2VD, 102; *96*, G. P. Anderson, G2QY, 101; *97*, D. R. Aston, G8DR, 99; *98*, H. B. Elliott*, VE2KS, 83; *99*, J. Romanchuk*, VE4ABC, 59; *100*, L. F. Woodhams, G8RL, 29; *101*, G. M. Reston, GM8CH, 15.

* Denotes non-member of R.S.G.B.

The Junior Event

For the second year in succession the Junior Contest has been won by a British Isles entrant—Mr. T. Martin, G2LB, of Birmingham; G2LB worked 74 stations in 16 zones, all on 14 Mc., and reached the very high total of 880 points. His achievement is all the more praiseworthy because he missed nearly three hours at the beginning of the first week-end and about eight hours during the night of the second week-end. An input of 25 watts was used with a ½-wave Windom running North and South, or a full wave Zepp running East and West.

Last year Mr. Martin was placed fourth, six points behind Mr. F. Charman, G6CJ, of Stoke Poges—this year the "Aerial Wizard" finished second with a score of 827. G6CJ worked 69 stations in 16 zones. Six of his contacts were on 28 Mc., the remainder being on 14 Mc. Unlike G2LB, who contacted six EI stations, G6CJ "neglected" these contacts but recorded nine with India. He employed an input of 25 watts and an even more extensive aerial system than the one used in 1937, one addition being a Rhombic for VK, VU, etc.

Close behind the successful British leaders came Mr. K. Rudkin, VK2DG, of Abermain, New South Wales, another entrant who confined his activities to the 14 Mc. band. His total of 810 points was obtained from 77 contacts (including 21 G's) in 17 zones. An input of just under 25 watts was used in conjunction with a 132 ft. Zepp.

After a fairly wide gap comes Mr. R. J. Beatson, VK4BB, who scored 761 points to take fourth place by working 65 stations in 16 zones, two contacts were on 28 Mc. His input was 25 watts and the aerial two full waves in phase.

After holding the Junior Trophy in 1935 and 1936, Mr. J. S. Nicholson, VU2JP, of Travancore, S. India, now takes the fifth place for the second year in succession, with a score of 734, obtained from 73 contacts in 17 zones. He worked 16 G and 28 VK stations using an input of 20 watts and had two Zepps coupled together to form a beam.

Sixth place is taken by Mr. C. J. McClelland, G6AG, of Bexleyheath, Kent, with a score of 672 from 53 contacts in 13 zones. His input was 25 watts from a pair of T55's in push-pull.

A Canadian entrant, Mr. C. B. Dowden, VE1HK, of Halifax, occupies the seventh position with a score of 658. He worked 83 stations in 13 zones and 43 G's were grateful to him for contacts. Mr. W. B. Stirling, GM6RV, was eighth with 632 points from 16 zones; Mr. F. H. Cooper, G2QT, ninth with 624; and Mr. L. A. Deane, VK5LD, tenth with 605 points. Mr. Cooper's log shows that he worked VU2FV on 7, 14 and 28 Mc., a notable achievement for both participants.

The positions of the first 20 stations in the Junior event are set out in Table 2; the following

is a list of all other accepted entrants in order of merit with their scores :—

21, F. J. Lubach, VK4RF, 437 ; *22*, G. M. Salt*, ZL1CK, 433 ; *23*, O. A. F. Spindler, VU7FY, 431 ; *24*, S. L. Hill, G8KS, 430 ; *25*, E. G. Ingram, GM6IZ, 408 ; *26*, S. R. McDowell, VU2FV, 401 ; *26*, S. W. P. Henton, G5VU, 401 ; *28*, W. S. Pennel*, ZS1Z, 391 ; *29*, R. D. Carter,* VE3QD, 387 ; *30*, A. H. MacKenzie, VK4GK, 386 ; *31*, J. N. Shearme, G2SH, 382 ; *32*, F. B. English, G6AZ, 367 ; *33*, A. J. Wyle*, VK6BW, 364 ; *33*, J. Fairley, G2IX, 364 ; *35*, C. C. Newman, ZB1J, 355 ; *35*, R. E. M. de la Pole, VS7RP, 355 ; *37*, D. W. Milne, GM6BM, 354 ; *38*, E. A. Donovan*, EI2M, 348 ; *39*, A. Reid, GM5YN, 336 ; *40*, C. E. Roach, VE1EA, 334 ; *41*, A. Eburne, G2DK, 320 ; *42*, H. G. Newland, G5ND, 317 ; *43*, G. Henderson, G8JV, 304 ; *44*, H. J. Chater, G2LU, 303 ; *45*, R. Campbell*, VK4RC, 285 ; *46*, H. Mee, G5MY, 266 ; *46*, C. A. H. Goudie, G8VC, 266 ; *48*, R. H. Rowe*, ZL3GR, 261 ; *48*, A. G. Fowler, GM8SV, 261 ; *50*, A. A. Hammond, G6AH, 253 ; *51*, W. Sullivan, GI6XS, 247 ; *52*, J. M. Kirk G6ZO 245 ; *53* R. W. Parfitt, G8MY, 244 ; *54*, D. Hunter, VP1AA, 236 ; *55*, R. B. Wood, ZU6V, 235 ; *56*, H. A. Gratton, G6GN, 228 ; *57*, H. B. Lambert, G8QL, 227 ; *58*, L. F. Viney, G2VD, 224 ; *59*, A. Garnock-Jones, G8TJ, 216 ; *60*, F. McAinsh, GM8MN, 215 ; *61*, R. L. Cunningham, VE1AS, 211 ; *62*, J. Mead, VK6LJ, 204 ; *63*, G. P. Anderson, G2QY, 201 ; *64*, E. S. Holden, VO1H, 198 ; *65*, R. F. Galea, ZB1E, 195 ; *66*, J. Foster, GM2JF, 178 ; *67*, P. L. Lowth, VQ2PL, 167 ; *68*, H. J. Hunt, G5HH, 150 ; *69*, H. D. Ackling*, VK2PX, 144 ; *70*, M. Brooke, VE5QP, 142 ; *71*, C. T. Malkin, G5IV, 118 ; *72*, J. H. Fraser*, VK2AFJ, 117 ; *73*, Dr. J. Lunt, ZT1Q, 114 ; *74*, L. F. S. Parker, G5LP, 113 ; *75*, S. C. Pleass, ZT6K, 109 ; *76* J. B. Kershaw, G2WV, 105 ; *77*, J. F. Stalley, G8IS, 103 ; *78*, A. E. Walz* VK4AW, 101 ; *79*, D. M. J. Tyre, GM5TY, 88 ; *80*, G. Edwards, G2UX, 87 ; *81*, J. Troy, GM8RJ, 75 ; *82* J. H. Payton, G2JB, 74 ; *83*, P. C. Mortimore, G8KI, 73 ; *84* N. P. Haskins G8JR, 72 ; *85*, R. Frew, GM8FR, 60 ; *85*, E. C. Ilott, G2JK, 60 ; *85*, S. A. C. Howell, G5FN, 60 ; *88*, H. O. Sills, G8QZ, 59 ; *89*, H. de L. Banting, G3BQ, 44 ; *90*, L. M. Mellars, ZL1AR, 15 ; *90*, J. K. Tutton*, VK3ZC, 15.

* Denotes non-member of R.S.G.B.

The Receiving Event

Although fewer stations took part than last year, the difference in score between the highest and lowest entrant has been considerably reduced, which points to the contest being keener. Further, it would seem that the rules give a fair basis upon which to judge merit.

Most of the leading stations in last year's contest appear at the top of the list again, but considerable change in position has occurred.

Mr. M. G. Bourke, 2AOU, the winner, took the palm out of the hand of Mr. E. W. Trebilcock, the 1936 and 1937 winner, by scoring 1,075 points—75 contacts between stations in 20 zones.

Mr. E. W. Trebilcock, BERS195, fills the second place, having recorded 100 contacts in 18 zones, scoring 1,000 points, against 124 contacts in 24 zones last year. It is interesting to note that Mr. Bourke recorded only 65 contacts in 22 zones during the 1937 contest.

Mr. R. J. Lee, BRS1173, who held fifth position last year, moves up to take third place, with a score of 979 points from 79 contacts in 18 zones. Mr. Lee missed second place by recording a contact by VP9BF, thus losing 51 points.

Mr. P. Seymour, 2AZX, who was seventh in 1937, now occupies the fourth place, with a score of 963 points—63 contacts in 17 zones. Mr. I. C. Fletcher, BRS2908, a newcomer to these contests, returned a log which gave him fifth place, with a score of 951—51 contacts in 18 zones. He would have been placed third if a 'phone station intercepted had given a regular report.

Unfortunately entries from L. J. Goupland, BRS3154, H. S. Brown, BERS265, and J. C. Barron, 2DJO, had to be disqualified under Rule 11, but their scores would not have altered the position of the leading competitors.

The positions of the first five stations in the Reception Contest are set out in Table 3 ; the following is a list of all other accepted entrants in order of merit, with their scores :—

6, W. L. Ely, BRS1535, 938 ; *7*, T. Rae, BRS2730, 912 ; *8*, B. Farleigh, BRS2339, 888 ; *9*, I. D. McDermid, BRS2689, 882 ; *10*, H. J. Houlding, BRS720, 871 ; *11*, T. L. Fletcher, BRS2763, 857 ; *12*, A. Leese, 2ATI, 847 ; *13*, J. Schefer, 2AUV, 841 ; *14*, J. A. Porter, BRS2722, 831 ; *15*, R. J. H. Baldwin, 2CBL, 823 ; *16*, E. Wake, 2CZQ, 791 ; *17*, H. J. Barlow, 2BCX, 786 ; *18*, G. A. Hook, 2CIL, 784 ; *19*, W. H. G. Metcalfe, BERS209, 734 ; *20*, O. M. Derrick, 2AJP, 732 ; *21*, K. M. Fraser, 2DIT, 687 ; *22*, E. H. Godfrey, 2CPL, 686 ; *23*, K. J. Grimes, BRS2649, 683 ; *24*, W. F. Miller, 2AAH, 678 ; *25*, D. Barlow, BRS2503, 674 ; *26*, W. A. Cowan, 2AIW, 632 ; *27*, F. Macfarlane, 2CRQ, 626 ; *28*, C. J. Harrington, BRS2292, 573 ; *29*, A. G. Dunn, 2AGK, 463 ; *30*, J. A. Hay, BRS1948, 306.

The Zone Winners

In accordance with the rules, Zone awards will be issued to the following :—

SENIOR CONTEST

Zone.	*Winner.*	*Call.*
Australia, VK2, 3, 4, 7, 8	R. J. Beatson	VK4BB
British Isles	F. Charman	G6CJ
Canada, VE1 and 2	C. B. Dowden	VE1HK
India	J. G. McIntosh	VU2LJ
Malta	E. M. Gauci	ZB1H
New Zealand, ZL1 and 2	W. A. Wilson	ZL2CI
Rhodesia	G. E. King	ZE1JF
South Africa, ZS, ZT, ZU, 1 and 2	R. G. Henwick	ZT2Q
South Africa, ZS, ZT, ZU, 4, 5 & 6	W. F. Meyer	ZU6P

JUNIOR CONTEST

Zone.	*Winner.*	*Call.*
Australia, VK2, 3, 4, 7, 8	K. Rudkin	VK2DG
Do. VK5, 6	L. A. Deane	VK5LD
British Isles	T. Martin	G2LB
Canada, VE1 and 2	C. B. Dowden	VE1HK
India, VU	J. S. Nicholson	VU2JP
South Africa, ZS, ZT, ZU4, 5, 6	E. R. Cook	ZT6AQ

RECEIVING CONTEST.

No Zone awards are made in connection with this event as the leading British Isles competitors (the only Zone with three or more entrants) will automatically receive certificates of merit.

Check Logs

The Awards Committee were pleased to receive check logs from the undermentioned who are cordially thanked for their co-operation.

It is hoped that in future years many of these amateurs will enter as competitors :—

H. Hodgens, E15F ; C. J. Greenaway, G2LC ; A. O. Milne, G2MI ; J. Davies, G2OA ; M. Geddes, G2SO ; P. R. Solder, G5FA ; R. W. Rogers, G6YR ; P. C. Mortimore, G8KI ; J. Troy, GM8RJ ; G. C. Allen, BRS250 ; A. E. W. Street, VE1EK ; L. D. Gadonry, VE2HG ; S. B. Trainer, VE3GT ; V. Williams, VE3KT ; B. W. Naylor, VE5BI ; F. J. Stirk, VK2ABC ; J. P. Vesper, VK2PV ; R. B. Jones, VK3BG ; A. Reiman, VK5JO ; L. S. Cotton, VK5LG ; G. W. Luxon, VK5RX ; A. H. Heath, VK5ZX ; T. Arnold, VU2AN ; G. Merriman, VS6AH ; G. E. King, ZE1JF ; N. Walding, ZL1FT ; H. M. Wilson, ZS1BF ; G. A. Clinton, ZS5AH ; N. W. Croeser, ZS6EJ ; H. H. Bridgman, ZT1Z.

General Comments

Although conditions were not quite so good as in 1937 the general opinion expressed by competitors was that the first week-end of the Senior was fair for the time of year, with the second week-end poorer in comparison.

It is of interest to note that no less than eleven zones were represented in the first 20 Senior entries, whilst only four of the 1937 leaders appear in the Table of Merit. This shuffling round is good for everyone concerned and tends to increase interest each year.

It was gratifying to notice that many of the leaders made full use of the prevailing good conditions on 28 Mc., whilst 7 Mc. provided several good DX contacts, an outstanding achievement was that of VU2FV, who worked 13 British Isles stations on that frequency, receiving an average report of S6.

Another feature of the Contest was the number of unusual zones active—VP2, 4, 7, VQ2, 3, VR4, XZ and ZS3 all showing up in the logs.

Space does not permit a detailed description being given of the gear used at the leading stations, but it is of interest to record that Mr. Mustill employed a transmitter based on the 1935 Olympia equipment, whilst his receiver was similar to the single signal superhet described by Mr. G. G. Samson, ex ZL4AI, in the April, 1936, T. & R. BULLETIN.

Many competitors were kind enough to forward comments, criticisms and suggestions for future guidance.

An outstanding criticism which has frequently been recorded in past years concerned the inability of foreign amateurs to respect "Test B.E.R.U." calls. Considerable difficulty arose in this connection, particularly from U.S.A. stations.

Mr. Mustill forwarded some interesting suggestions in regard to scoring methods. He also mentioned that the band was only open for about two hours for G contacts, but during that time he was called by many dozens.

Most of the VU entrants complained about poor conditions. VU2FV considers that those operating close to the edge of a band should call less times and sign more frequently. He also suggests that more points be given for 28 Mc. contacts.

VO4Y attributed his higher score to greater VE participation, but as the records show very few of the Canadian stations heard active sent in an entry.

Potted Comments

"Thank you very much for a jolly fine show."—ZT2Q. "Conditions were the worst that I have known them to be for many years—GM6RV only station heard."—VU2FY. "My appreciations to the organisers."—G2QT. "I still do not think the VE stations support the contest as they should. Conditions were quite good for VE1, 2, 3, 4."—GM6RV. "Give B.E.R.U. contests more publicity in foreign journals. This might help to relieve unnecessary QRM due to Test B.E.R.U. calls being answered by stations outside the British Empire."—GM8SV. "This is my fourth consecutive attempt to get a place amongst the first 50."—VO4Y.

Conclusions

It is regretted that several scores in all sections of the Contest had to be reduced through entrants guessing at reports. It has been noticed that errors often occur when the incoming signal is weak.

The Awards Committee were also very reluctant to disqualify entrants who had failed to comply with Rule 11.

The almost complete absence of entries from the South Island of New Zealand was noted with surprise, for in past years Dunedin and Christchurch have been keen centres of B.E.R.U. Contest interest. It would be interesting to learn why enthusiasm has fallen off.

The Council and Awards Committee extend sympathies to those overseas entrants who were deprived of a hard-earned Zone Certificate through the failure of their colleagues to enter. It will be remembered that no Zone awards are issued unless three entries are received from a specific zone.

The thanks of the organisers are extended to all who contributed to the success of the Contest.

Calls Heard

Eric Trebilcock (*BERS*195), *Powell Creek, North Australia* :—

1938 N.F.D., 7 Mc. : g5msp, 6vdp.

14 Mc. : ei8mp, g2iop, 2jyp, 2oip, 2xap, 5anp, 5aop, 5jzp, 5rip, 5ukp, 5vmp, 6cjp, 6ghp, 6gmp, 6wap, gi5qxp, gm6izp, 6kop, 6msp, 8rvp, hb1x.

June 1-19, 1938, 7 Mc. C.W. : g2ta, 2nj, 3ad, 3hk, 3ih, 3jx, 6jk, 6qo, 6uw, 8dg, 8lu, 8na, 8nd, 8ub, ve4afi, 4alu, 5aad, 5lk, 5ul.

14 Mc., phone : g2cg, 6by.

14 Mc. C.W. : g2dh, 2hd, 2nn, 3gx, 5uf, 6dp, 6wy, 6vd, 8fc, 8pv, 8px, 8ui, gm5wt, 6hz, 8fb, ei6g.

Reports Wanted

GM3NI would appreciate reports on his 7,172 and 14,344 kc. C.W. signals. All reports will be acknowledged.

G2QY (London, N.W.7) is now crystal controlled on 56,200, 57,520 and 58,304 kc. Normally 56,200 kc. will be used. Reports should state times as aerial tests are being conducted. All will be acknowledged.

'Ware Pirate

Mr. Regnaud, VQ8AA, of Mauritius, informs us that his call sign has been extensively pirated in recent months. He will not be on the air until August next.

Experimental Section

By A. M. H. Fergus (G2ZC).

General

ALL members of the Society, especially those in R.E.S., will have read with keen interest Mr. E. J. Williams' article in the July issue entitled "Sunspots, Magnetic Storms and Radio Conditions." Few will deny that this fascinating subject opens up many matters for consideration, not the least of which is the necessity for keeping a properly kept log. Although specifically required by the G.P.O., few amateurs seem to be capable of maintaining anything except the merest shadow of a complete record of their observations. It is not to be expected that every amateur has the inclination or the ability to compile comprehensive data on his own account, but it is obvious that data giving *detailed* comparative results over *regular* intervals, on fixed or known signals, will provide information of possible value.

For instance, fading or similar phenomenon on regular schedules could be noted, as also could erratic behaviour of known stations, both amateur or commercial. It should be pointed out that a report of a random observation cannot contain data of value, save in the chance case of a complete fade-out, magnetic storm, or some such unusual occurrence; therefore care should be taken to avoid disjointed reports.

It is over such matters as these that the whole of the active members of the R.S.G.B. can find a means of delving into a problem common to all and as yet unsolved, and such investigations can arouse interest, which in itself will give all the means of sharing their investigations with others, for the general benefit of Science.

A careful study of the article in question opens up a wide field for experimental work, and while at present few of us could claim to be in the position of solving even some of the problems, working on our own, all of us can lend our aid in collecting and supplying data, which, when compiled, may add to the store of knowledge already gained. Many problems suggest themselves if we extract points from the article, and these must be obvious to any who give the matter serious thought.

Why, for instance, should sunspots at or near the sun's equator give more effect than those not so situated? Is this due to a better reflective agency or to a better angle of propagation, and in any case, what are sunspots? We have two very conflicting theories, which are more for the astronomer to solve than for the man interested in wireless, but these two theories alone open up a field of investigation as to the pros and cons of all phenomena following sunspot activity, and have to be examined in relation to radio conditions.

Sometimes amateurs are at a loss as to what problems there are to examine—here surely is a very wide field of research about which, as yet, very little is known.

We have heard much about "11 year cycles," "Lunar Tides," "Sunspots," "Auroral Displays," "Magnetic Storms," etc., and much thought (and ink) has been expended, but are we any nearer finding a true solution? This is not intended to imply pessimism nor destructive criticism, but these words are written with the object of arousing interest in both theory and practice, as every single member of the R.S.G.B. who is active, can at least contribute something towards helping to solve some of the problems confronting us. To show how limited is our knowledge, at present, it might be mentioned that a theory is being "nibbled" at on both sides of the Atlantic that the sun itself is acting as a reflector only. This is mentioned merely to show how far we still are from the word "finis," even over solar matters, and it would also appear that lunar tides are not the reason for laughter that they were when suggested a few years ago. We must remember that what science said yesterday is often disproved to-day—will our "to-day" hold good to-morrow? Full investigation may give an answer, and that is one task facing some of the R.E.S. Propagation Groups; therefore every step further in assisting them may also assist Science. Who can say what lies ahead?

Membership

An appeal is made to individual members, who can afford the time and who are willing to work, to transfer to group membership. This applies to all sections.

Convention

The Experimental Section Manager and the Group Managers all hope to be in attendance at Convention, not only for the purpose of meeting R.E.S. members, but of attending to any points that may arise.

Receiver Group

Mr. H. R. Heap (G5HF), of 404, Victoria Avenue East, New Moston, Manchester, 10, has been appointed Group Manager in place of 2BIB, whose resignation was announced in the July Bulletin.

Propagation Group

Nine groups have now been formed and all are active. It is hoped that group formation will be completed in time for a full statement to appear in the next issue.

Barometric Group.

Results to date show that 7 Mc. propagation between Britain and the Western Mediterranean is best when the pressure gradient is zero. When a number of isobars intervene, conditions are very poor.

56 Mc. Group.

The letter budget circulating in July contains magnetic, sunspot, critical frequency and meteorological data, in addition to members' reports on conditions during June. 2AAH sends interesting graphs showing the hourly variations of signal strength of G2XC, and G6PK discusses the mechanism of 56 Mc. DX. A study of meteorological conditions, on days when signals from distances of the order of 50 miles or so are extra strong, is suggested.

Auroral Group.

BRS3227 has been investigating the effect of sunspots on night static. He finds that the graph

of the number of sunspots closely follows the one of the night static, and further study of the subject is to be undertaken by the group.

Magnetic Group.

G8DA reports fadeouts on June 12 and July 10. These are referred to later in these notes.

3.5/1.7 *Mc.Group.*

The "hissing" phenomenon was heard by G5JL on 1.7 Mc. on June 12; it is believed that this is the first time it has been heard on this band. Reports on conditions on all bands on June 30 are required.

28 *Mc. Group "A"*

G2YL heard the "hiss" a number of times on June 18. G6QZ reports that U.H.F. conditions were exceptionally good on June 12, the date of a fadeout on the lower frequency bands! W1IED was heard by 2AZX at the extraordinary hour of 0720 B.S.T.

28 *Mc. Group "B"*

G8MH heard the "hiss" and noticed a partial fadeout on 7 Mc. on July 2, a day on which U.H.F. conditions were very good and an English/Italian contact was made on 56 Mc. BRS25 mentions that the signals from G stations, situated from 25 to 300 miles distant, sometimes heard during the summer months, appear to be totally different in character from those frequently heard during the winter months. The former are usually strong and clean, whereas the latter usually sound very attenuated and often have echoes and flutter. (Summer signals reflected from E layer while winter signals go round the world? G.M.)

Recent Fadeouts

On June 10 and July 2 the "hissing" phenomenon was heard by a number of members and fadeouts were reported, yet the reports of others show that U.H.F. conditions were exceptionally good on these days. This point will be investigated further by the appropriate groups.

A severe fadeout took place on July 10. The "hiss" was heard several times during the morning. At 12.22 it started again and there was a complete absence of signals from 56 Mc. to 1.6 Mc. The medium wave-band did not seem to be affected. The "hiss" could be tuned to a maximum strength at 15 Mc. As has been reported in previous fades, the higher frequencies recovered first. 15 Mc. was back to normal by about 12.40, but 7 Mc. was still affected at 13.00 G.M.T. There was a magnetic storm on that day but details regarding its severity are not yet to hand.

Cosmic Notes

The following notes are a summary of solar and magnetic activity during the period June 25 to July 24.

Sunspots

Sunspot activity was very strong during most of this period. Several large groups crossed the sun's central meridian during the period June 30 to July 3. A large spot crossed the meridian on July 6, and a large group followed on the 9th and 10th, while a much larger group was observed with C.M.P., July 15. In the case of a group of spots, the date of C.M.P. is for the centre of the group. On several days Tokio Observatory reported more than 300 individual spots visible.

This is probably the most suitable place to draw attention to a small error of terminology in the article on sunspots and magnetic storms in the July BULLETIN. The word "equator" on page 29 is used in every case to indicate the line on the sun's disc bisecting the central meridian at right-angles. The sun's equator is, of course, not necessarily this line. On page 64 the word "equator" is used with its correct meaning.

Magnetic Conditions

With the exception of the 3rd, the magnetic elements were generally slightly disturbed during the first six days of July. The disturbed conditions started on June 30. The disturbance reached moderate intensity during July 1, the early morning of July 2, and again on July 4, when the maximum intensity was experienced between 20.00 and 22.00 G.M.T. A moderate disturbance of horizontal intensity began at 19.54 G.M.T. on the 9th and continued through the 10th, all the elements being disturbed on the latter day. Another disturbed period began on July 13 with an intensity which was slight until 08.04, when irregular oscillations of moderate intensity were experienced. This continued through July 14 and 15, with varying intensity, and at 17.00 both horizontal and vertical intensities of the earth's field became disturbed. The disturbance ended at 07.00 G.M.T. on July 17. A slight disturbance was recorded on the 19th and 20th.

G2XC.

[*Editorial Note.*—Members are asked to forward a stamped and addressed envelope when writing to Mr. E. J. Williams, G2XC, for Cosmic data or other relevant information.]

Barometric Observations on 7 Mc. Signals

By J. H. Cant * (G6FU)

DOES barometric pressure influence the propagation and/or reception of radio waves?

The writer has been studying this subject in a practical manner for the past 3½ years, and has often felt certain that as a result of his observations this definitely was the case. Then totally contradictory findings sent him along a different path of investigation in an endeavour to solve this interesting problem.

In the initial observations use was made of the Air Ministry Daily Weather Maps of the Northern Hemisphere. These maps show the isobaric lines and a wealth of other informative data.

At times it was found that a number of stations contacted could all be assumed to be actually located along one of the isobaric lines, although the path of the line was far from being a straight one; in fact, it frequently passed through several countries in quite an erratic fashion and extended many hundreds of miles. On other occasions this was not the case.

Another interesting point noted was that when London was encircled by an isobar and far away in, say, the Ukraine district of U.S.S.R., an isobar of identical pressure was encircling a town there, two-way contact was effected. Whilst this condition

* Member R.E.S. Propagation Group.

THE AMATEUR RADIO HANDBOOK

THE FIRST BRITISH PUBLICATION OF ITS KIND

WRITTEN BY MANY OF THE LEADING AMATEURS OF GREAT BRITAIN, THIS NEW PUBLICATION WILL FULFIL THE REQUIREMENTS OF ALL WHO WISH TO BUILD AND OPERATE A MODERN AMATEUR STATION.

PRELIMINARY LIST OF CHAPTERS :

i. Amateur Radio.
ii. Fundamentals.
iii. Valves.
iv. Receivers.
v. Radio Transmitters.
vi. Modulation and Keying.
vii. Power Supply.
viii. Audio Equipment.
ix. Artificial Aerials.
x. Aerials.
xi. Prevention of Transmitter Interference.
xii. Ultra High Frequencies.
xiii. Ultra High-Frequency Equipment
xiv. Television.
xv. Frequency Measurement.
xvi. Measuring Instruments.
xvii. Station Planning.
xviii. Operating a Station.
xix. How to Become a Radio Amateur
xx. How to Obtain a Licence.
xxi. Useful Data and Formulae.
xxii. Selected References.
xxiii. The R.S.G.B. and the Radio Amateur.

Appendix :—Abacs and International Prefixes.

The Handbook will contain upwards of 220 pages printed on good quality paper with stiff covers, and the sections will be sewn to enable each page to be opened flat.

The price will be **2/6**, or by post **2/9** within the British Isles. Overseas selling price **3/6**. Quotations for bulk quantities.

Place your Order NOW

---------- CUT OUT ALONG THIS LINE ----------

To THE R.S.G.B. SALES DEPT.,
53, Victoria Street, London, S.W.1.

Please reserve me.....copy(ies) of THE AMATEUR RADIO HANDBOOK due to be published in November, 1938. I enclose P.O. for.....

Name .....

Address .....

.....

USE BLOCK LETTERS

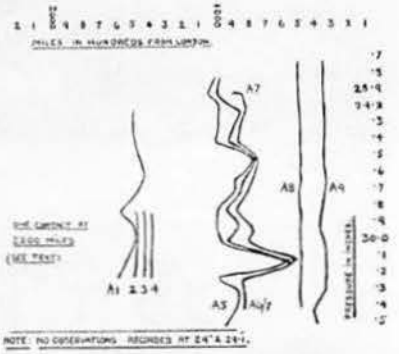
lasted, the Russian station was consistently heard for several days, so once again a diverging line of thought arose.

After many months work it seemed that some other system must be adopted in order to obtain more concrete results. It was therefore decided to dispense with the maps and to rely upon direct measurements at station G6FU.

At the outset various difficulties became apparent, one being the problem of making a graph when so many "points" were probable for some "districts," and which would produce such a complex "lightning-like" batch of curves as to make it impossible to detect any outstanding peculiarities which might become evident.

It was decided that the only practical system would be to prepare a "Zone Chart" (*i.e.*, a list of all countries which might be contacted) and to give each one of them a definite pre-determined mileage factor. Thus any Polish station contacted automatically becomes "factor 975 miles" regardless of its location; any Swiss station "factor 500 miles"; any Algerian station factor 1,000 miles," and so on.

These factors were determined in the case of small states or countries by their approximate geographical centre. In the case of large countries different methods had to be employed to compute the desired factor. For instance, amateur activity in certain countries is more concentrated, in one-half or perhaps a third of the territory than elsewhere, thus the odds are strongly in favour of a contact being made in that section and not in the other part of the country.



Graph showing relationship between Signals Zone and Pressure and Transmission Mileage to Pressure

Taking this as a basis, and also bearing in mind probable skip effects, the charts of actual stations contacted throughout Europe and prepared in the past by the writer (in 1936) * very considerably narrowed down the *area* in which the "zone factor" was *assumed to be located* in each individual country.

The most valuable point in adopting the system of a "mileage zone" for each country is that the resultant "curves" obtained *must obviously bear a definite form*. Thus it may be assumed that the values of the curves are actually greater than might at first be supposed, assuming obvious errors in compiling the "zone factor" which necessarily must be present.

However, the resultant curves in the Chart of Observation (made between 1936 and 1938) which accompanies this article give much food for thought, and it must be admitted that the actual "area of reception," "district," or "zone," is consistent in form.

The following points should be noted when studying the "curves" obtained and the Chart in general:—

The right-hand side shows the pressure in inches, taken in steps of .1 inches.

The curves left to right A1 to A9 record signals at the pressure shown in the right-hand column, their mileage from London being found top left to right figures.

Note that although A8 and A9 appear as semi-straight lines, it does not mean that signals form a straight line! It records that at the pressures shown, viz., 28.7" to 30.5", the zone of contacting stations was 350 and 500 miles respectively.

None of the lines in any way indicate *direction, but distance only*.

The more one studies the curves, the more they seem to hold good; note, for instance, the cut-off, at 29.2 and 30.2 at 1,500 miles.

The peaking forward effect at 29.8 also seems *very* marked at all distances.

The tendency to dip backwards (loss in range) is also very pronounced about 29.5 to 30.1.

These are but a few of the possible points of interest brought about through the compilation of this Chart, though how to explain them, their direct causes, whether they are the result of the effects of pressure or otherwise, it is extremely difficult to determine. The recorded skip effects are also worthy of notice.

It does appear, however, that the "zones" from which signals are emanating is consistent, and the writer feels that a more concentrated effort along similar lines to those adopted by him might result in further interesting data coming to light.

It is hoped that this short article will encourage more members to carry out detailed observations and eventually bring forward their results so that fresh knowledge will become available on this most interesting subject.

* A detailed list of the 'zone factors' employed by the writer is not given, as it must be understood that these are only applicable in his case, and any member wishing to carry out similar kinds of observations must compute his own figures according to the known performance of his own station (see text on 'zone factors').

A SIMPLE L.F. OSCILLATOR FOR MORSE CODE—(*Continued from page* 104).

varied by tapping down the H.T. battery. If further variation in the note is desired this may be done by trying different capacities across the transformer primary in the place of the .005μF. stated. This value, in practice, gives pleasing results and it should not be, normally, necessary to alter the value.

The best method for learning the Code is to construct two complete oscillators and instal them in different rooms with headphones and keys wired to each room. In this manner two people can carry out communication without being together: this, in itself, is a great aid to learning.

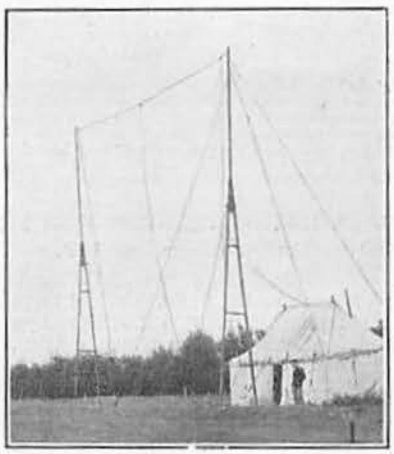
NATIONAL FIELD

1

2

3

4



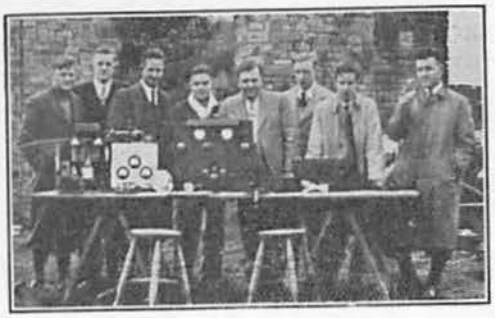
5

6

1. G6PRP. Stoke Poges, Bucks.
3. G2AIP. Mill Hill, Middlesex.
5. G6GHP. Baumber, Lincolnshire.

2. G5UMP. Welwyn Heath, Herts.
4. G2WSP, Matlock, Derbyshire.
6. G6CJP, Stoke Poges, Bucks.

DAY 1938



7

8

9

10

11

12

7. G5VDP. Huddersfield, Yorkshire.
9. EI9D. Sligo, Eire.
11. G5KMP. Barnsley, Yorkshire.

8. G5MSP. St. Annes-on-Sea, Lancs.
10. G6AKP. North Thoresby, Lincs.
12. GI5QX. Portaferry, Co. Down.

Cosmic Data

By J. C. Elmer,* A.C.G.I., D.I.C. (G2GD).*

AT last a long-felt want is satisfied. Beginning with this issue we hope to publish monthly a table of Cosmic Data, recording the daily observations of magnetic disturbances, solar phenomena, information regarding the Kennelly-Heaviside layers, etc. We are enabled to do this by the courtesy of "Science Service," of America, who supply Bulletins each week (through the post) of the daily recordings from stations all over the world. The writer, when Manager of the R.E.S. Propagation Groups, always felt the handicap from lack of adequate information, and it is hoped that this service will be appreciated. If so, and as information grows in detail, we may in the future be allowed to occupy more space in this Journal; but in any case, we hope to publish next month the data for June and July, after which there should only be a time lag of two months (e.g., August data appearing in the October issue).

Explanation

Magnetic. The intensity of a field may be measured in gammas, where 100,000 gammas = 1 C.G.S. Unit. The intensity of the earth's horizontal field is normally about .18 C.G.S. units, 18,000 gammas, in London.

Average Magnetic Character. These figures are based on the reports from the magnetic observatories of the U.S. Coast and Geodetic Survey located at Cheltenham, Maryland; Tucson, Arizona; Sitka, Alaska; Honolulu, Hawaii; and San Juan, Puerto Rico; and from the magnetic observatories of the Department of Terrestrial Magnetism located at Watheroo, Western Australia, and Huancayo, Peru.

Each observatory rates the magnetic activity of each half-day with the character-figure 0.0, 0.5, 1.0, 1.5, or 2.0; 2.0 signifying the greatest degree of magnetic disturbance and 0.0 signifying the least degree of or no magnetic disturbance. The mean value for the reporting observatories is given in the report.

Solar. This information includes the number of groups of spots and the total number of spots observed at Mount Wilson and Tokyo. From Meudon, France, comes information relating to the activity of sunspots, the calcium and hydrogen faculæ, protuberances appearing on the sun's disc, and protuberances observed externally on the edge. In addition is given the quadrant of the sun on which the principal spots are visible, together with the number of days they are distant from the Central Meridian.

In passing it may be of interest to note that the current theories hold that the Aurora and high-frequency fade-outs may be due to slow moving positively charged particles, whereas the low frequency or Dellinger fade-out may be due to radiation at the speed of light from the bright hydrogen eruptions.

Kennelly-Heaviside Layers. The height from which vertical reflection is received is tabulated against the frequency of the wave emitted for Wednesdays every week at approximately 17.00 G.M.T. The frequency is given in kilocycles per second, and the height in kilometres. The height of reflection is measured as the frequency is raised, until no reflected wave is received.

* Assistant Manager R.E.S.

COSMIC DATA

DE-CODED BY J. C. ELMER, A.C.G.I., D.I.C. (G2GD).

MAY, 1938. ALL TIMES G.M.T.

Day	MAGNETIC			SOLAR										KENNELLY-HEAVISIDE LAYERS									
										MEUDON, FRANCE.				Bureau of Standards, Washington at 17.00.									
				Mount Wilson.		Tokyo, Japan.		Sunspots.						May 4.		May 11.		May 18.		May 25.			
	Recorded at Cheltenham, U.S.A.	Average Mag. Character. h. h. h. h. 0 to 12 12 - 24	Recorded at Kakioka, Japan.	Number of G'ps.	Number of Spots.	Number of G'ps.	Number of Spots.	Activity.	Quadrant.	Days from C.M.	Calcium Hydrogen Facular Activity.	Protuberances on Disc. Activity.	Protuberances Externally. Activity.	Frequency kc/s.	Hght. km.	Frequency kc/s.	Hght. km.	Frequency kc/s.	Hght. km.	Frequency kc.s.	Hght. km.		
1	Quiet until 18.40, then slightly disturbed.	0.0 0.2	Calm	—	—	10	119	Strong.	S.E.	2	Fairly strong.	Medium	Fairly strong.	2500	120	2500	120	2500	120	2500	110		
2	Quiet, slightly disturbed.	0.3 0.1	Rather calm.	—	—	13	124	Strong.	S.E.	1	Fairly strong.	Medium	Medium	3600	130	3500	130	3500	130	3500	130		
3	Quiet, slightly disturbed.	0.4 0.5	Rather calm.	10	20	—	—	Strong	S.W.	0	Fairly strong.	Medium	Fairly strong.	3700	—	3900	170	3750	160	3800	160		
4	Slightly disturbed until 09.10, then moderate irregular oscillations.	0.8 1.1	Slight disturbance.	13	80	—	—	Fairly strong.	S.W.	1	Strong	Fairly strong.	Strong	3850	280	3980	270	3800	260	3850	—		
														4100	240	4200	220	4200	210	3900	230		
5	Moderately disturbed until end of oscillations at 06.00, then slightly disturbed.	0.5 0.6	Rather calm.	12	40	—	—	Fairly strong.			Strong	Fairly strong.	Medium	4300	240	4800	230	4600	240	4400	150		
														4600	260	5200	280	4800	310	4400	230		
6	Slightly disturbed until 18.00, then quiet.	0.4 0.3	Rather calm.	10	55	—	—	Fairly strong.			Fairly strong.	Fairly strong.	Feeble	4800	370	5400	340	5000	520	5400	360		
7	Quiet.	0.0 0.0	Calm.	15	75	—	—	Fairly strong.			Fairly strong.	Fairly strong.	Medium	5000	730	5800	390	5200	390	5600	380		
8	Quiet.	0.0 0.1	Calm.	15	80	—	—	Strong			Strong	Fairly strong.	Feeble	5200	630	6200	320	5800	350	6200	350		
9	Quiet until 21.00, then slightly disturbed.	0.0 0.4	Calm.	16	85	41	111	Strong	S.E.	1	Strong	Fairly strong.	Feeble	5600	560	7000	350	6400	380	7000	360		

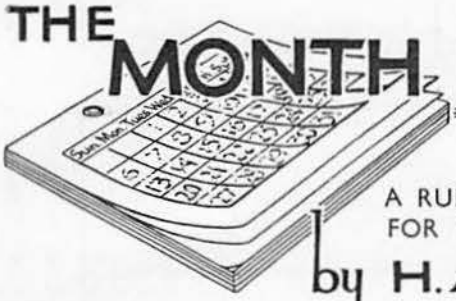
10	Quiet.	0.4	0.1	Calm.	12	60	13	127	Strong	S.W.	0	Fairly strong.	Fairly strong.	Feeble	6000	650	7800	370	6800	400	7800	390
11	Very disturbed day. Irregular oscillations. Storm 15.55. *	0.4	1.9	Storm of rather sudden cm'c'mt.	11	85	12	197	Strong	S.W.	1	Strong	Strong	Feeble	6200	600	8600	390	6800	500	7800	550
															6600	570	8600	460	7400	450	8200	440
12	Greatly disturbed till 00.30, then moderately disturbed, irregular oscillations.	1.7	1.0	Slight disturbance.	11	75	12	100	Strong	S.W.	2	Strong	Fairly strong.	Feeble	7000	680	9000	450	7400	680	8600	610
																	9000	500				
13	Moderately disturbed, irregular oscillations until 02.00, then quiet.	0.4	0.0	Calm.	11	80	12	138	—	—	—	—	—	—	7200	—	9400	460	7800	490	8800	—
																	9400	640	8200	680		
14	Slightly disturbed till 09.49, irregular oscillations, then moderately disturbed.	0.9	1.1	Slight disburbance.	13	85	12	12	Strong			Fairly strong.	Fairly strong.	Feeble			9800	500	8400	—		
																	10200	680				
15	Moderately disturbed, irregular oscillations till 06.00, then slightly disturbed.	1.0	0.5	Rather calm.	11	65	11	136	—	—	—	—	—	—			10400	—				
16	Slightly disturbed till 03.50, then moderately disturbed, irregular oscillations.	0.6	0.4	Rather calm.	—	—	—	—	—	—	—	—	—	—								
17	Moderately disturbed, irregular oscillations till 09.00, then slightly disturbed.	0.5	0.5	Rather calm.	—	—	—	—	—	—	—	—	—	—								
18	Quiet.	0.3	0.0	Calm.	9	40	—	—	Fairly strong.			Fairly strong.	Fairly strong.	None								
19	Quiet.	0.0	0.0	Calm.	—	—	—	—	—	—	—	—	—	—								
20	Quiet.	0.0	0.0	Calm.	10	50	8	139	Strong			Fairly strong.	Fairly strong.	Fairly strong.								
21	Quiet.	0.4	0.1	Rather calm.	9	60	—	—	—	—	—	—	—	—								
21	Quiet.	0.0	0.1	Calm.	12	75	—	—	—	—	—	—	—	—								
23	Quiet.	0.0	0.1	Calm.	13	125	—	—	Fairly strong.			Fairly strong.	Fairly strong.	Feeble								
24	Quiet till 10.10, then slightly disturbed, irregular oscillations till 21.00.†	0.1	0.8	Rather calm.	10	190	11	210	Fairly strong.	‡		Fairly strong.	Fairly strong.	Medium								
25	Declination and vertical intensity quiet, but horizontal intensity very slightly disturbed.	0.7	0.4	Rather calm.	12	125	—	—	—	—	—	—	—	—								
26	Quiet.	0.1	0.1	Calm	—	—	13	158	Fairly strong.	S.W.	3	Strong	Fairly strong.	Medium								
27	Quiet.	0.0	0.2	Calm.	11	90	11	127	Fairly strong.	S.W.	4	—	Medium	—								
28	Slightly disturbed.	0.7	0.8	Slight disturbance.	8	60	—	—	Fairly strong.	S.W.	5	Fairly strong.	Fairly strong.	Fairly strong.								
29	Slightly disturbed till 06.00, then moderately disturbed irregular oscillations till 24.00.	1.0	1.0	Slight disturbance.	10	60	9	89	Fairly strong.	S.W.	6	Fairly strong.	Fairly strong.	Fairly strong.								
30	Slightly disturbed.	0.3	0.3	Slight disturbance.	9	45	8	84	Medium			Fairly strong.	Fairly strong.	Feeble								
31	Quiet.	0.1	0.0	Rather calm.	8	65	9	85	Feeble			Medium	Fairly strong.	Medium								

* Mag. May 11. Slightly disturbed until 15.55, then greatly disturbed. Storm was characterized by high values of horizontal intensity. Ranges were about 1¼ degrees in declination, 800 gammas in vertical intensity, and more than 700 gammas in horizontal intensity.

† Mag. May 24. After 21.00 horizontal intensity only disturbed till 24.00, with a range of about 115 gammas.

‡ Chromosphere eruption, C.M. 07.11 to 08.42.

THE MONTH ON THE AIR



A RUNNING COMMENTARY OF RADIO CONDITIONS FOR THE MONTH OF . . . . . JULY, 1938

by H.A.M. WHYTE (G6WY.)

THE sport of chasing new countries is gaining a larger and larger number of faithful adherents each month, which brings us to two points. Firstly, the necessity for stations in "rare" localities to work as many other stations as possible, with short QSO's and much lost sleep; and, secondly, the necessity for QSL'ing all contacts. Although we are in favour of "rag chewing," it is sometimes selfish to hold an unusual DX station for longer than is necessary, especially when it is known that the whole band is waiting *impatiently* for a contact. We very rarely call a "rare" station again after working him, unless there is a message of importance for him; for one thing we should probably be robbing someone of a new country, and for another, the "rare" station may only be in that country for a limited period of time.

We have begun like this because we have received an interesting letter from HB9CE. He claims that he cannot raise ZC6AQ even though he uses a beam in that direction, and he feels quite sure that ZC6AQ *must* have heard some of his hundreds of calls. We prefer to believe that such a condition could not happen in the DX amateur world, *i.e.*, that a station will not reply to calls from a country he has already worked. We feel sure that the very next time ZC6AQ hears HB9CE he will give him that coveted contact, and similarly we feel sure that any station, situated as is ZC6AQ, in a country where amateurs are as scarce as the proverbial "hens teeth," will give all and sundry a new country when they are heard to call.

HB9CE has kindly offered to act as the *exclusive* QSL bureau for LZ1ID. Send your cards to F. A. Bech, Badenerstrasse 68, Zurich, and he will forward them under cover. LZ1ID will recommence operations at the beginning of August, and it is hoped that HB9CE can induce him to be on the air as much as possible. You will remember that this station is in Sofia, Bulgaria. HB9CE has now worked 83 countries in exactly a year, which would appear to be almost a record. HB9J, the well-known Swiss DX station, requires information on the best method of obtaining a card from VR6AY. For QSO's with that station, we have no definite information, but believe cards will be sent by W1BES on request. HB9J also requires the QRA of VP3AA, which is: L. C. Fonseca, 33 Robb Street, Georgetown. HB9J reports a contact with FG8AB, 14,430 T7 in Guadeloupe, who asked him to await his card, so we hope this station will prove genuine.

We have to thank ZD4AB for giving many of us a new country; he is regularly active at 17.00-19.00 G.M.T. on 14,340 kc. and uses a Harvey UHX-10 transmitter and a 67-ft. single wire-fed aerial. In the first week's operation he contacted 35 countries, and to quote from his letter, "I must say it's fine to be a DX station and have everybody after me instead of laboriously hunting round the band for stations to call"—you're telling us! G2MI kindly agreed to get 1,000 cards printed for him, so do not become impatient if your card is a little delayed: he intends to QSL everybody. During a QSO with F8RJ, the latter suggested to ZD4AB that a new "Q" sign should be used denoting, "You are my first ZD4—pse QSL"—"QZD4," it certainly makes less QRM! Incidentally, ON4AU submitted a card from the Gold Coast for his B.E.R.T.A. claim: the call was VPD, we believe, for a contact in 1936. Cards for ZD4AB should be sent to T. F. Hall, Engineering Department, Post Office, Accra, Gold Coast, B.W.A. ZD4AA comes on occasionally on 'phone to help to make this country a little easier for the telephony amateurs.

And now we have some news of ZD2H, ever active on 14,300. He confirms that he will QSL all reports *if they are of value*, and will be in Lagos until the end of 1939. He is endeavouring to co-ordinate all amateurs in British West Africa and to act as a QSL forwarding agency; send your cards for him to A. Tomlinson, Posts and Telegraphs, Lagos, Nigeria.

A welcome letter arrived from our long silent friend D. Paterson (FN1C) in Chandernagore, French India. We should begin to hear his signals again at the beginning of August on his old frequency of 14,200 or on his new, and better, one of 14,084. His new transmitter will use an RK20 with 1,250 volts on the plate, fed into a beam directed on the British Isles. As he is dead keen to make himself useful, we have no doubt that many of us will assist him in that direction! From Tibet we have received a most interesting letter from AC4YN, who tells us that he has been having a trying time endeavouring to erect a beam in a confined space, as the trees belonging to the Kunderling Monastery in Lhasa are in the way and, for some reason or other, the Lamas do not like having their trees cut down. Reg. Fox has been in the forbidden city of Lhasa for 18 months; very few other white men have been there as many weeks. The secret is that he is friendly with the Regent of Tibet and his Cabinet Ministers. He has been allowed to attend most of their ceremonies never before witnessed by white men, and has actually been given the privilege of taking photographs. He uses chop sticks when out to "dinner," eating shark's fins, sea slugs, dried raw meat and

about two dozen other dishes at one sitting. It's great to be a ham, isn't it ? Listen for AC4YN on 14,106 kc.

From India we have news of VU2CR, who has now W.A.C. with 9 watts maximum input ; the last missing continent was S. America, and PY2GS obliged. VU2CR informs us that the Shanghai QSL bureau address is Box 685, therefore send all cards for XU8 to this address. He is trying hard to work as many new countries as possible and has added SV1RK, HB9CV and LA5B by using his new crystal on 14,380. He hopes to get his official call in a few weeks. Talking of India reminds us of the amazing signal heard every evening recently from VU2FZ (portable of VU2FV), using only 5 watts!

And now some news from Australia. We are informed that VK6LJ is willing to handle all cards for VK6, as the time taken to send them to the official W.I.A. bureau operated by VK3RJ and back to VK6 tends to delay the cards unnecessarily. Eric Trebilcock (BERS195), in Northern VK, is to be congratulated on hearing so many N.F.D. portables, including two on 7 Mc. All of these stations will receive his card. He has now reached the amazing total of 163 countries heard on CW and 62 on 'phone, of which 122 have QSL'd. On 7 Mc. he has heard such tit-bits as F7JDY, Box 81, Noumea, New Caledonia, and PK6XX on 'phone (14,009). The latter is an expedition call with W2BVB at the " mike " ; he says he has no QSL's, but requests cards to be sent to his home address and he will then answer them on his return. K7GLL, a YL operator, is again active at Kennecott, Alaska, as is K7FXJ at Five Fingers Lighthouse.

Who is ZK1AA, heard by 2BGN on July 24 in the American 'phone band at 22.25 G.M.T. on 'phone ? We believe that he is someone with a poor sense of humour.

2AOU is to be congratulated on bringing the B.E.R.U. receiving trophy back to G from Eric Trebilcock. He has now reached the 152 " countries heard " mark, having added ZD2H, 4AB, ZP6OJ 14,400 T7, and ZD9B 14,280 T9 (can anyone supply information about the latter station ?). QSL's have been received from VR2AF, VR6AY and VP4TI ; whilst other unusual calls heard included HH2MC (14,260), HH3C (14,270), TI2CAH (14,320), OQ5AS (14,310), PJ1BV (14,380) and VP9X (14,080), who is believed to be a pirate.

GM6JD informs us he wisely refrains from calling " test " on 14 Mc.—he was rewarded by working PK1RI (14,360) and LZ1ID. He also heard ZP6OJ and the usual DX already mentioned in previous issues of the BULLETIN. John Burtt (2DKQ), of Stroud, who sends a long list of DX, is 17, and listens mostly at Reading, where he is at school, with a 1-v-2 receiver. He had heard 141 countries, including CP1CC (14,130), HP1F (14,400), ZC4A (believed to be a pirate or ship), VK9DM (14,380), I7AA (active again on 14,375), OY4C (14,310), VR4AD (14,300), VR2FF (14,050) and UX1CN (14,400). He queries the QRA of YV2CU ; we believe he is in Curacao, but cards should be sent to G3BR. J9LL, heard on 14,390, gave his QRA as : C/o Radio Station JFK, Taihoku, Formosa. UX1CN is the call of a Russian survey expedition studying weather conditions on Rudolph I., Franz Joseph Land, and UX1CP is the second operator of the same station. 2DKQ heard W6GUW in Nevada, W9ZNV (Nebraska), W9YDG (S. Dakota) and W9WZQ (N. Dakota).

BRS3319, of Thurnby, Leics., reports TG5 in Guatemala City on July 23 ; cards should be sent to Box 12. Other DX heard includes TI2AV (who QSL's) and HC1BZ, both on 'phone. Talking of 'phone brings us to the tireless G6BW ; his latest " catches " include KA7EF, W6FUO (Nevada 14,215), HK1JC, HK3LC, CE3BH, PK1MX (also worked by G2MI and G5BQ), XE2IY, VS1AI and VP4TK. On 'phone, G6BW has worked 64 countries in 27 zones—a creditable performance. BRS3003, of Coulsdon, Surrey, has also heard ZK1AA this time on July 16 at 22.27 G.M.T. He reports hearing a new Tangier station, CN1AF, and HI6Q who has been giving a new country to the 'phone operators.

G2DH, who is seldom off the air these days, is really trying hard to make the DX Century Club. So far he has 88 cards from a total of 110 countries contacted. New ones worked during the month were ZS3F, VO6D, XZ2DY, LX1TW and VP9L, the last two on 'phone. He reports hearing VQ8AS in Chagos again, VP1JR, and EL5AA, who claims to be in Monrovia : he must be second cousin to YA5XX worked by G5AN ! By the way, TA1AA is still as much a mystery as ever. The card sent by G6WY to the address given in last month's BULLETIN has been returned " inconnu," but he still persists in giving this address. Mention of Turkey reminds us that there is now a Turkish listener who calls himself TA-Re-1, and is sending cards to British 'phones. G3JR is still doing wonders with his 6L6 and building up his country total rapidly. His most interesting contacts include PK3MP, TF5M, OQ5AS (QRA given as Demey, Tshikapa, Kasai; Bel. Congo) and VK6MU. He also heard ST2KH (we want to know if this station is genuine), K6PAH, EL2A, VP4TP, and HC5AF, whom he suspects as bogus. LZ1AA is active again, but we think this is another " funny man." New countries for G6KP (who has applied for membership of the DX Century Club) are ZD4AB, VP4TP, VQ2FJ and UX1CP.

SU3HC, the new call of the Heliopolis Radio Club, will use the old transmitter of SU2TW temporarily. SU1OT is a new station in Luxor. G5BD reports hearing eight K6's between 08.00-09.00 G.M.T., as well as PJ3CO (Curacao) on 14,375, PK5KF (HF 14), YN1AA (14,400), FY8AA (14,385), FM8AD (14,260) and W1OXDA on 14,260 'phone. G5CI tells us he worked TF2X on 7,200. QSL's should be sent *via* TF3C. G8UA worked TF3H in Reyjavik on 7 Mc. also, but TF3C informed G6ZO that the only known stations in Iceland were 3C, 2Z, 5C, 5M, 5F and 5CM, whereas the following are bogus : 2BX, 2X, 5B and 3P. G6ZO has received a QSL from HR1JR and has now worked 44 States of America. He asks if ST counts as an unrestricted Colonial area for B.E.R.T.A. claims. The answer is " Yes," as it is not ex-mandated territory. Unusual calls heard by G6ZO include SLBN, Swedish m/s. *Anita*, PX1A, and 2A, YV2CU, XOH1WW, XOH5NK, VGCX (being received at S8 at the same time by W6VX), ZZ2Z, XYR5BK (Campia Turz), CR5Q (obviously a pirate), ZP6OJ, HR7WC (14,030) and EA9AH on 'phone (14,000). We are told by G6ZO that OK3TW, who is on a visit to London, has actually seen a card and 'photo from TA1AA. We give it up !

BRS1986, of Wirral, has heard 110 countries and queries IN2Y heard with a T4 note. GM2UU was working OA4AI on 14 Mc. 'phone when the latter requested him to listen on 7 Mc. To GM2UU's surprise he received him at RS44 at 08.00 B.S.T. amidst the QRM of Sunday morning 'phones! G8HA reports working XSV1SM, a ship off Buenos Aires (QSL *via* LU2CW), VU2KK in Wana, Wazistan, and has received a card from J8CG. G8IC wants details of XSM7LK. G6VD has received a report from Wellington, N.Z., on his N.F.D. portable, G6VDP, when operating on 7 Mc. at 20.50 G.M.T. G5UG received some news from VE5AAD to the effect that K7FST is operating across the Bering Strait in Zone 19. Other DX worked at G5UG includes VP1AA (14,430), CE1AU, CX1CB (14,375), VP7NT (14,395), and heard VS2AS (14,380), ZD7A (14,415), VP8AR (14,430) (we want some more information of him), EL2A (14,300), VK9VG (14,100) and XU8CM. Ninety-eight countries have been worked.

G6GH, who has over 100 countries with 87 QSL's, also received a card from HRS1548 following his QSO with ZA3X! By the way, HRS1548 writes to say he knows nothing of ZA3X, but but would like to correspond with an English lady of about 30-35, as he wishes to better his knowledge of English. Interested ladies should write to Gustav Steiner, Sopron, Poda E.u.4, Hungary. BRS3213, of London, has been receiving weak W's on 3.9 Mc. 'phone and identified some calls. G5MV entirely agrees with G5HH about contributing towards the R.S.G.B.'s endeavours to obtain verifications from non-QSL'ing stations. He cites ZP2AC, CE7AA, FB8AG, but, strange to relate, G6WY has cards from all three!

The G3's must have their paragraph. G3BS was licensed on December 14, 1937, and had W.A.C. by January 29. Is this the first G3 W.A.C.? We regret that we reported G3DO as having received his W.A.C. certificate: we should have said W.B.E. G3GU is informed by G5RF that SU1SW does QSL! We know now, but another SU1SW used to operate unlicensed before the present station came on the air. G3BI was delighted to qualify for W.B.E. by working ZC6AQ and W.A.C. by working PY1AZ. He has worked two of the difficult Europeans, PX1A and LZ1ID. G3CY made his first QSO outside Europe with PY2KX—who QSL's!

"Roddy," of W1SZ, writes to say he is willing to supply DX information wherever possible for this page, and W8NKU, of Toledo, Ohio, is willing to send in news from his part of the world. Twenty-eight zones and 70 countries in two years is his record. I1IR heard FK6NW and W7BYW in Idaho. G5RF asks if anyone has received a card from U9 recently? The only U9's we know who have QSL'd are U9AY and U9AL; possibly there are others. G6QS now awaits two cards for his W.A.C. We wish him luck and apologise for calling him "Parker" when his name is Stanley Roberts.

* * *

In Search of B.E.R.T.A.

Call	Dominion Radio Districts	Colonies	Total
G5SR	24	15	39
G8IL	—	—	37
G6ZO	20	11	31
G8HA	22	8	30

The above are the calls and present scores of B.E.R.T.A. aspirants. Please send in the number of *confirmed* contacts. Only 30 or more will be listed.

A Simple L.F. Oscillator For Morse Code Practice

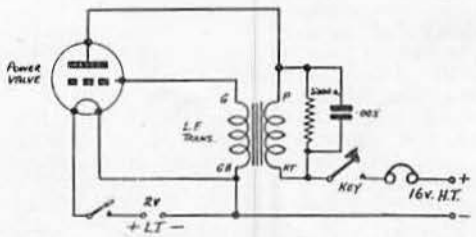
By James N. Roe (G2VV).

THOSE readers who spend a good deal of time listening to short-wave broadcast and amateur stations working on telephony must often envy their fellow enthusiasts who can read Morse Code. Perhaps they feel that learning the Code is beyond them, and with this idea in their mind decide not to worry about it.

With a little trouble and half-an-hour's practice a day the Morse Code can be mastered, and once learned will not be forgotten. The added pleasure it will bring in receiving DX stations, copying press messages, etc., will more than repay the time spent in mastering the Code.

The simple Morse Code Practice Oscillator described here is probably the best arrangement for those wishing to learn how to send and receive. It is to be preferred over the buzzer type of practice set for the reasons that the note emitted in the headphones is pleasing and of the type to be heard "on the air." It also has the advantage that only the person wearing the 'phones can hear the signals and the use of this oscillator does not annoy other members of the household who might complain when buzzer practice was taking place!

The essentials for making the oscillator are as follows:—1 baseboard about 6"×6"; 1 ebonite or bakelite terminal strip about 5" long and ¾" wide, drilled to take 8 2BA terminals; 1 baseboard mounting 4-pin valve holder; on-off switch for L.T.; 2 pieces of tubular ebonite or paxolin rod about 1" in length for supporting terminal strip; 1 L.F. transformer ratio about 5-1; 1 .005 μF. condenser; 1 5,000 ohm resistance; and 8 terminals. External accessories are: 1 2-volt power



valve, 16 v. grid bias battery (for use as H.T. supply), 2-volt accumulator, pair of headphones, and a Morse-sending key. A few lengths of flex will be required for connections to batteries, etc.

The wiring connections can be easily followed by reference to the diagram shown here.

Only 16 volts H.T. supply is required to give ample tone and strength, and the tone of the note may be

(*Continued on page* 95.)

Amateur Radio in Scotland

COMPILED BY D. MAXWELL TYRE (GM5TY).

At our invitation Mr. Maxwell Tyre has prepared a brief account of amateur radio activities north of the Border. On the eve of the Scottish Convention which takes place on September 17 in Glasgow, it is appropriate to record the outstanding progress which has been made in Scotland during the past thirteen years.—EDITOR.

IN the T. & R. BULLETIN dated December, 1925, under the heading "Organising," the following appeared :—"SCOTLAND.—No volunteers yet. Please send direct to Head Office." That appeal was indicative of a "wonderful optimism" at headquarters as at that time only some eight or nine transmitters existed in Scotland. These were : 2VX (Aberdeen), 6WG (Glasgow), 2MG (Glasgow), 5JD (Burntisland), 6JJ (Dingwall), 5BA (Berwick), 2JZ (Huntly), 5YG (Glasgow), and 2TF (Edinburgh). 6IZ followed almost immediately. Of these only "MG," "JZ" and "YG" were members of the Society and of all the transmitters mentioned, only "YG" and "WG" were associating, and every man was making a lone fight.

Shortly after this Mr. Jack Wyllie (5YG) volunteered to take over the difficult task of organising affairs in Scotland and so successfully did he act as propagandist that by June, 1926, the membership having grown considerably, he was co-opted on to the governing body, then known as the "T. & R. Committee."

In the July, 1926, issue of the BULLETIN, the first Scottish notes were published. By that time there were about thirty transmitters and about half that number of A.A. licence holders or listeners.

To facilitate management, the country was divided into three districts. No. 1 District consisted of the counties of Glasgow, Renfrew, Lanark, Dumbarton, Stirling, the Lothians and Berwick. This district was looked after personally by "YG" in addition to his work of overseeing the others. The transmitters in this district were 2BP, 5MG, 5YG, 6BQ, 6NX, 6WG, 2FV, 2TT, 5ST, 5YQ, 6YT, 2MG, 2BB, 2OA, 2TF, 5HC, 5IP, 6OW, 5BA, 2BQS. Of these only 5YG, 5ST, 2MG, 2TF (now 5OD) and 5BA remain with us as active amateurs.

No. 2 District, embracing the counties of Aberdeen, Fife, Moray, Ross and Cromarty, and Inverness, was in charge of Mr. J. Wood (5JD), of Burntisland. This district possessed the following transmitters :—2JZ, 2VX, 5JK, 6IZ, 6VO, 5JD, 6GQ, 6JJ, 6NV. Of these 2JZ (brother), 5JD, 6IZ and 6VO remain.

The counties of Forfar, Argyll and Clackmannan formed No. 3 District, which was under the care of Mr. Cross, of Muthil, Perthshire. The district had five transmitters, 5NW, 5SQ, 6GY, 6KO and 5WT. Of these 5NW, 6KO and 5WT remain.

The increase in the Scottish membership synchronised with the renewed growth of the society, for in the issue of THE BULLETIN for August, 1926, the Editor, Mr. Cooper, wrote :—

"In the meantime our membership steadily increases, thanks to the splendid work of Messrs. Jamblin, Hampson, Wyllie and Wright. The flat part of our membership curve, which rested for over a year, has long been past and new members come in about thirty per month, even in midsummer."

A "Secret Service" was active in Scotland, and as each new man started up, the emissaries of the society got after him right away until there were no transmitters outside the society.

Later, a new district, No. 4, was created, the chief of which was ultimately the late Geoffrey Gore (5DA). This district covered the Edinburgh area and the south-eastern counties of Scotland and held 2TF, 5IP, 5BA, 5DA, 6ZD and 5HC.

In September, 1926, the first R.S.G.B. Convention was held, at which Mr. Wyllie represented Scotland and made his report on the progress of affairs.

It was realised that Scottish matters could not adequately be served by correspondence alone and several Scots, resident in London, undertook to represent "YG" by proxy. Two of these gentlemen, G2WL and G5ST ably represented Scotland and were instrumental in presenting Scottish views to the Committee.

Another event around this time was the granting of Scotland's first individual prefix "GC," but, with the approach of the Washington Convention, it was cancelled by the G.P.O.

In June, 1927, the Society organised observations during a Solar Eclipse and of the six British Isles stations selected for the furnishing of signals for observation, Scotland supplied two in 6IZ and 5YG. (The other stations were G2NM, 2OD, 6WW and 2WJ.)

By this time, in No. 1 District, at least, the monthly meetings of G5YG had been commenced and were the forerunner of the regular meetings of to-day.

In January, 1928, the Joint Committee of the R.S.G.B. and the Wireless League founded their Register of Approved Traders to protect the public and, as Scottish area manager, 5YG undertook the examination of applicants.

In October, 1928, Scotland became District 14 under the re-organisation scheme of the society, but the submerging of Scottish identity was not at all acceptable. Steps were immediately taken to retain Scottish individuality. Not, however, until October, 1930, were these protestations successful when, through the good offices of the then Honorary Secretary, Mr. Clarricoats, Scotland ceased to be known as No. 14 District.

In February, 1931, on the institution of the Empire Link Station Scheme, Scotland, represented by 5YG and 6RG, became responsible for the West Indies. In June of that year, owing to reception difficulties from the West Indies, 5YG and 6RG were diverted to the Nigerian area.

With the greatly increased activity by January,

1932, some means of minimising local interference seemed desirable and the Scottish Crystal Register was introduced with satisfactory results.

About this time the ninth W.B.E. Certificate to be issued by the society was awarded to Mr. Wyllie.

In the 1.7 Mc. contest in November, 1932, the first three places were taken by Scottish stations, G6FN being the winner.

In January, 1933, the winner of the QRP contest was G5ZX, followed by G5YG in March, 1933, with first place in the 3.5 Mc. contest. The latter was also awarded the R.O.T.A.B. Trophy at this time in connection with communications and services to the society. The second place in that year's N.F.D. contest was taken by Scottish "A" District, and to round off a memorable year in contest work, 6IZ won the 1.7 Mc. contest.

In October, 1934, the well merited award of a Vice-Presidency was conferred on Mr. Wyllie by Council in recognition of ten years service in organising and as a gesture towards a rapidly growing membership. Nine months later, in July, 1935, owing to the continual and steady increase in membership, the Scottish Districts were again reorganised. Eight districts were now formed. District "A" being the County of the City of Glasgow, "B" Aberdeen and district, "C" Dundee and district, "D" Edinburgh and district, "E" the counties adjacent to Glasgow, "F" Stirling and district, "G" Galashiels, Hawick, etc., district, and "H" Fifeshire, each district being in charge of a district officer. Scottish Records Office, in charge of Mr. Hunter (6ZV) was created at this time and 5YG before stepping into the background, donated the cup known as the "Wyllie Trophy," to be presented each year to the outstanding Scottish station. To date, the trophy has been held by 6ZX, 6SR and 6RG.

February, 1937, is another landmark in Scottish affairs, for then it was that Scotland once more, through representations made by its resident Vice-President, became posessed of the individual prefix "GM."

Still another change falls to be recorded. In June, 1938, again through great increases in membership it became necessary to reorganise "A" and "E" districts. The old "E" district was scrapped, only to be revived again as the county of Ayrshire, while "A" district takes once more under its wing the counties of the City of Glasgow, Lanark, Renfrew, Dumbarton, Argyll and Bute.

It is interesting to note that the membership in Scotland at the date of writing exceeds 300. In December, 1925, it was three!

In compiling these notes, the writer is conscious of the many gaps in sequence and possible omissions. So many events have taken place in these thirteen years that it is impossible to note them all. It has only been possible to pick out the higher spots and arrange them in chronological order. The writer would also like to express his indebtedness to Mr. Wyllie and others who have supplied much of the information.

First-Class Operators' Club

By R. Webster (G5BW).

A certain amount of delay has arisen in dealing with F.O.C. correspondence, and we must apologise to those correspondents whose letters have not yet been answered. The writer was confined to bed with influenza during most of July and was unable to keep pace with the volume of mail.

First of all we should like to thank all those who have sent in suggestions for an F.O.C. certificate and emblem. Several really excellent designs have been received and will be given careful consideration.

A correspondent raises the point that "Break-in" working is a contravention of the regulations as prescribed on our licences, and at first sight it certainly appears to be so. Paragraph 10, after laying down the procedure for calling a station or answering a call, goes on to say: "The call signal of the station sending should also be sent at the beginning and end of each subsequent period of sending and on every occasion when the wavelength is changed." Genuine instantaneous "break-in" should proceed like an ordinary verbal conversation, complete with interjections, exclamations, etc., and under such circumstances it would be impossible to interpret the aforementioned condition literally. Although we feel certain that the G.P.O. cannot wish us to dispense with the manifold advantages of "break-in" operation, it would be interesting, nevertheless, to have an official pronouncement on that point.

While on the subject of "Break-in" operation, we cannot help but deplore the fact that so few people use what we have already described as "genuine instantaneous break-in." By this we mean operation which enables the other station to stop the sending station instantly with one touch of the key. Far too many people who profess to use "break-in" merely employ a rapid change-over from send to receive, and imagine that they are working "break-in," if they conclude every transmission with the magic signal "BK" (although what there is to "break" when their transmission has ceased, we have yet to discover). The next time a station says he is working "Break-in," put your key down immediately, send a few dots, and see if he stops his transmission—perhaps two or three out of ten will, but the rest just go on like the babbling brook. Please don't inform the world at large that you are using "BK" unless it is genuine "Break-in."

A number of amateurs are still clinging to the idea that F.O.C. is merely a get-together for C.W. speed merchants. May we point out that membership is open to any station, 'phone or CW, the only proviso in the case of 'phone stations being that their technique is good and orthodox, and that they have an adequate knowledge of the code. It is immaterial to us whether our members work on 'phone or C.W., except that we deplore the practice of sticking exclusively to 'phone.

Members elected during the month are: G2XG, G8CV, ZB1P, G5JM, G2RC, G6WY, G2CF and G6PZ.

Please address all correspondence to Radio G5BW, Willingdon, Eastbourne.

Stray

We learn from VQ4KTF that all VQ4 stations now use "Test" in place of "CQ" and are allowed to operate for only 2 hours in every 24.

THE 56 Mc. BAND

By L. G. Blundell (G5LB)

European DX Contact

ON July 2 at 15.00 B.S.T., G5MQ, of Woolton, Liverpool, contacted the Italian station 11RA. Both stations tested 'phone and tone modulation during the QSO which lasted until 15.45, when conditions " evaporated." 5MQ states that the Italian was R5 S8 and his own transmissions were reported as R5 S7 on tone and R5 S5 on speech. Congratulations!

Further details of this contact and associated activity appears elsewhere in this issue.

The above is a clear indication of the prevailing conditions in and around last month, and the following reports confirm the advent of summer conditions. It appears that G5MQ was the only station to be within a favourable skip distance of European activity.

STAND No. 10

THERE WILL BE A FULL DISPLAY OF 56 Mc. APPARATUS ON THE SOCIETY'S STAND AT RADIOLYMPIA

Inter-G work is on the up-grade, with signals getting well beyond the " semi local " distances. As will be noticed, the southern counties seemed to be particularly favoured in this respect.

G2XC, in addition to getting more frequent contacts with local and semi-local stations, heard G6FO of Newport on two occasions at RST578; QRB being 96 miles.

On July 2 (what a day for DX!) 2HG heard harmonics of HBH, DKF and ICE between the hours of 14.00 and 16.00 B.S.T., all at average signal strengths of S5/6. It will be remembered that this particular day also furnished HG with a report from Switzerland, and G2XC with a signal from I1ER (see last issue).

Continuing with 2HG's log, further commercial harmonics were heard as follows: July 19, IBE and another unidentified signal at S5/6 between 09.55 and 10.30. On the 18th, 23rd and 24th, G6DH was heard again—QRB about 65 miles.

G6FO in Newport has been getting some very encouraging reports, *viz.*, 549 from 3HW in Teignmouth (75 miles) and 329 from 8LY in Winchester (82 miles) on July 17, whilst July 19 produced a similar report from 3HW, but 558 from 8LY, 578 from 2XC Portsmouth (96 miles) and 548 from 8DF in Alton, Hants. (92 miles). On the 22nd of the month, 6FO was logged at 2DDD, Angmering, Sussex, for a brief period at 23.00 at 338. The distance in this case is 112 miles. On the 26th, 6IH of Malvern, 45 miles distance, was 559 for over one and a half hours. G6FO suggests that with such conditions as these prevailing, it would be to everybody's advantage to use omni-directional aerials for both receiving and transmitting.

G6DH reports again (Welcome home) on the upper frequency limit during the latter part of the month. By 08.00 on the 19th commercials were audible up to 50 Mc., and at 08.25 a further commercial was heard on 56 Mc. During the latter half of the day the limit frequency dropped back to about 45 Mc. Other " good " days were the 23rd, with signals up to HAS3 on 46 Mc., and the 24th and 25th with sundry signals up to 48 Mc.

As an afterthought to his trip to W and VE, 6DH mentions that the average receiver over there gave him a strong reminder of what 7 Mc. sounds like in this country!!

G8YL also reports on the appearance of " extra local " signals from G6FO in Newport, Mon., and G6IH Malvern on July 17 and 19.

G3BY, of Audenshaw, Manchester, reports hearing GW6AA during N.F.D. on the 2nd of the month, G6LI in Mansfield, Notts., on the 3rd (signal getting over or through the Pennines), and on the 13th, 6IH of Malvern—a distance of about 100 miles.

BRS3322 reports (as a result of portable activity on the South Downs during the past month) that 20 CW and 11 'phone transmissions were logged. During these tests a large number of additional but weak 'phone signals were unidentified owing to the call sign not being given in code at the conclusion of a transmission.

BRS3101 of Golders Green logged some 27 different stations during the month. Fading of a very slow and deep variety being observed on G2XC of Portsmouth.

G6YL also reports good conditions for DX working as the following commercial harmonics were received between June 27 and July 23. IRX on June 27 at 1717 to 1730 on 70 Mc. at 564, and again on the 29th between 1520 and 1530 at Q4 S5 on tone. On July 2 this signal was again logged at 564 between 1012 and 1056, 34- tone between 1112 and 1146, 55- tone at 1303 and 564 from 1446 until 1520. Another Italian signal in IBE was also heard on this day as follows: 1118 IBE 56 Mc. 559, 1150/1156 569, 1249 569, 1436/1459 559. It seems that the path between this country and Italy was extremely favourable for solid contacts on this particular day, and it is no small wonder that only one QSO was effected. Several telephony carriers were audible at 6YL, but none of them strong enough to render speech intelligible.

July 7 produced IBE and IRX again as follow, 1946 IBE 56 Mc. 449, 1952/1959 IRX 60 Mc. 554, 2001 IBE 559. Both these signals had faded out by 2007. IBE was again heard on the 23rd at 1002, when signals were 349.

All times mentioned in G6YL's reports are G.M.T., and not B.S.T. The times stated in last month's report from this station should also be read as G.M.T.

56 Mc. Activity in Canada

G5UM advises us that VE3AU of Toronto is putting out automatic code every day between 18.00 and 19.00 G.M.T., and is standing by for calls after this period. VE3AU uses an input of 300 watts and is most anxious for G contacts!

N.F.D.

The writer wishes to thank all those sending in reports on N.F.D. activity and results. These have

been forwarded to H.Q. for inclusion in a separate article.

Contest Results

As mentioned in the last issue the spell of DX conditions in the U.S.A. gave several operators there a few score-bearing contacts in the International CW Contest.

A log for the month of June has been received from W9NY and this shows a score of 17 points. The following stations were worked with CW, W3BZJ, 1EYM, 1IZY, 1CSR, 1AKD, 1KTF, 3CXU, 3BYF, 3AIR, 3EVT, 2BYV, 3FVR, 5ZS, 5AJG, 11ZY, 2KLZ, and 5EHM. All these stations falling at various distances between 630 and 880 miles.

No other score-bearing logs being to hand, it seems that W9NY is so far the "one and only." Anyway, such success is richly deserved as this station has been active EVERY DAY SINCE THE COMMENCEMENT OF THE CONTEST. Continued success, W9NY!!

Conditions in Switzerland

A further report is to hand from G5MP at present located in Chesieres-Villars, Switzerland. This shows that on July 2 when G2HG was heard, two further British signals were also logged at the same time. Unfortunately local car QRM prevented full identification, and since the signals became inaudible within a very short time, there was no opportunity to re-check the calls.

The above-mentioned signals had all faded out by 1500, and there was nothing to be heard of G5MQ or 11RA, who were in QSO at this time.

On July 3 (N.F.D.) it is understood that several Swiss and French stations made contacts over distances of about 100 miles, but at 5MP's location local screening limited reception to approximately 40 miles.

Transmissions on 42 and 46 Mc. have also been logged. The 22nd of the month produced signals on these frequencies from 1450 until 2215 B.S.T., and these were thought to be television and sound from Berlin or Prague.

G5MP adds that reception tests continue daily at 1130, 1430, and onwards until 2000 B.S.T. Schedules during the afternoon hours will be welcomed, and correspondence concerning same should be forwarded through G5MP's home address, which is 48, Earlsfield Road, Hythe, Kent.

Finale

With the conclusion of this month's writing, G5LB regrets to announce that he is unable to continue with the 56 Mc feature and requests those who have reported so consistently and generously to hold such material as they may have on hand until arrangements have been made for the continuance of the feature from another source.

Some members have already been notified of the re-arrangement, but those who have not please note that no further reports should be sent to G5LB.

To all concerned, 5LB tenders sincere thanks for "services rendered" and good wishes and success in all future work.

Snowdon 56 Mc Tests

In view of the interest taken in the last 56 Mc tests from Snowdon, GW6AA will be carrying out a further series on September 9, 10 and 11. The last two dates coincide with the GW Trophy Contest, announced elsewhere in this issue.

Times of operation will be as follows :—

Friday, September 9.—19.30 to 22.30 B.S.T.
Saturday, September 10.—12.00 to 23.30 B.S.T.
Sunday, September 11.—09.30 to 20.00 B.S.T.

Special times set aside for CW transmission only,

Friday, September 9.—20.30 to 21.30 B.S.T.
Saturday, September 10.—14.30 to 15.30 B.S.T.
Sunday, September 11.—14.30 to 15.30 B.S.T.

Schedules with stations over 80 miles distant are wanted, and all reception reports will be appreciated and acknowledged.

In addition to other aerials, a bi-directional beam array, consisting of eight vertically stacked dipoles, fed in phase, will be used. This will be directed along a line drawn from Sligo, I.F.S., to South Foreland, Kent, and should effectively cover Dublin, Shrewsbury, Wolverhampton, Birmingham, and Coventry.

It is hoped that as many stations as possible, along, or near, this line, will co-operate in the tests.

While on Snowdon, GW6AA will be pleased to listen for any station on 112 or 224 Mc., and to reply on 56 Mc.

A straight acorn-tube receiver, and a super-het., will be used for C.W. reception. Super-regenerative receivers will be used for phone and I.C.W.

G.W. Cup Contest

In connection with the G.W. cup contest announced on page 115 the following portable stations will be in operation on September 11 :—

EI2J	Carlingford Mountain, I.F.S.
EI8L	Three Rock Mt. (6 miles South of Dublin).
GW6AA	Snowdon Summit (3,560 ft.).
GW6OK	Esclusham Mt. (1,500 ft.), nr. Wrexham.
GW2NF	Llanelian Mt. (950 ft.) 3 miles S.E. of Colwyn.
GW3GL	Gt. Orme's Head, Llandudno (650 ft.).
G2HQ	"Cat and Fiddle" Hill, near Buxton (1,600 ft.).
G2MF	The Peak (2,050 ft.), Derbyshire.

In addition to these there will be many other 56 Mc. fixed and portable stations in operation.

THE 28 Mc. BAND

By NELLY CORRY (G2YL).

DURING July solar and magnetic activity was unusually intense, Dellinger Fade-outs were reported on July 1, 2, 3, 5, 7, 10 and 20, and the Hissing Phenomenon was heard on July 6, 9, 10, 12, 26, 29 and 31. Under the circumstances it is not surprising that on a good many days the band appeared to be absolutely dead, and DX signals were only heard spasmodically.

The only station reported from the Antipodes was ZL1FT, possibly a harmonic, heard by BRS25 at the unusual hour of 18.27 G.M.T. on July 9. Conditions were certainly abnormal that evening, as BRS25 subsequently logged EA7AV, F8CT, FA8RY, FXD (harmonic), and PY2HM, i.e., all continents except North America. No Asiatic amateurs were reported heard, and VU2AN on July 24 reported a completely blank month, apart from commercial harmonics. On July 17 he was on the band more or less continuously for 12 hours

with no results. On Sunday, August 28, VU2AN will call " CQ Ten " for five minutes at 10, 12, 14 and 16 hours B.S.T., and will acknowledge all reports—if any !

The only African stations audible appear to have been ZS6EJ, heard working F's on the afternoon of July 31, and an occasional FA. Europeans from about 14 countries were heard throughout the month, and though they seemed less plentiful than in June G2XC had 18 QSO's with D, F, I and OK up to July 25.

Stations in the Western Hemisphere were heard more frequently and in far greater numbers than ever before during the month of July. Occasional signals were logged early in the month, but the best period was during the last week, particularly July 25 and 29, 18.00—23.00 G.M.T. South Americans included CE3BH, CX1FB, CX2BK, LU1DJ, LU2BR, LU3DH, LU4BL, LU5FG, LU7AG, LU9AG, LU9AX, LU9BV, PY2CK, PY2CT, PY2HM and YV1AP. G6BW and G6DH worked PY on 'phone at 14.00 and 17.30 G.M.T. on July 24, and several G's worked PY2CK on July 29 when his signals peaked to S8. Central American and West Indies stations reported were: HH2MC, HH5PA, HI7G, HI5C, K5AN and at least 7 Porto Rico stations. W's in Districts 1, 2, 3, 4, 5 and 8 were logged, about 90 per cent. on 'phone, and most expressing surprise at contacting Europe during July. W4FT worked G6BW, G8MU, G6WY and G8DN consecutively on July 29, and the same evening BRS3179 heard CT, D, F, HH, HI, 3 K4's, K5, 4 LU's, PY and W1, 2, 3, 4. G6BW had 15 'phone QSO's with W1, 2 3 and 4 on July 25, 28 and 29, and other contacts with K4, LU and YV the same week.

G interest in the band is always low in the summer and reports from G2MV, 2XC, 5BD, 6BW, 6DH, 6WY, BRS25 and 3179 were therefore doubly welcome. Don't forget that the 28 Mc. Summer Tests continue until September 18. Full details are on page 637 of the May BULLETIN.

Contemporary Literature

BY L. FRYER (GM2FR).

THE 1938 " MODEL 222 " RECEIVER. Frank C. Jones (W6AJF). *Radio* (Amer.), June, 1938.

A description of a modern superhet by the Engineering Editor of *Radio*. The receiver follows somewhat along the general lines of the 222 receiver described several years ago. Modern valves and circuit layouts result in greatly improved performance and a new " Noise suppressor " circuit is incorporated.

The receiver uses a 6J8G regenerative first detector oscillator, 6K7G I.F. working at 1,600 kc., 6F8G as regenerative leaky grid detector and first audio amplifier, and a 6V6G output.

* * *

THE FLAT-TOP BEAM. John D. Krauss (W8JK). *Radio* (Amer.), June, 1938.

The author, who is well known for his previous articles on flat-top beam arrays, gives some new design data, the result of tests made with flat-top arrays having seven different spacings (0.032 to 0.185 wavelength).

The conclusion drawn from the tests is that the optimum spacing with respect to gain is about 0.15 wavelength.

A design table giving all dimensions for single, two, three and four-section, both centre and end-fed arrays, is included, together with information on matching stubs for frequencies between 7 and 30 Mc.

* * *

OPERATION OF ZERO-BIAS MODULATORS. Thomas A. Gross (W1JZM-VE1IN). *Radio* (Amer.), June, 1938.

A brief article based on tests made in the Bowdoin College (Brunswick Maine) physics laboratory, illustrated by curves and oscillograms.

* * *

A MIDGET PORTABLE RECEIVER. L. V. Broderson (W6CLV). *Radio* (Amer.), June, 1938.

A description of a neat A.C. receiver designed as a companion to the " 20-Watt Midget Portable " Transmitter described in *Radio* for April.

The receiver weighs 7½ lbs. complete, is enclosed in a 6-in. square metal cabinet and uses a 6J7 detector with cathode regeneration, the detector being resistance coupled to a 6C5 audio stage. Regeneration is controlled by varying the screen voltage on the 6J7. The midget has performed so well that it has now become the main receiver at the author's station.

* * *

A MANUALLY OPERATED PUSH-TO-TALK RELAY SYSTEM. Vernon C. Edgar (W6CRF). *Radio* (Amer.), June, 1938.

A description of a push-to-talk relay system using two home-adapted relays to control both receiver and transmitter.

* * *

A DISC-TYPE FREQUENCY METER FOR AMATEURS. Guy Forrest. *Radio* (Amer.), June, 1938.

A very interesting description of the design and construction of a heterodyne-type amateur frequency meter, the maximum error of which is conservatively rated at less than 0.1 per cent., while the total cost is less than that of a precision dial.

The precision is attained by means of a home-constructed disc condenser, the meter has a self-contained power supply and uses a 6J7 and 1-V valves.

* * *

A MIDGET 90 CM. TRANSCEIVER. De Forest O. Romain (W2IEV). *Radio* (Amer.), June, 1938.

An interesting portable station built complete with batteries into a cabinet 5½ by 6 by 5½ ins. The circuit used is a form of Lecher oscillator modified so that it can be worked as a self-quenching detector in the receiving position. The valves used are 955 oscillator and a 30 as modulator.

* * *

PRACTICAL DESIGN OF CLOSE-SPACED UNIDIRECTIONAL ARRAYS. W. W. Smith (W6BCX). *Radio* (Amer.), June, 1938.

A discussion on the advantages to be expected from a unidirectional array, and data for the construction of arrays for 7 and 14 Mc. are given.

AN INEXPENSIVE EXCITER-TRANSMITTER. Jack Rothman (W6KFQ). *Radio* (Amer.), June, 1938.

A simple transmitter based on Frank C. Jones' latest crystal oscillator circuit for harmonic output.

The circuit uses a 6L6 crystal oscillator, followed by an 809 amplifier, and with four coils and 3.5 and 7 Mc. crystals four-band working is easily accomplished, or the unit can be used as a 25-40-watt exciter for all-band use for higher power work.

* * *

A CATHODE-RAY OSCILLOSCOPE FOR $1.37. E. H. Conklin. *Radio* (Amer.), June, 1938.

The object of this article is to show the facility with which a simple cathode-ray oscilloscope can be constructed at a very low cost.

* * *

SOLENOID-TYPE RELAY CONSTRUCTION. E. R. Johns (W7BTH). *Radio* (Amer.), June, 1938.

The writer describes the design and construction of a solenoid-type relay used in his station for the dual purpose of feeder switching and transmitter control.

* * *

BEAT-FREQUENCY AUDIO OSCILLATOR. H. W. Anderson (W6CCG). *Radio* (Amer.), June, 1938.

A design and constructional data for a beat-frequency audio oscillator capable of delivering outputs of low harmonic content over a wide frequency range.

The article will appeal to advanced amateurs interested in the frequency response of transmitters and audio amplifiers.

* * *

ONE-TUBE DUPLEX RECEIVER. *Short Wave and Television* (Amer.), June, 1938.

A description of a 0-V-1 receiver operation on batteries. The set has a range of 25 to 80 metres, and incorporates bandswitching by means of a new Meissner rotary switch. The valve used is one of the newer 2-volt valves, a 1E7G dual pentode type.

* * *

THE 2AJL SUPERHET RECEIVER. Herman Yellin (W2AJL). *Short Wave and Television* (Amer.), June, 1938.

A description of a superhet designed primarily for amateur work. The circuit incorporates a stage of R.F. with provision for using either a doublet or a single-wire aerial, crystal gate (optional) A.V.C., noise limiter, "R" meter, B.F.O., and provision for 'phones, magnetic or dynamic speakers. The plug-in coils are handled in units of three and the valves used are 6K7, 6L7, two 6K7's, 6H6 and two 6J7's as oscillator and B.F.O.

* * *

A LOW-COST 1.75 MC. 'PHONE TRANSMITTER. Vernon Chambers (W1JEQ). *QST*, July, 1938.

While the transmitter described is essentially a one-band outfit, it makes a neat self-contained rack-mounted 25-watt station. The crystal oscillator is a type 6F6 valve with pentode connections, the buffer stage uses another 6F6 as a straight amplifier with a 6L6 as final amplifier.

The speech amplifier and modulator used consists of a 6C5 feeding two 6L6's in push-pull operated Class A-B, without grid current, so no power is required from the 6C5 driver.

The power supplies are mounted on the same chassis as their respective units, the whole being built up on a home-made wooden rack.

* * *

LOOK FOR ME ON . . . kc. E. P. Tilton (W1HDQ) and Glen H. Browning. *QST*, July, 1938.

A description of a "Universal Exciter" possessing excellent qualities.

The unit has an output of at least 35 watts on all bands from 160 to 10 metres and 15 to 20 watts on 56 Mc., using three crystals and one set of plug-in coils. The output on all bands may be either crystal or self-controlled oscillator with quick change-over from one method to the other and from one band to another. Either oscillator may be keyed without the slightest trace of chirp, thus allowing snappy break-in operation.

The valves recommended are 6J5G crystal oscillator, 802 or RK25 E-C oscillator and an 807 in the final stage which gives full output either as a straight amplifier or doubler and, if desired, this stage may be used for quadrupling with an output of 10 to 15 watts.

* * *

MINIMISING RECEIVER FREQUENCY DRIFT. Charles S. Mayeda. *QST*, July, 1938.

A very interesting discussion and a description of an easily constructed compensating condenser for overcoming the frequency drift of a receiver during the "warming up" period.

* * *

THE "QSL FORTY" ON 14 MC. Fred Sutter (W8QDK). *QST*, July, 1938.

The writer describes further developments in his popular low-power transmitter, which was originally described in the February issue of *QST*, and gives an original method of making a Faraday screen.

* * *

A TEN-METRE ROTATABLE ALFORD BEAM. Don C. Wallace (W6AM). *QST*, July, 1938.

This article is based on practical experience with an extended double Zepp and reflector system, the novel feature of which is that it is suspended vertically from the ordinary aerial of the station by means of swivels. It is easily rotated, the turning radius being only 3½ ft. for the whole system.

A full description of the tuning operations, which are carried out with the array in a horizontal position before hoisting, is included.

* * *

A VERSATILE REMOTE-CONTROL CIRCUIT. Max L. Hilliard (W9WEE). *QST*, July, 1938.

The system described provides remote control of a 'phone transmitter at any reasonable distance up to several miles from the control point. The circuit uses only two wires between the control point and the transmitter, the earth acting as common return for all circuits except the speech circuit which is full metallic.

The circuit provides for the following features: (*a*) speech circuit; (*b*) filament control; (*c*) anode control; (*d*) monitoring; (*e*) modulation checking; and (*f*) frequency changing.

* * *

DO'S AND DON'T'S IN POWER SUPPLIES. T. M. FERRIL, JNR. (W5CJB-1). *QST*, July, 1938.

An interesting discussion on what may properly be expected from the component parts of a power supply. Examples of the necessary calculations are given.

HEADQUARTERS CALLING

Society Trophies, 1938-9

The Council have pleasure in announcing that Society Trophies have been awarded to the following members :

Rotab Cup. To Mr. Bryan Groom, GM6RG, first in recognition of his technical contributions to the advancement of the Society's work ; second, in recognition of his outstanding DX work on 14 and 28 Mc., and third, in recognition of his pioneer experimental work on 56 Mc.

Wortley-Talbot Trophy. To Mr. Seymour Buckingham, G5QF, first, in recognition of his numerous practical contributions to the advancement of the Society's work, especially in connection with the construction and design of transmitting apparatus ; and second, in recognition of his many services to the Society in his capacity as North London District Representative over a period of nearly eight years.

Courtenay Price Trophy. To Mr. F. W. Garnett, G6XL, in recognition of his several important technical contributions to the Society's Journal, and in particular for his articles dealing with Beam Aerial experiments.

1930 *Committee Cup.* To Mr. W. A. Scarr, M.A., G2WS, in recognition of his consistent experimental work on the ultra-high frequencies.

* * *

B.E.R.U. Senior Trophy. To Mr. F. J. Mustill, XZ2DY, winner of the Senior Transmitting Contest.

B.E.R.U. Junior Trophy. To Mr. T. Martin, G2LB, winner of the Junior Transmitting Contest.

B.E.R.U. Receiving Trophy. To Mr. M. Bourke, 2AOU, winner of the Receiving Contest.

Col. Thomas Trophy. To Mr. F. Charman, G6CJ, leading British Isles station in the Senior B.E.R.U. Contest.

* * *

Somerset Trophy. To Mr. R. W. Rogers, G6YR, winner of the 1.7 Mc. Transmitting Contest.

N.F.D. Shield. To Northern Ireland.

N.F.D. Replicas. 1.7 Mc. Chief operator of EI6FP ; 3.5 Mc., Chief operator of G8FCP ; 7 Mc., Chief operator of G6RBP ; 14 Mc., Chief operator of G6CJP.

The Powditch 28 Mc. Trophies will be awarded later in the year.

The winners will receive their Trophies from the hands of the President at 2.15 p.m. on Saturday, September 3 (Convention Saturday).

Mr. J. Sang will, it is hoped, be present to accept the N.F.D. Shield on behalf of Northern Ireland, whilst the Senior B.E.R.U. Trophy will be despatched to Mr. Mustill.

The 56 Mc. Band

It is with much regret we have to record that Mr. Blundell, G5LB, who has for several years conducted our monthly commentary dealing with the 56 Mc. band, has found it necessary to relinquish this important work. We take this opportunity of thanking him for his whole-hearted co-operation in the past, and we look forward to the time when he will again be free to become a regular contributor to these columns.

We hope to make an announcement in the next issue regarding his successor.

Scottish Convention, 1938

Saturday, September 17.

It is expected that arrangements will be made to hold an informal " get-together " in the Empire Exhibition during the evening. Details will be sent to Scottish members later. Those intending to be present from outside Scotland are invited to write for details.

Sunday, September 18.

10.45 a.m.	Leave Bridge Wharf, Glasgow, for trip down River Clyde to view the giant Cunard-White Star Liner, *Queen Elizabeth*, on the stocks. Fare 1s. per head.
12 noon.	Assemble Grand Hotel, Charing Cross, Glasgow.
1.0 p.m.	Lunch.
2.30 p.m.	Business Meeting.
5.0 p.m.	High Tea.

Charge, 7s. 6d. All reservations to Mr. J. Hunter (GM6ZV), not later than September 8. Further information will be furnished on request.

Headquarters

During the period of the Radio Exhibition, Headquarters will be open from 10 a.m. to 5 p.m. except on Saturdays, when the hours will be from 10 a.m. to noon. Members are requested to note these times.

R.S.G.B. Slow Morse Practices

Details appear above of the Slow Morse Practices organised by the Society for those members wishing to learn or improve their code. As usual, test matter will be taken from recent issues of the T. & R. BULLETIN. The page number and month of issue will be given at the end of each test—

by telephony. A telephony announcement will also be given at the commencement of each test to assist those interested in tuning in the sending station. It is emphasised that reports will be appreciated, and are desired, in order to ascertain useful range and numbers utilising the service. If, however, a reply is desired, a stamp should be sent. In the schedule below it will be noticed that the Stafford area will now be served by Mr. D. Rock, G8PR, 4, Linton Road, Old Hill, Staffs. Will stations in areas not at present served offer their services to Mr. T. A. St. Johnston (G6UT), "Normandale," Little Hallingbury, Essex.

	B.S.T.	kc.	Station.	Location.
Sundays ...	0900	1755	G8NF	Manchester
	0930	1792	G8AB	Loughton
	1000	1800	G8PR	Staffordshire
	1015	1920	G6VC	Northfleet
	1230	1850	G6VD	Leicester
Mondays ...	2315	1741	GI6XS	Bangor
Tuesdays ...	2215	1792	G8PZ	Colchester
Wednesdays	2315	1741	GI6XS	Bangor
Thursdays...	2215	1792	G8PZ	Colchester

CALIBRATION SECTION

Crystals and frequency meters of the heterodyne type can be accepted for calibration and these should be sent *direct* to the Calibration Manager:

Mr. A. D. Gay (G6NF),
156, Devonshire Way,
Shirley,
Croydon, Surrey.

Crystals should be enclosed in a small tin and securely packed to avoid loss in transit, whilst frequency meters should be packed in a wooden box or substantial cardboard container.

Return postage for crystals and frequency meters must be enclosed as stamps and not attached to the postal order. The Society cannot accept responsibility for any loss that might occur in sending apparatus for calibration through the post.

Calibration Fees

Crystals, 1.7, 3.5 and 7 Mc. types... 1s. 6d. each
Crystals, 100 kc. type ... ... 2s. 6d. ,,
Heterodyne frequency meters 5 points within the amateur bands ... 5s.
For each extra point at any desired interval 6d.

NEW MEMBERS

HOME CORPORATES.

H. J. CLEMENTS (G2QL), 16, Lynton Road, South Chingford, London, E.4.
W. H. HODGSON (G3BW), 53, Hill Top Road, Arrowthwaite, Whitehaven, Cumbs.
R. G. PARKER (G3GD), 71, Manor Road, Stoke Newington, London, N.16.
A. F. JOHNSON (G3JN), Officers' Mess, R.A.F., Thornaby-on-Tees, Yorks.
G. H. MARSHALL (G3JT), 148, Shaw Road, Oldham, Lancs.
A. G. TEARLE (G3KG), 16, Kenilworth Road, Luton, Beds.
P. H. ROCK (G3LN), 258, Yardley Fields Road, Yardley, Birmingham.
J. R. GARRETT-PEGGE (G3MI), The Meades, Chesham, Bucks.
J. E. THORNBER (G3MR), 3, Dean Avenue, Old Trafford, Manchester, 16, Lancs.
G. W. PARKES (G3NL), 14, Bilford Road, Worcester.
E. S. WILSON (G5CW), 20, Singleton Scarp, Finchley, London, N.12.
E. MENZIES (G5MQ), 38, Linkstor Road, Woolston, Liverpool, Lancs.
H. EDGE (G6GD), 2, Green Mount, Stamford Road, Bowdon, Cheshire.
J. V. TURNER (G6LU), 20, Cody Road, Farnborough, Hants.
N. H. A. PAYNE (G8FV), 116, St. Margaret's Road, Twickenham, Middlesex.
R. H. H. MCDONNELL (GI8WD), B.B.C. Studios, 31, Linenhall Street, Belfast, N.I.
E. H. PICKETT (2BZY), 28, Cross Oak Road, Berkhamsted, Herts.
J. B. BURTT (2DKQ), The Weaver's House, Burleigh, Stroud, Glos.
G. S. WOOD (2DNZ), 92, Camden Road, Bridgwater, Somerset.
D. P. M. URQUHART (2DQS), 7, Padwell Lane, Bushby, Thurnby, Leicester.
N. BOOTH (2DSF), 20, Gordon Avenue, Levenshulme, Manchester, Lancs.
H. N. BARR (2DYD), 14, Coverdale Road, Shepherd's Bush, London, W.12.
G. F. SWANN (2DZR), 57, Nunnery Lane, York, Yorks.
C. T. WAKEMAN (2DZS), 44, River View, Chadwell-St.-Mary, Grays, Essex.
P. REDDOCK (BRS3355), 93, Silver Street, Higher Irlam, Manchester, Lancs.
J. D. SMITH (BRS3356), "Wyndcroft," West Shore, Llandudno, N. Wales.
F. W. ADAM (BRS3357) (now 2FBM), The Elms, Galashiels.
W. J. VINCENT, junr. (BRS3358), The Grange, Warwick Road, Solihull, Warwicks.
E. HOLT (BRS3359), The Olde Thatch, Rushden, near Buntingford, Herts.
I. J. WYLIE (BRS3360), 219, Merchiston Street, Carntyne, Glasgow, Scotland.
D. BROOKES (BRS3361), 140, Richmond Road, Bristol, 6, Glos.
D. H. JONES (BRS3362), Llys Evryn, Brompton Avenue, Colwyn Bay.
J. SIMPSON (BRS3363), 26, Laurel Avenue, Darwen, Lancs.
A. E. HUTCHINSON (BRS3364), Endwood Lodge, Little Aston Park, Sutton Coldfield.
J. STACEY (BRS3365), 39, Callicroft Road, Patchway, near Bristol.
J. A. FRANCIS (BRS3366), 55, Stanley Road, Great Yarmouth, Norfolk.
R. H. BAILEY (BRS3367), 167, Wolverhampton Road, Cannock, Staffs.
L. T. MULLINS (BRS3368), 9, Picton Street, Lincoln.
J. W. JOWETT (BRS3369), 355, Colne Road, Burnley, Lancs.
F. A. SINGER (BRS3370), 144, Junction Road, London, N.19.
S. A. ROGERS (BRS3371), 46, Winchester Road, Brislington, Bristol, 4, Glos.
J. E. QUARRINGTON (BRS3372), 33, Harrow Road, Brislington, Bristol, 4, Glos.
R. B. HOULT (BRS3373), 12, Ethel Road, Norwich, Norfolk.
J. W. H. CAMMACK (BRS3374), Biaten Dene, Brackenboro' Road, Louth, Lincs.
T. B. PAISLEY (BRS3375), 19, Bute Gardens, Glasgow, W.2, Scotland.

DOMINION AND FOREIGN.

J. FORBES (EI8N), Castle Forbes, Newtownforbes, Co. Longford, Eire.
J. E. FOWLER (VE5VO), c/o CKWX Transmitter, 1220, Seymour Street, Vancouver, B.C., Canada.
R. H. ATKINSON (VK6WZ), 27, Rathay Street, Victoria Park, Western Australia.
R. C. DUNHAM (W1EWF), River Ridge, Hanover, New Hampshire, U.S.A.
H. A. BEERING (W1GDY), 291, Park Street, West Roxbury, Boston, Mass., U.S.A.
D. W. ATCHLEY, junr. (W1HKK), Winthrop F-24, Harvard University, Cambridge, Mass., U.S.A.
G. OHL, junr. (W2HLN), Calton Court Apartments, New Rochelle, New York State, U.S.A.
F. M. GRAY (W6HUA), 9015, Ashcroft Avenue, West Hollywood Calif., U.S.A.
A. L. KENT (W8BTO), 590, Shenango Street, Binghamton, New York, U.S.A.
G. AFFLECK (BERS448), Cottage Farm, P.O. Box 91, Stellenbosch, S. Africa.

Reports Wanted

GW3KY (Holyhead) on his 7063 kc. transmissions.

Stray

Mr. W. H. G. Metcalfe, VU2EU (ex VU2CR) is looking for G contacts on 14380 kc., and also requires reports, all of which will be acknowledged.

The "G.W. Trophy" 56 Mc. Contest

The second contest for the "G.W. Trophy" will be held this year during the week-end of September 10-11 and the rules will be similar to those governing the contest in 1937. Consideration has been given to shortening the period of the contest but as it is desirable for the tests to be conducted during the hours of both darkness and daylight, it has been decided to maintain the 24 hours, especially as many participants prefer to make a week-end of it. The station may be either fixed or portable but only one location may be used during the period of the contest. Any number of QSO's may be made with any station but only one will count for points.

Whilst any system of communication may be used, it is emphasised that provision should be made for using CW at least part of the time, as many more stations this year will be using crystal controlled transmitters.

The rules are as follows :—

(1) The period of the contest will be from 1800 G.M.T. (1900 B.S.T.), September 10, to 1800 G.M.T., September 11.

(2) Only fully paid up R.S.G.B. members are eligible and licence conditions must be strictly adhered to.

(3) Logs should show all relative information whilst time should be given in G.M.T. QSA 3, R3 is the minimum report acceptable.

(4) Points will be allocated on the following scale :—

A.	Under 10 miles	1
B.	10 to 15 ,, ...	2
C.	15 to 20 ,, ...	3
D.	20 to 30 ,, ...	5
E.	30 to 40 ,, ...	8
F.	40 to 50 ,, ...	12
G.	50 to 75 ,, ...	20
H.	75 to 100 ,, ...	35

and five extra points for every 10 miles in excess of 100.

It will be noticed that the scoring system has been revised. Completed entries should reach Mr. J. N. Walker (G5JU) not later than October 8.

Editorial Note.—This is a privately arranged Contest which has the full support of Headquarters.

R.S.N.I. Leonard Trophy Contest

We have been asked by the Radio Society of Northern Ireland to publish the rules of their Leonard Trophy Contest, which is open to all transmitting stations in Ireland (EI and GI) and the rest of the world.

Dates of Contest

October 1, 1938, at 12.00 G.M.T. to October 2 at 24.00 G.M.T.

October 8, 1938, at 12.00 G.M.T., to October 9, at 24.00 G.M.T.

October 15, 1938, at 12.00 G.M.T. to October 16, at 24.00 G.M.T.

October 22, 1938, at 12.00 G.M.T., to October 23, at 24.00 G.M.T.

Rules

The contest is open to all licensed transmitting stations. Licensed power must be used.

Only one operator is allowed at each station, but if more than one operator, each operator's score counts separately.

All stations must exchange RST reports to count for points.

Stations may be worked once only during the contest.

All licensed frequencies may be used.

Method of Scoring

One point for European contacts.
Two points for African contacts (above equator).
Three points for African contacts (below equator).
Three points for North American contacts.
Four points for South American contacts.
Four points for Oceania contacts.

Irish Stations

Score to be multiplied by the number of countries worked.

Districts of America, W1 to 9, and Canada VE1 to 5 count as separate countries.

Awards

For the leading Irish station the Leonard Trophy will be awarded for one year (replica also).

For the leading station outside Ireland a Gold Medal.

For the second station outside Ireland a Silver Medal.

All logs must reach the Hon. Secretary, R.S.N.I., H. F. Ruberry, 19, Little Victoria Street, Belfast, Northern Ireland, on or before December 31, 1938.

European Contests

The N.V.I.R. announce a European DX Contest during the period September 17-25. Operating hours are from 1740 to 2140 GMT daily. Six cypher codes will be used, the first three figures indicating the RST report and the last three the code number of the Dutch competitor. Logs and QSL's bearing the code group, must reach N.V.I.R., P.O. Box 400, Rotterdam, before December 1. The highest scorers in each country will receive a certificate.

No details have been supplied to us in regard to the scoring system to be used.

The C.A.V. also announce a European contest for the period September 3 to 11. Operating times 16.00 to 24.00 G.M.T. daily.

Full details of this contest can be obtained from Ceskoslovensti Amateri Vysilaci (C.A.V.), Adbocka Brno, Czecho-Slovakia.

This contest commemorates the twentieth anniversary of the Czecho-Slovakian Republic. Certificates will, we understand, be given to the three leaders in each country.

An Aerial Feeder Tip

Those interested in constructing concentric tube feeders may run up against the difficulty of obtaining suitable spacers. Calit washers which are obtainable from *Webbs Radio*, make quite a good substitute for the real thing.

Thin walled 1/32 in. brass tubing, 7/16 in. outside diameter, and No. 11 gauge inside conductor, used with these spacers, give an excellent impedance match into a ½-wave doublet.

G6AH.

OPERATING PROCEDURE

To the Editor, T. & R. BULLETIN.

DEAR SIR,—Being located very near to the Border and having decided "GM" characteristics, I would like to voice my opinion on three of the letters appearing in the July issue.

Firstly, that of Mr. R. B. Webster's (G5BW). It seems to me that he is a self-styled No. 8 hat authority on this operating racket! May I ask him to study the meaning of the word "tolerance," and to show a little of it to the 6½ fellows before making his sweeping assertions public. Many amateurs, myself as a typical example, have had no opportunity of commercial tuition, and are so isolated in a radio sense, that it was impossible to fraternize with others who knew the proper length of a dash, etc. After laboriously mastering the ABC of Morse, my method was to pick out a strong clean signal on 7 Mc., and if I thought it good sending, then I tried to copy it and model my operating ideas along those lines. This was four years ago.

But I should hesitate to condemn even the apparent "lids," because after all I do not know the conditions governing the sending at the other end.

I would suggest that, instead of denouncing our operating abilities in so unhelpful a way, Mr. Webster and his merry men spend a little more time with the newcomers, and, if necessary, give advice on what to send and how to send it by letter, and ask for a schedule. *Don't* swing off a "Test" at 25 w.p.m. in a "call-me-if-you-dare-you-poor-left-handers" manner, but listen for a newcomer and give him a break.

Regarding N.F.D. operating, my opinion is that most operators have an attack of stage fright during the first part but quickly settle down. Also it seems to me that next year's N.F.D. winner is a foregone conclusion, if a crew of F.O.C.'s get together. Maybe!

I appreciate and applaud Mr. Webster's efforts to clean up the bands, but the "lids" of to-day will be the good operators of to-morrow, so in the meantime, O.M., allow me humbly to refer you to the Book of good procedure, which says "Judge not, lest ye be judged."

The next letter I read was from Mr. R. W. Rogers (G6YR), and I agree with the later part of it. My "starred" operator is G6ZR, of Bristol, to whom I am indebted for much constructive criticism *via* many pleasant QSO's.

Finally, I read the letter from Mr. W. E. F. Corsham (G2UV) and my answer to that is prolonged hand-clapping and a murmured "Hear, hear."

Yours faithfully,
SYD. B. D. YOUNG (G2YY).

Berwick Hill,
Berwick-on-Tweed.

A.R.P. AND THE RADIO AMATEUR

To the Editor, T. & R. BULLETIN.

DEAR SIR,—I cannot allow the July BULLETIN to go by without comment on Mr. Corsham's letter on A.R.P.

I do not doubt the sincerity of the writer when he waxes indignant over the turning down of the Society's offer by the A.R.P. authorities. But I should like to point out that the men (and women) concerned have not been consulted as to their willingness to co-operate. A very great deal of assumption has been taken and I consider that where such important decisions likely to affect Amateur Radio are contemplated the wishes of the majority should be determined.

I could fill a page of the BULLETIN with political arguments against A.R.P. itself, but unfortunately it would not be the place to do so; however, there are reasons why there should be no co-operation with A.R.P. which come well within the scope of this journal.

(1) Peace itself is a state of mind and body whereby man's feelings to his neighbours are one of toleration and good-fellowship. Is the spirit of good fellowship (Ham Spirit) present during international QSO's going to be fostered or killed if we allow ourselves to be organised "against" those very hams with whom we have the QSO's? The answer is obvious.

(2) Argument about A.R.P. in relation to fire and war insurance and ham radio activity in flood and 'quake do not hold water, because the above are natural catastrophes, whereas war is entirely *man-made*, and as such can be readily stopped by man if he so desires.

(3) From the point of view of the rights and privileges of the amateur, it can be argued that it would be a retrograde step to harness the movement to the military machine which is notoriously jealous of its own rights and privileges and would not countenance any free action which the amateur movement might wish to make.

Surely it would be wiser to leave the right of co-operation in A.R.P. to the individual, rather than allow our movement to be diverted from its course of radio experimentation and international fraternisation.

I for one am determined that I shall not allow my hobby to be used as a military tool, either openly or disguised, under one of the popular catch-penny organisations.

A far more effective A.R.P. would be to forestall all chances of bombing by taking an interest in the foreigner, getting to know and understand him, and, what is more important, settling his grievances in an honourable way.

Let amateur radio show the way; it has the men, the women and the opportunity.

Yours sincerely,
H. JACKSON (G6HJ).

N.F.D. in District 8

With reference to the article, "Fresh Air and Good Company," published in our last issue, Mr. G. Jeapes (G2XV), D.R., for Home Counties, asks us to mention that the credit for producing the special N.F.D. log sheets goes to Mr. L. W. Jones, G5JO. For three years Mr. Jones has prepared these very useful aids to N.F.D. operating.

The Home Counties Cam-Fest

ONCE again Cambridge became the *Mecca* of a large number of members, on Sunday, July 10. The famous Market Square looked strangely populous at 10.30 a.m., with some forty cars parked, and 100 members and wives strolling about renewing old acquaintances.

The ever-popular D.R., Mr. G. Jeapes, did a brisk trade in tickets for about half-an-hour, when the first party moved off to the Cavendish Laboratories, where, due to the kindness of Dr. W. B. Lewis, we were able to inspect, and have explained, the larger of the only two Cyclotrons in the world, whose job it is to split the atom.

Part of the equipment here is a 100 kW. transmitter operating on 11.5 Mc. This transmitter supplies radio-frequency alternating potential to two coplanar semi-circular plates situated in the Cyclotron proper, which is itself located between the poles of a mighty electromagnet. Such is the power of this magnet that we saw pieces of copper and aluminium floating about like feathers between its poles, while we were advised to leave our watches outside the building! Electronic emission from a suitably placed filament in the Cyclotron liberates protons from traces of hydrogen within the apparatus, and these at once accelerate towards that one of the semi-circular plates which is at that instant at a negative potential of 100,000 volts, but before they can impact upon it the potential which is changing at the radio frequency of the transmitter reverses and the protons receive a further acceleration towards the other plate, but again the potential reverses before impact. This process continued at radio frequency and combined with the influence of the magnetic field causes deflection of the protons into a circular track and under the influence of their constantly increasing velocity they travel in ever-increasing circles until reaching a suitably-placed deflecting plate they escape from the radio-frequency field and impinge upon a suitable target. So enormous is their energy level by this time that the atoms of the target are literally smashed to pieces, the effect being somewhat analogous to the impact of a shell on to a shingle beach!

The target is made of the element whose atomic structure is to be studied, and the changes taking place are deduced from the tracks which are left as the rapidly moving particles knocked from the target pass through a cloud of water vapour. These tracks can be made visible on a photographic plate.

While all this was being explained, the ladies were being shown some of the beauty spots of the town, under the able guidance of Mrs. Jeapes and Mrs. Scott, the reunion of the two parties taking place at the University Arms Hotel, for lunch.

After lunch the ladies were despatched on their "cruise" up the Cam, while the male members "got down to business."

The Cambridge P.D.M., July 10, 1938.
In the front row, extreme left, G2UJ (D.R. No. 16), G6OT, G6PA, G6CL, G2XV (D.R. No. 8), G6UN, G6FO (D.R. No. 10), G6LL, G6CJ, G6NF. Extreme right, G6VD (T.R., Leicester).
The ladies had disappeared for their river trip on the Cam!

First a photograph on "Parker's Piece," and then a meeting, at which the D.R. took the chair. The Granfield Trophy was then presented by the President, Mr. Watts. The trophy is competed for annually by members in the District only.

The Secretary, in his usual "short speech," touched upon many matters of general interest, concerning the Society, and Amateur Radio.

The D.R. in a few well-chosen words discussed District affairs, and the meeting then broke up for tea. After this meal, farewells became numerous, and except for some station visits, another enjoyable meeting was over.

The success of the meeting was due largely to the energy and enthusiasm of Mr. Jeapes, in arranging yet another Cam-fest.

District 16 Meets at Hastings

The annual conventionette of District 16 was held on Sunday, July 24, and this year Hastings was selected as the venue. From noon onwards, members from all parts of the District and in addition our Executive Vice-President, Mr. A. D. Gay (G6NF) converged upon the Adelphi Hotel in Warrior Square, and by the time lunch was served, the party numbered thirty. At the end of an excellent meal the D.R. introduced "Clarry," who thereupon proceeded in his own inimitable fashion to give those present the usual clear and up-to-the-minute information on ham radio and the work that goes on behind the scenes. The subjects covered, ranged from Cairo and licence matters, to 56 Mc. DX, and contained much interesting news that it would be difficult to convey to the membership by means of the printed word.

Members of a scattered district such as No. 16 have little chance to be present at any of the important London or Provincial gatherings, and consequently are liable to be considerably out of touch with what may be called, for want of a better word, the "politics" of amateur radio. This is a dangerous state of affairs, for in the absence of authoritative information on such matters, rumour takes its place, and rumour is often very wide of the true facts.

The Hastings Conventionette
A Group taken at G6XF

"Clarry's" talk ended, a move was made for the open air, and in a few minutes a line of cars was wending its way towards G6XF's station in St. Leonards. The neat layout of his gear was much admired, likewise his equally neat and attractive Sarden, of which all present showed their appreciation by disporting themselves in various attitudes on the lawn while many yards of film, both moving and still, were loosed off! The conversation ranged from amateur radio to the inner mysteries and finer points of the art of Izaak Walton. 2DDD was the leading authority on this subject, but despite attempts on the part of his listeners, refused to be drawn into a description of "the one that got away."

The afternoon thus enjoyably passed, a return was made to the hotel for tea, followed by an impromptu but none the less lucid explanation by Mr. J. E. Bryden, 2BOL, of his latest creation, a most impressive looking signal generator. This fine piece of apparatus rivals, in both accuracy and versatility, the most expensive products of the big commercial firms and reflects great credit on Mr. Bryden, who designed and constructed it entirely himself. It is hoped that this instrument will be displayed on the society's stand during the Radio Exhibition.

By this time, many of the "DX" members were starting on the 50 or 60 miles which lay between them and their homes, but the remainder of the party went on to Little Common, near Bexhill, where is situated G2AX, whose genial "op." Norman Blackburn, runs a pretty pair of T55's in push-pull, and works much uncommon DX, despite aerial difficulties.

Before closing we should like to thank all those who came to Hastings and helped to make the day a success, and to remember particularly G6XF and 2AX, who put in so much hard work in the organisation and running of the event.

G2UJ.

British Isles Calls Heard

ZD4AB, Accra, Gold Coast, between May 13 and June 12.

During N.F.D.

3.5 Mc. CW: g5kgp, 5mlp.

7 Mc. CW: g2uxp, 5kmp, 5msp, 6tip, 6vdp, gm8mnp.

14 Mc. CW: g2oip, 2wvp, 2xap, 5ukp, gw5bip.

---

7 Mc. CW: g2ao, 2xd, 6cj, 8jn, 8kp.

14 Mc. CW: g2as, 2df, 2dh, 2dk, 2hw, 2hx, 2jt, 2ku, 2la, 2lb, 2os, 2pf, 2pn, 2pw, 2qo, 2so, 2ut, 2wc, 2xd, 2xn, 2xq, 2yb, 2yl, 2zp, g3bs, 3bu, 3gw, 3gx, 3jr, 3km, g5an, 5bd, 5bj, 5cg, 5iu, 5li, 5mi, 5my, 5ns, 5pr, 5qi, 5rv, 5tz, 5tw, 5uc, 5xy, 5yu, g6cj, 6dl, 6fv, 6gh, 6if, 6kp, 6lj, 6oq, 6pr, 6qs, 6rb, 6rh, 6sq, 6td, 6uc, 6vp, 6vx, 6wb, 6wy, 6yg, 6yz, 6zq, g8aw, 8bn, 8bp, 8df, 8dt, 8fc, 8fl, 8gd, 8hf, 8hn, 8ii, 8il, 8ip, 8jo, 8kh, 8kv, 8lu, 8md, 8po, 8ql, 8qz, 8ri, 8tl, 8tx, 8ud, 8ui, 8wc, gi5nj, 5sj, 5ur, gm2ia, 3bl, 5sc, 6hz, 6iz, 8sv, gw5ab, 5tw.

TECHNICAL INFORMATION BUREAU

The service is free to members except that a nominal charge of 6d. *per query* is made to cover clerical and postage expenses.

The Rules governing the service are :—

1. Questions must be written legibly and concisely on one side of the paper.
2. A sixpenny postal order must accompany each question.
   The postal order must be made payable to the R.S.G.B., and the letter addressed to Technical Information Bureau, R.S.G.B, 53, Victoria St., London, S.W.1.
3. The service is only available to fully paid-up members of the Society.

BOOK REVIEW

PROBLEMS IN RADIO ENGINEERING. Third Edition. By E. T. A. Rapson. 117 pages. (Published by Sir Isaac Pitman & Sons, Ltd., London. Price 3s. 6d. net.)

The demand for this little book of problems is made evident by the appearance of the third edition. The latest examination questions have been added, and the new edition should appeal to those who will be preparing for the examinations of 1939.

A section has been added on acoustics, though none of the questions given appear to be from examination papers.

It is noted that, though the second edition appeared in 1935, the references to suitable textbooks have not been altered or augmented. In the three years there has been a large number of first-rate publications which would be suitable, and the one lonely American textbook recommended is deserving of additional company. Such references are of the utmost value to the private student, and there would appear to be no reason for restricting their number in these days of excellent library facilities.

T. P. A.

Beethoven Battery D.C.-A.C. Converter

THIS instrument is a vibrator type converter intended for supplying A.C. to all mains radio receivers from a 6-volt or 12-volt battery, and is manufactured by *Messrs. Beethoven Electric Equipment, Ltd.*

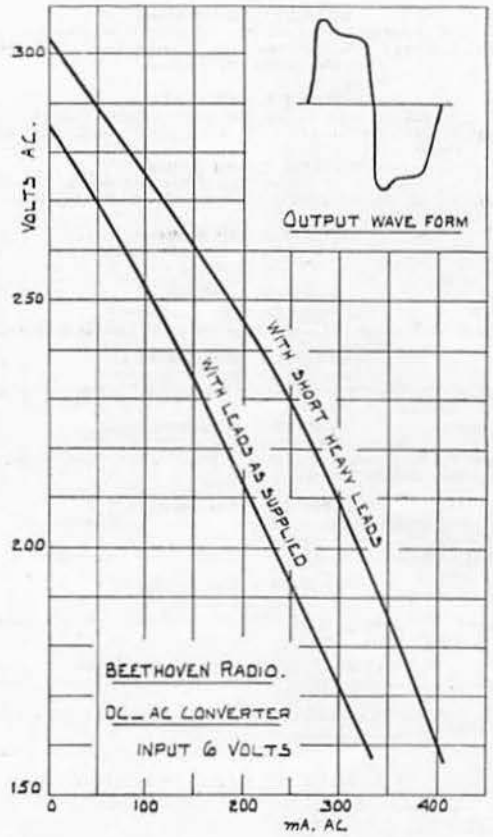
Two models are made, one a type C6 for 6-volt accumulators and one a type C12 for 12-volt accumulators. The output is rated at approximately 220 volts 70 watts. The converters are priced at £5 15s.

The instrument is housed in a black finished metal case approximately 8½" by 6½" by 4". Two heavy shielded leads with large clips are provided for attachment to the battery. The output is connected to a 2-pin 5-amp. plug socket; a fuse and on-off switch are also fitted. The apparatus is well made, a generous sized transformer is incorporated together with an R.F. choke and various good quality condensers for suppressing interference from the vibrator; the latter is of the plug-in type for easy replacement. The model tested was a type C6 for 6-volt operation, and full instructions for installation were supplied with the instrument.

The curves show the relation of output voltage to output load current with a constant 6-volt input. It was found that using the maximum length of leads supplied the output was rather low. On measurement the drop in the leads was approximately 0.7 volts, so that short leads of 7/.036 cable were substituted in which there was no measurable drop and the second curve taken.

Under these conditions with a load of 58 watts at 230 volts the input of D.C. was 6 volts at 13 amps., i.e. 78 watts, giving an efficiency of 75 per cent., which is very good indeed. The curves indicate that the regulation is such that the economical output is about 60 watts maximum.

The wave form of the output was checked on a cathode ray oscillograph and a trace of this wave form is shown above the curves. Whilst the shape is not a sine wave, by the time it has passed through a receiver mains transformer, it will be near enough a sine wave for practical purposes. When supplying power to a receiver no interference was observed except when the gain of the receiver was at a maximum, and it created no interference when operated adjacent to a 56 Mc. super-heterodyne receiver. Any interference that the unit might cause in use could be overcome by suitable earth bonding.



Care should be taken when installing one of these units to measure the output voltage and to set the mains transformer tap correctly because the output voltage is very dependent on the load. The makers advise that when used in a car the engine be left running to keep the battery on charge, due to the consequent rise in voltage. In this connection the makers inform us that they will consider supplying shorter leads for the 6-volt model; this is not so necessary in the 12-volt model, as it consumes only 6.5 amps. It can be said that the converter provides a definitely needed piece of apparatus for powers up to 60 watts for operating A.C. apparatus from a car battery, and should find useful application for portable receivers or transmitters for field days and the like.

D. N. C.

NOTES and NEWS from the BRITISH ISLES

DISTRICT REPRESENTATIVES.

DISTRICT 1 (North-Western).
(Cumberland, Westmorland, Cheshire, Lancashire.)
Mr. J. Noden (G6TW), Fern Villa, Coppice Road, Willaston, near Nantwich, Cheshire.

DISTRICT 2 (North-Eastern).
Yorkshire (West Riding, and part of North Riding).
Mr. L. W. Parry (G6PY), 13, Huddersfield Road, Barnsley, Yorks.

DISTRICT 3 (West Midlands).
(Warwick, Worcester, Staffordshire, Shropshire.)
Mr. V. M. Desmond (G5VM), 199, Russell Road, Moseley, Birmingham.

DISTRICT 4 (East Midlands).
(Derby, Leicester, Northants, Notts.)
To be appointed

DISTRICT 5 (Western).
(Hereford, Wiltshire, Gloucester.)
Mr. J. N. Walker (G5JU), 4, Frenchay Road, Downend, Bristol.

DISTRICT 6 (South-Western).
(Cornwall, Devon, Dorset, Somerset.)
Mr. W. B. Sydenham (G5SY), "Sherrington," Cleveland Road, Torquay.

DISTRICT 7 (Southern).
(Oxfordshire, Berkshire, Hampshire, Surrey.)
Mr. E. A. Dedman (G2NH), 75, Woodlands Avenue, Coombe, New Malden, Surrey.

DISTRICT 8 (Home Counties).
(Beds., Cambs., Hunts and the towns of Peterborough and Newmarket.)
Mr. G. Jeapes (G2XV), 89, Perne Road, Cambridge.

DISTRICT 9 (East Anglia).
(Norfolk and Suffolk.)
Mr. H. W. Sadler (G2XS), "The Warren Farm," South Wootton, King's Lynn, Norfolk.

DISTRICT 10 (South Wales and Monmouth).
Mr. A. J. Forsyth (G6FO), 29, Stow Park Avenue, Newport, Mon.

DISTRICT 11 (North Wales).
(Anglesey, Carnarvon, Denbighshire, Flintshire, Merioneth, Montgomery, Radnorshire.)
Mr. D. S. Mitchell (GW6AA), "The Flagstaff," Colwyn Bay, Denbighshire.

DISTRICT 12 (London North and Hertford).
(North London Postal Districts and Hertford, together with the area known as North Middlesex.)
Mr. S. Buckingham (G5QF), 41, Brunswick Park Road, New Southgate, N.11.

DISTRICT 13 (London South).
Mr. J. B. Kershaw (G2WV), 13, Montpelier Row, Blackheath, S.E.3.

DISTRICT 14 (Eastern)
(East London and Essex.)
Mr. T. A. St. Johnston (G6UT), "Normandale," New Barn Lane, Little Hallingbury, Bishops Stortford.

DISTRICT 15 (London West).
(West London Postal Districts, Bucks, and that part of Middlesex not included in District 12.)
Mr. H. V Wilkins (G6WN), 530, Oldfields Lane, Sudbury Hill, Greenford, Middlesex.

DISTRICT 16 (South-Eastern).
(Kent and Sussex).
Mr. W. H. Allen (G2UJ), 32, Earls Road, Tunbridge Wells.

DISTRICT 17 (Mid-East).
(Lincolnshire and Rutland.)
Mr. W. Grieve (G5GS), "Summerford," New Waltham, Lincs.

DISTRICT 18 (East Yorkshire).
(East Riding and part of North Riding.)
Mr. W. A. Clark (G5FV), "Lynton," Hull Road, Keyingham, E. Yorks.

DISTRICT 19 (Northern).
(Northumberland, Durham, and North Yorks.)
To be appointed

SCOTLAND.
Mr. James Hunter (GM6ZV), Records Office, 51, Camphill Avenue, Langside, Glasgow.

NORTHERN IRELAND.
Mr. J. A. Sang (GI6TB), 22, Stranmillis Gardens, Belfast.

New Members are cordially invited to write to their local District Representative.

DISTRICT 1 (North-Western).

In spite of the special announcement at the beginning of these notes last month, a number of reports have been received containing such information as "G9ZZ is getting out well on 14 Mc.," or "9ZX is using CO-F.D. PA on 7 Mc.," and similar notes of no interest whatsoever to readers generally. This leads to a great deal of work in cutting and preparing the notes for publication and suggests either that Town Representatives do not read the notes published here or that they do not take any notice of them!

Burnley.—G3IY and 3KT are welcomed as new members this month and there seems to be plenty of activity in the district. Reports have been received from 3IY and 3KT, with notes of their DX newly worked, and from 3HK, 8TD, 8UA, 5ZN, 8TD, 2RB, 2CVI, 2DKR, 2BFB and BRS3268 (who is now 2FBI). Members considering a new aerial system should contact 8TD, who has been trying various types.

Bury.—Members operating the District portable station, G2GAP, had a very successful and enjoyable week-end during N.F.D. About 30 stations were contacted on 7 Mc. and 1.7 Mc., including four Swiss portables. The transmitters were supplied by 8NL and 8NF, the receiver by 2BGF and poles and batteries by 6QA.

Six members attended the monthly meeting held at the T.R.'s house. Several members have recently joined R.E.S. and all are active on one or more bands. The T.R. hopes to get a number of stations working on 56 Mc. before the winter so will those interested please get into touch with him.

Active stations include G2GA, 3CJ, 8NF (who will shortly be operating a portable transmitter in Wiltshire on 1.7 Mc., 3.5 Mc. and 7 Mc. 'phone and CW), 8NL (who wants reports on his 1.7 Mc. signals), 8QS and 2BGF, who has applied for a full licence.

Liverpool.—Despite the fact that the holiday season is with us, an attendance of 15 was recorded

at the July meeting. It is observed with somewhat uncertain feelings that there were only two BRS members present.

An interesting discussion on 56 Mc. took place, led by G5MQ, who recently contacted 11IRA. He has also heard another Italian and an HB station and states that he consistently receives the Alexandra Palace transmissions on a 1/10 Super-reger receiver.

This latter fact inspired G6DP and 2JT to take an 0-V-1 straight receiver on to the top of Frodsham Hill, where they received the television sound and vision signals at S 7/8 (QRB about 200 miles) using a half-wave dipole in either horizontal or vertical positions! It is also interesting to note that these signals could also be received S 3/4 without an aerial and with no wires in the vicinity of the receiver. Further study of these signals is to be made with a view to ascertaining their consistency and mode of propagation.

FORTHCOMING EVENTS

Aug.	24	R.M.A. Exhibition opens at Olympia.
Sept.	1	District 14 (Colchester Section), 7.30 p.m., at G8PZ, 19-21, Artillery Street, Colchester.
,,	2	District 8 Meeting in Bedford Area.
,,	7	District 1 (Manchester Section), 8 p.m., at Brookes Café, 1, Hilton Street, off Oldham Street, Manchester.
,,	7	S.L.D.R.T.S., 8 p.m., at Brotherhood Hall, West Norwood.
,,	15	District 10, 8 p.m., at Globe Hotel, Duke Street, Cardiff, opposite Castle.
,,	16	District 12, 7.30 p.m., at the Orpheum Cinema, Temple Fortune.

Much interest in 56 Mc. is being shown in the area and many stations intended to be active during the Relay Tests.

Manchester.—An attendance of 24 was recorded at the July meeting, when N.F.D. was the main topic of discussion. It was suggested that the weight of N.F.D. gear should be limited to some specified figure and the views of H.Q. are awaited with interest. An RK11 used at the field day was raffled and won by 8QS. 2LK won a 6L6 and 2JS won three 20-watt power resistances.

A 56 Mc. network is being formed in the Manchester area and those taking part in the 56 Mc. tests include G6TL, 6OM, 6UQ, 5BS, 3DA, 3HO, 2OI, 5YD and 2RA—most of these stations are either crystal controlled or about to adopt crystal control on this frequency. Co-operation from listening stations will be welcome. These stations are on the air every Friday night from 2200 onwards.

Active stations include: 6TL, 5YD, 2ARC, 6OM, 2WQ, 2LK, 2BMG, 3DC, 8BI, 3BY, 8QS, 2BGV, 2DH, 5WR, 2JC, 2HW, 5HF, 3LF, 2AVV, 2CGL, 2OI, 2RA, 3DA and 2918.

Preston.—G5UG and 3JR are experimenting with various types of aerials and the former, using a Windom, is obtaining interesting results by sloping the top. Other active stations include 5AX, 6SQ, 2CSM and 2DBR.

DISTRICT 2 (North-Eastern)

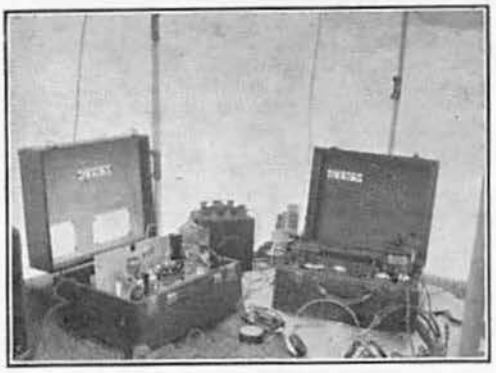
Most areas are fairly quiet, but preparations are being made by the different groups for an active winter session. Reports are few, but it is hoped to have a better selection next month.

Barnsley.—Congratulations to Mr. Webster, who is now G2WX. Active stations include 2BH, 2WX, 5IV, 5KM, 5DW, 5UA, 6LZ, 8NM, 8TZ, and 8WF.

Sheffield.—The winter session commences on September 22 at the Angel Hotel, Angel Street, at 7.30 p.m.; business at 8.30 p.m. prompt.

Halifax.—The T.R., G5QS, has recently joined the R.A.F., and a successor is to be appointed shortly. An appreciation of his past services is hereby recorded, and the good wishes of all members are sent to him in his new post.

Bradford.—Congratulations to G6QS, in being the first British station to get the WAS Certificate. This is the second in Europe, and some of the local stations are now trying to get those elusive states in an endeavour to emulate this performance. The local society will be starting up again in the autumn and the T.R. and Scribe then hope to renew contact with all members.



Gee Two Walking Suit-Cases.
Here are the two suitcases carried by G2WS on his many jaunts to investigate 56 Mc. propagation. This gear was used by Mr. Scarr during N.F.D. for contacts on 56 Mc. with other parts of District 4.

DISTRICT 3 (West Midlands)

Only one report has been received. Members are requested to send a P.C. either to their T.R. or the Scribe by the 25th of each month.

Shrewsbury.—Congratulations to 2CJO who has passed his morse test, and awaits his full call. G5YP and 6KR are active, whilst 8JC has built a new MO for control on all bands. 2COB is rebuilding his shack with a view to obtaining full licence. It is hoped to encircle the Wrekin with 1.7 Mc. stations before winter arrives.

Staffordshire.—G6SW reports activity but is having trouble neutralising his parallel PA due to mismatching of tubes. 2YV is active on 7 Mc. 'phone. The Stafford group held a field day on Cannock Chase on Sunday, July 24, but no report of its success has yet been received. Mr. T. Ball G6SW has kindly consented to act as T.R. for Cannock.

DISTRICT 5 (Western)

District Representative : J. N. Walker (G5JU), 5, Frenchay Road, Downend, Bristol, Glos.

Town Representatives :

Bath : G. R. Marsh (G2IW), Oriel Lodge, Lower Swainswick, Bath.

Bristol : R. E. Griffin (G5UH), 4, Nailsea Close, Bedminster Down.

Cheltenham : W. G. H. Brown (G5BK), 200, Prestbury Road, Cheltenham.

Gloucester : J. H. Hamilton (G5JH), Brook Cottage, Bristol Road, Hardwicke, Glos.

Members in the District will be interested to learn that our 7 Mc. N.F.D. station succeeded in winning one of the four Replicas of the N.F.D. Shield. This will be awarded to G6RB, the operator in charge.

Another announcement of interest is that a special meeting is being held at Weston-super-Mare on Sunday, October 2, in conjunction with Districts 6 and 10. Whilst technically a Conventionette, this meeting will be more in the nature of a P.D.M., as it is expected that officers of the Society will be present. Please keep the date open. Full particulars will appear in the September BULLETIN.

Mr. D. F. Waddington, BRS373, has presented a Silver Cup to the R.S.G.B. in memory of the late Mr. W. A. Andrews (G5FS) and his thoughtfulness is much appreciated by all. A Committee of members from various parts of the District has been formed and at their first meeting on July 27 Mr. L. Crabbe (G6VF) was selected as the first holder of the cup (which is to be known as the "*G5FS Memorial Trophy*"), in recognition of his very excellent U.H.F. work during the past year, including putting signals twice into Czechoslovakia on 56 Mc. The trophy will be presented at the Weston meeting mentioned above.

Activity in Bath is mainly confined to 14 Mc., although G8DX has recently started up on 1.7 Mc. —this is the first time a Bath station has been heard on 1.7 Mc. for many years.

Bristol amateurs were again fortunate in having yet another thoroughly interesting visit arranged for their benefit by G2IK, this time to the Post Office Radio Station at Portishead. The visit took place on July 14, and quite a large party took advantage of it. We are indebted to G6FG and Co. for the able way in which they described in detail the various transmitters, power supplies, etc.

Mr. H. C. Bailey, BRS3065, brought along to the Bristol July meeting his model SX 17 Super-Skyrider of 1938 vintage and described its major features. The demonstration was marred by electrical interference, but details of the receiver's performance under average conditions was given.

G6YA has left the district to take up an official appointment on the South Coast and whilst sorry to lose him, we wish him the best of luck.

The T.R. (G5UH) wishes to thank members for their splendid response to the summer programme and it is hoped that another interesting one can be arranged for the autumn.

There has recently been great activity on 56 Mc. in Cheltenham ; it has been arranged that, when convenient, operators listen and call on that band every night at 9.30 p.m. This will avoid waste of time and useless calls when no one is on. Other stations please note.

ON4FOR of Ghent whilst staying in Cheltenham recently visited all the local stations.

Gloucester members have been taking part in 1.7 Mc. Field Days arranged in conjunction with the local Radio Club.

DISTRICT 6 (South Western)

There is little information to hand this month concerning the activities of the members. It is to be expected that active work is at a low level during the summer months, and this, coupled with the decidedly poor conditions on the 14 Mc. band, is no doubt responsible. The D.R. would like to hear more from individual stations, however, especially if there is anything outstanding to report. He expects to be in London during Convention, and hopes that many others from the South-West will also attend.

Exeter.—There was an attendance of fifteen at the meeting held on the first Wednesday in the month, which was excellent considering the time of the year. Each of the transmitting members present gave a ten-minute talk describing the type of aerial in use at his station, and explaining the reason for his choice.

At the next meeting there will be a debate on the subject of straight C.O.—F.D. *versus* Tritet. All members report active and G3MU, the most recent, is obtaining quite good DX.

Taunton.—Apologies are due from the D.R. for not entering the report last month. It was apparently sent in with the N.F.D. logs, and must have been mislaid. On July 14 members paid a visit to the Portishead Radio Station, and afterwards had tea with G6LQ at Weston-super-Mare. The party comprised 3NB, 5AK, 5GT, 5TN, 6LY, 6LQ, and 2BFI.

Examining the Cyclotron at the Cavendish Laboratory, Cambridge.

North Devon.—Congratulations to G8US, who has at last succeeded in obtaining his 14 Mc. W.A.C. on C.W. He has also managed to work all U.S.A. districts in less than an hour. Reports have been received from 6GM, 3GH, 3BO, 2DOW, BRS2970, 3AM, and 2ID.

Torquay.—Though there are now no regular monthly meetings, quite a number of members

have been meeting at the D.R.'s station on Sunday mornings, when all sorts of subjects have been discussed. It is hoped to hold a series of D.F. tests on 56 Mc. during August and September, and those interested should write to the D.R. for particulars.

G3HW at Teignmouth was successful in receiving 6FO's 56 Mc. C.C. C.W. from South Wales, a distance of 75 miles over hilly country, on Sunday, July 17.

Will intending visitors to G5SY kindly write first, as he is finding it very difficult to attend to all his jobs and entertain unexpected visitors as well?

A real portable.
G6NA operating G6NAP on 1.7 Mc. Note the "outsize" in transmitter and receiver.

DISTRICT 7 (Southern)

Reading.—At the meeting held at the Y.M.C.A., Reading, on July 20, some 14 amateurs were present. A welcome is extended to G8TH, and congratulations to Mrs. Gladys M. Salter on obtaining her full call, G3LJ. 5CA is again coming on the air after an absence of ten years. Reports have been received from 2YB (who is awaiting QSL from ZS1AN for WBE and WAC on 28 Mc.), 2GG and others. N.F.D. was considered very successful, and the T.R. wishes to thank all the members in Reading and District for their help and support. There will be no meeting during the month of August owing to the holidays.

Guildford.—G2GK, 5WP, 6NA, 6LK, 8IX, and 8LT are active, and 6LK is making regular 50-mile contacts on 56 Mc.

Reigate.—The local club is still being well supported, and talks by well-known amateurs, including G2CX, 6WY, 5YK, 5LA, and 8HB have encouraged many debates and aroused much technical interest. Meetings for August have been suspended for the benefit of Convention and Radio Olympia. Active stations include 6JF, 8MP, 5LK, 8HH, 8KI, and 2BGN.

DISTRICT 8 (Home Counties)

The Eastern District Provincial Meeting held at Cambridge proved to be a great success and was attended by 97 members and friends, including W1HKK with YL. Everybody seemed to have a good time in spite of the uncertain weather. Further notes on this function will be found elsewhere in this issue.

Reports are very scarce, although most stations are known to be active. At Peterborough a pair of 55 ft. masts are in the course of erection by 5NF, and at Cambridge a pair of 50 ft. ones will shortly appear at 2XV's QRA.

The D.R. wishes to take this opportunity of thanking all members in the district who helped to make the P.D.M. a success.

DISTRICT 9 (East Anglia)

A good number of District members attended the Cambridge P.D.M. and from verbal reports received it seems that everyone had an enjoyable time.

In spite of summer weather, activities seem to be much in evidence.

Ipswich.—On July 24 G8AN was unfortunately hoaxed by a local amateur into believing that he had worked Sweden on 56 Mc. Fortunately for all concerned an apology was forthcoming before too much publicity was given. Other activity is centred chiefly on 14 Mc. aerials. G8MU is using horizontal and vertical W8JK beams, while 8CU, 2JD and 8AN are using the former type only; 6TI, who has forsaken his Windom for a doublet, has received a report from BERS337, Prospect, South Australia, confirming reception of G6TIP on 7 Mc. during N.F.D. G2DT and 8AG are also trying doublets; 8KB is erecting a vertical rotating beam, while 2AN is using a fixed vertical doublet. Congratulations to 2CBX who is now G3NQ; also to 2CWZ, who has passed his morse test and now awaits his full licence.

"Professor" Jeapes shows some of the party around King's College, Cambridge—taking care to keep them off the grass!

Great Yarmouth.—The Yarmouth Radio Society continues to surmount difficulties and forge ahead. A club-room has now been acquired, which it is hoped to equip with gear at an early date. Morse practice has been carried on consistently for the past three months. 2BND now listening on 56 Mc. with the 6DH three-valver. 2FAO building a T.P.T.G. and designing a rack. BRS3255, 3366 active, the latter being a new member whom we welcome to the district.

Lowestoft.—Upon the resignation of G8DD as T.R., G5QO has been nominated and elected to stand in his place. 5QO, who is active on 3.5 Mc. telephony and 56 Mc. C.W., has also constructed a Reinartz rotary beam for work on the latter band.

Norwich.—No reports were received owing to the illness of the T.R., G6QZ, who hopes to be active on 56 Mc. again as soon as his health will permit. G5IX has completed the construction of an "H" beam for 56 Mc. and will be transmitting on that band very shortly.

Outlying Districts.—At Beccles 2CTR is taking his morse test and hopes to have his full licence shortly. G8WI of Orford is active on QRP 7 Mc. C.W.

DISTRICT 10 (South Wales and Monmouthshire)

There is a scarcity of material this month due to the holiday season, while the D.R. himself has been out of touch for a month owing to absence. He is glad, however, to say that several members in the outlying parts of the District have written in response to his request in the May issue.

G6BK is having his call pirated on 1.7 Mc. 'phone, and any assistance in locating the offender will be appreciated. GW8CT and GW2BG are testing on 28 Mc. with the idea of using it as a summer-time link! A proposal has also emanated from this quarter that Monmouthshire be officially declared Welsh; the difficulty is that for the majority of other members (apart from geographical and similar considerations) it is an English county and only a minority are using the GW prefix. The matter could well be discussed at the next meeting at which there are a representative number of Monmouthshire members present.

From the West comes news that GW2OP is active on 56 Mc. In this connection, G6FO received reports between July 17 and 25 of the reception of his 56 Mc. CC signals from many directions in the south of England at distances up to 112 miles. The most outstanding was that from G2XC, Portsmouth, 96 miles, who gave RST-578, QSB 558 at 2230 B.S.T. on July 19. The input at Newport was just under 25 watts and the aerial a 10 ½-wave omni-directional arrangement. On July 26, G6FO heard G6IH, Malvern, at RST-559, 2140 to 2220 B.S.T. The distance in this case is about 45 miles. The regular G5JU-G6FO contacts are still being maintained and G2JL, who has been on holiday in North Devon with a portable receiver, was able to find very strong signals, up to RST-599, from both these stations at points on the coast.

The D.R. had the pleasure of attending the Cambridge P.D.M. on July 10, at which no less than nine Districts were represented.

DISTRICT 12 (London North and Hertford)

No reports have been received this month from Area and Town representatives, but there are several stations in the district operating regularly. As announced at the last District meeting, and the subsequent issue of the BULLETIN, meetings will be resumed again in September.

The third Friday in the month falls on the 16th, and as the September issue will probably not appear in time, please make a note of the date—September 16, Orpheum Cinema, Temple Fortune.

The D.R. hopes that the District will again be well represented at Convention. We have in North London one of the largest District memberships, so it is up to us to turn up in force at the most important Society function of the year.

A New-Timer looks at the Old Timers and others at G6TIP one of the District 9 N.F.D. stations.

DISTRICT 13 (London South)

A meeting of the Central Areas took place on July 21 and, in spite of the holiday season, was very well attended. Nothing of outstanding importance occurred last month and owing probably to the fact that many members are away on holiday, reports are scarce. It may be well to mention that matters dealing with the finance of the District were to be dealt with at the August meeting. Further information will appear in our next notes.

G2JK reports that he took part in the 56 Mc. Field Day with the assistance of 3CU and BRS3276; he wishes to convey his special thanks to the latter for the loan of site and masts, etc. Reports on transmissions on 56 Mc. from 2JK would be welcomed. 2BNL has now received the call 3TA and we wish him good luck. 6GQ and 6KM are active. It will be of interest to South London members to learn that ex-G2TH is now active again, using the call ZD4AB. He is to be heard on 14,340 kc. between 1700 and 1800 G.M.T. most evenings.

In conclusion, may we wish everyone a very happy time at the Annual Convention, which is almost upon us once again. We look forward to meeting many old friends and hope that all the new members will come along and introduce themselves. The D.R. hopes to be on the stand at Olympia most evenings.

DISTRICT 14 (Eastern).

Brentwood.—The local Society held their first D.F. Contest on July 24. The transmitter, built by G3CQ and operated by G2WG, 3CQ and 8TV was hidden near Ingatestone. G6CT of the South-

end Society was the winner, with Mr. Kelly of Ilford second, and the Brentwood Society third. A cup to be known as the Shenfield Trophy, donated by G8KM, was presented to the winning Society by the D.R. at the subsequent hamfest held in Brentwood.

The following are active : 2CRV, 2DJB, 2DRI, G3CQ, 3GW, 3LA and 3MV.

Colchester.—The Colchester T.R. is Mr. S. D. Perry, G8PZ, 19, Artillery Street. His name was omitted from the July notes.

East London.—The July meeting held at BRS3270 was poorly attended. No meeting will be held this month.

Thanks are due to Messrs. Harmer and Simmons, of Walthamstow, for loaning accumulators to the Abbess Roothing N.F.D. station.

G8AB recently visited several French amateurs including F3AC, 3JK, 3OO and 8ZS.

District 10 at Blackwood.
Some of the group operating the 7 Mc. station. Left to right, 6BK, 8PU, 8CT, and in front, 2BG.

East Sussex.—Thirteen members attended the July meeting held at G8RT. The next meeting will take place on September 21 at G2LC.

G2LCP was in operation during the Annual 56 Mc. Field Day. Thanks are recorded to BRS2538 for the site.

The summer D.F. Tests organised by the Southend Society have been well attended. Co-operation has been arranged with the Ilford, Romford and Brentwood Societies.

Congrats. to 2CGF who is now G3OA. We are sorry to lose Dr. Gee, G2UK, of Eastwood, who has accepted a new post at the Nottingham Sanatorium. The District wish him the best of luck.

Romford.—It is expected to form a group under a T.R. in this town at an early date.

G6QX has just returned from his U.S. tour during which time he visited A.R.R.L. Headquarters and very many amateur stations.

DISTRICT 15 (London West, Middlesex and Buckinghamshire).

Reports are very few this month, and activity is, no doubt, affected by holidays. Will members please make a note of the D.R.'s new address (occasioned by his marriage during the latter part of July), which is now 530, Oldfields Lane, Sudbury Hill, Greenford, Middlesex. We offer him and his wife congratulations and sincere good wishes for the future.

West London.—Active stations from which reports have been received are 2CMG, 2DRF, 6CO, and BRS3074, who sends his usual list of DX heard.

South Middlesex.—Members of the T.V.A.R.T.S. visited Brookmans Park during the month, and had a very interesting time. Reports have been received from G3JG, 2CAL, and 2DDV.

DISTRICT 16 (South-Eastern).

The most important event of the month was the Conventionette held at Hastings on July 24, but as this is reported fully on another page of this issue, no more need be said of it here.

By the time these notes are read, the 1938 Radio Exhibition at Olympia will be opening its doors. The R.S.G.B. stand, which is this year for the first time on the ground floor, will be the rendezvous of amateurs from all over the country, and it is hoped that a large number of District 16 members will be present.

If it is at all possible, come to Convention, and the dinner on the evening of September 3. It is *not* a stiff and formal affair, as some people seem to think, and you will certainly enjoy yourself if you come. But don't forget to book early ! Failing the Dinner (or, in addition to it if you can), try and get to the Conversazione at the Florence Restaurant, Rupert Street, on the Friday. Come and have a rag-chew and see the new N.F.D. films. See you at Convention !

Ashford.—Local members interested in 56 Mc. work have been carrying out field strength measurements, and ran a station on Wye Downs during the 56 Mc. Field Day. Unfortunately, no results were forthcoming, and a beam aerial is now under construction.

Brighton and Hove.—G8OQP, situated 813 feet above sea-level on Ditchling Beacon, worked 2HG, 5MAP, 5OJ, 6LK, 8IX, and 8KZP with an input of 9 watts during the 56 Mc. Field Day.

Active stations include G2RU, 3JF, 3KJ, 6CY, 6RM, 8AC, 8OQ, and all A.A. and BRS members.

Eastbourne.—G2AO has received a 56 Mc. report from F8AA, and hears F, ON, and PA on this frequency. (Details please, OM.)

Active stations include 3CX, 5BW, 5IH, 8CP, 2AVQ, 2BPB, 2CNO, and BRS3293.

Gravesend.—The T.R. is unfortunately unwell at the time these notes are being written, and it is hoped that he will be fully recovered by the time they are published. For this reason there is no detailed news this month. It is understood, however, that 56 Mc. activity is high.

Heathfield.—Five members attended the Conventionette at Hastings. Activity is fairly good.

Medway Towns.—5FN, 6NU, 2AFT, 2BCH, 2BOL, and 2DOH are active.

Tunbridge Wells and Tonbridge.—Active stations include 2UJ, 5KV, 6OB, 8NO (Tonbridge School Radio Society), and 2UJ (whose 56 Mc. CW signals have been heard by 5RD near Watford). 2PQ and 2UJ assisted 8NO to arrange a small radio exhibition on the occasion of Tonbridge School Speech Day, at which 2PQ showed an oscilloscope and generators.

Whitstable.—Eight members were present at the Conventionette, being the largest party there. The following are active : 3BD, 5CI, 2AAN, and 2BBT.

DISTRICT 17 (Mid-East)

Boston.—Congratulations to G8BQ, who is now W.B.E., having contacted that elusive VU. 6GH and 8GI ask for co-operation on 1.7 Mc.

Horncastle.—2AAS, the only station sending in a report, has recently completed a very efficient transmitter.

Lincoln.—5XL, 2CFT, and 2CMN report active. 2CFT being almost ready to apply for his two-letter call.

Cranwell.—G8FC is carrying out tests on 56 Mc. and would appreciate co-operation from other 56 Mc. stations in the District.

Mablethorpe and Sutton.—G5CY and 5LL are carrying out extensive tests on 56 Mc. and would appreciate co-operation. 5BD is also active.

Brigg.—G8AP is active and will shortly be working on 56 Mc.

Grimsby and District.—The Grimsby and District Short Wave Society continues to hold very successful weekly meetings and an interesting 56 Mc. programme has been arranged. The following stations have sent in reports: G2QA, 2VY, 5GS, 6AK, 8IV, 8CI, 2AZH, and 2BXG.

Northern Ireland

Owing to illness the writer has been out of touch with most of the active stations and no written reports have been received.

GI6YW has worked Haiti and Baluchistan as new countries for him and says conditions have been poor on the whole.

The N.F.D. station operators are suitably bucked by the good news of their win and send the best of wishes to their successors next year.

A district meeting with tea, as previously, has been arranged for Friday, September 30, in Belfast. A reminder will appear in "Forthcoming Events" in the September issue.

Scotland

When this is being read the Scottish Convention will be less than a month ahead. Everything is now well in hand and full particulars appear elsewhere in this issue. It has been decided to take advantage of the fact that the new giant Cunard-White Star liner, *Queen Elizabeth*, will, at the time, be ready for launching the week following. As it is thought that many members will welcome an opportunity of seeing the great liner at this stage of her construction, arrangements have been made for a trip from Glasgow down the Clyde to view the new giant. The boat will also pass the many famous Clyde shipbuilding yards and docks on the river. The trip will start from Glasgow (Bridge Wharf) on Sunday, September 18, at 10.45 a.m. prompt, and the fare will be 1s. per head. May we ask all intending to be present at the meetings to book as soon as possible as, owing to the pressure on caterers caused by the Exhibition, it is necessary to give them instructions considerably earlier than usual. Co-operation in this way will be appreciated.

The most important personal news this month is that Mr. B. Groom (GM6RG) has been awarded the "ROTAB" Trophy, and everyone congratulates him on this distinction.

"B" District.—Mr. D. W. Milne, Jun. (GM6BM), has resigned as District Officer and Mr. G. W. McDonald (GM2OX), of 122, John Street, Aberdeen, has been elected as his successor. We were very pleased to have the good luck to pass through Aberdeen on a district meeting night and only regret that our visit to the meeting had to be so short, owing to limitations of time.

"C" District.—The district has decided to suspend meetings for only one night, which falls on the Dundee Holiday week, resuming after this as usual.

What was the Joke ?

A happy snap taken outside the University Arms Hotel, Cambridge, after the recent P.D.M. In the group can be seen G6NF, 6PA, 6LL, 6UN and 2XV. Mr. F. Wise seems busy, as usual, with his cine camera.

"D" District.—Activity is falling off with the advent of better weather and several stations are rebuilding.

"E" District.—Full details as to date, time and place of meeting for the first meeting of the district, will be published in the September issue. Mr. T. M. Auld, 2CHP, is now GM3MH. Reports have been received from GM2MP, 2UU, 3MH, 2CFQ, BRS1295 and 2916.

"G" District.—GM6RG is meeting success in his aerial experiments. Mr. D. S. Bruce (2CXZ), the District Officer, joins the ranks of the fully licensed as GM3NI. 2CGY, 2CXC and BRS2845 report.

"H" District.—Morse instruction is being given by GM6JJ at his QRA each Thursday evening at 7.30 p.m.; all interested are welcome. Mr. Gouck (2CWG) is now GM3NH, while Mr. A. T. Wood is GM3ND. GM2UW, 3ND, 3NH, 6JJ, 2AXG report.

BRITISH EMPIRE NEWS AND NOTES

Australia (Queensland)

By VK4GK

The writer has now installed himself at Ithaca, Brisbane, and schedules have been resumed with VE5BI. A 33 ft. Hertz with single-wire feeder is in use, but no G's have yet been worked.

VK4RY and 4HR have qualified for 28 Mc. W.B.E. certificates, 4UR and 4UL are active. 4YL has been appointed to the Teachers' Training College, so has little time for DX.

VK2NO has been a recent visitor to Brisbane. A welcome is extended to any British amateur who may visit Queensland's capital.

Australia (Western)

By VK6WZ.

The annual general meeting of the W.A. Division of W.I.A. was held in Perth on June 14 and general business, including the election of officers for the coming year, was attended to. A new Council consisting of the following members was declared elected: K. Anderson (VK6KS), C. Brown (VK6CB), A. Buckie (VK6AB), E. Doddy (VK6WH), G. Moss (VK6GM), J. Park (VK6BB), C. Quin (VK6CX), F. Tredrea (VK6FT) and A. Wyle (VK6BW). Other officers to be elected included VK6LY (R. Collis), who, in association with VK6CP (C. Cooke), continues as QSL officer for VK6.

Trophy winners for the year past were announced and the presentations made at the dinner held on June 18. The "West Australian" Cup was won by W. Weston (VK6MW) for the second time; the Hayman Trophy went to G. Rann (VK6KO); whilst the President's Trophy (usually a cup but this year replaced by pennants) was tied for by C. Brown (VK6CB), J. Park (VK6BB) and G. Rann and C. Quin (VK6KO and VK6CX) in association. The Radio Inspector's Trophy was awarded jointly to W. Weston (VK6MW) and A. Wyle (VK6BW), who will hold it for its first year of presentation.

Nearly eighty members sat down to the annual dinner and the gathering was considered a most successful one.

Malta

By ZB1E.

The hot weather prevailing, together with very poor conditions and QRN, is undoubtedly responsible for the general slackness in activity so conspicuous this month amongst the members. Only one report has been received, from ZB1V, which confirms the foregoing!

As stated, the 7 and 14 Mc. bands are noisy and poor, and the 28 Mc. band is dead.

Northern India

By VU2AN, *via* G5OV.

The past month provided very patchy conditions on 14 Mc., with a few very good days and many poor ones. Activity has been irregular as a result and little inter-VU working has taken place. It has been suggested that Sunday morning would make an ideal time for local rag-chewing on 14 Mc. with not so much congestion as on a certain band in G! So what about giving the idea a trial?

VU2EB has made an appearance on 14,200 kc. with an RK25 in the final but is troubled with DC fan QRM. VU2DR has made his 'phone WAC, using a single 6L6 in PA and another as modulator. (Congrats!)

VU2FX, who has been working portable from Topa, hooked VR6AB. (VR6AB is a pirate and not in Pitcairn.—ED.)

VU2AN has rebuilt from parallel to push-pull 6L6's final, in readiness for the 28 Mc. season. Very slight difference in output has been noticed on 14 Mc. but the transmitter now lines up much more easily.

South Africa

Division 6.—ZS6C will be inactive until the power mains are installed at his new location. He built a crystal receiver for a newcomer to the amateur fraternity, and the first amateur station he heard was the writer's brother's!

ZS6T has made application for the 28 Mc. W.B.E. telephony certificate. He has rebuilt his outfit, and is operating on 3.5, 7, 14, and 28 Mc. His Johnston Q gives him best results for 28 Mc. operation when in the vertical position, about 16 feet off ground. 6T has given up telephony and states that his interest will in future be C.W.

ZS6BL has almost completed the building of his new transmitter and hopes to emit a strong signal on 14364 kc.

ZS6BT is active on 14 Mc., and has added to his log two new countries, one of which is the acquisition of a new zone—FI8AC and ZD2H. 6BT has built a receiver using metal tubes in an O-V-1 circuit—6J7 into 605—which performs efficiently in the reception of DX on 14 and 28 Mc. He is hopeful of getting the receiver to operate on 56 Mc.

ZS6CS has completed the erection of his new station and is active on 14 Mc. He has contacted VU2.

ZS6DM managed a few contacts on 3.5 and 14 Mc., working VU2 and W8 on the latter frequencies and a few Gs. He had an interesting contact with VE5AAD and hopes to contact him again in the near future. 6DM requests the VKs to note that he is listening for signals every Saturday at 1400 G.M.T.

ZS6DZ has received the W.B.E. award, which is a tangible reminder of his old ZU6Victor days!

ZS6EN is enjoying a few weeks with the Division Five amateurs, whilst ZS6EN is holidaying at Port Elizabeth.

ZS6DZ.

Sudan

By ST6KR *via* G2JU.

ST6KR is now using a new transmitter employing a Jones exciter. Input 80 to 100 watts. Before the installation of the new gear, ST2CM and 6KR did well with 18-36 watts to an ECO-PA. Recent DX has been J2, 5, VK, VU, VS7, PY, LU, W and ZE. It is hoped to employ a 132 ft. harmonic Windom from a new shack at an early date.

QSL's are outstanding from a very large number of stations worked.

Egyptian Notes

Conditions on 14 Mc. continue fair with heavy QRN in the early evenings, which clears up towards midnight.

NY1AD and NY1AE gave the writer a new zone and a new country and thanks are due to W2GT for lining them up—a sked with ST was fixed in return.

Several American stations have been heard calling ZC6NX, who is either a very newcomer or someone with a distorted sense of humour.

SU3HC and SU3HCP (portable) is the call of the newly formed Heliopolis Amateur Radio Club —H.A.R.C.

Some queer ZC6 calls may be heard soon, due to SU1SW and most of the members of SU1GT going to Palestine complete with portable gear.

SU1SG is recuperating after a lot of hard work as Honorary Editor of the *ERSE Bulletin*, publication of which is suspended until September.

Ex-2BBB, of District 16, who is now at Helwan, is a member of the H.A.R.C. and will be applying for an SU call soon.

All the rest of the SU group appear to be away on vacation since no details of activity are available.

SU2TW anticipates returning to G shortly.

SU2TW.

An Electrically Operated "Bug" Key

By L. W. GARDNER (G5GR).

THERE can be no doubt that once one has acquired the use of a "Bug" key it has many advantages over the straight type. Owing to its intricate mechanical nature, the commercial article is rather expensive and, furthermore, home construction presents many difficulties, particularly to those who have no access to a set of mechanic's tools.

In presenting a design of such a key which is electrically operated, the mechanical construction is no more difficult than is a home-constructed receiver and, at the same time, it has certain advantages over the mechanical model, one of which is that the speed of the dots can be varied instantly, or even whilst actually keying.

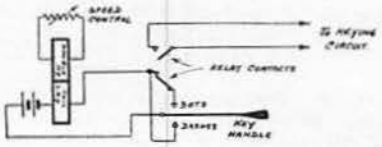
As is well known, dots are produced on the mechanical key by means of a spring arm loaded with a bob weight, the position of which may be varied to suit the speed of sending.

In the electrical design, a telephone type relay, which can be purchased from ex-Government stores, is used to produce the automatic dots.

By using a set of break contacts in a self-interrupting circuit (as in a trembler bell) the armature of the relay can be made to pull up and drop away again during the whole of the time battery is applied to the circuit.

In order to obtain a speed of interruption which is sufficiently slow for the purpose, it may be necessary to tension down the contact springs. If there are any spare contact springs which will not be used (remembering to reserve a pair of "make" contacts for use as the keying contacts) the spare springs should be employed to apply the tension. This is necessary because, to assist in slowing down the relay, the "break" contacts should remain made, over practically the whole of the armature travel and with this critical adjustment it is difficult to obtain a heavy tension.

In order to compete with the mechanical "Bug," means must be provided to vary the speed of the dots and in the model made up by the writer this was achieved by choosing a relay having a double winding, one winding being used to operate the armature and the other shunted by a variable rheostat. This causes a current to flow in the



second winding, due to the back E.M.F. set up across it by the breakdown of the field in the operating winding. The smaller the shunt resistance the slower will be the speed of interruption.

The model described had a 200+200 ohms relay with a shunting resistance having a maximum value of the order of 400 ohms and it was found to be capable of controlling the speed of the key for sending between approximately 10 and 35 words per minute.

The dashes present little difficulty, the circuit being arranged to apply battery direct to the operating coil when the key handle is moved over to the dash contact.

The operating contacts call for little comment, as all that is required are two contacts, one on either side of the operating arm, spring tension being applied, such that the arm returns to the centre when the knob is released, but not such that the arm rebounds across and makes contact on the opposite side. In other words, what is commonly known as a "side swiper" key.

The operating voltage will, of course, depend on the winding of the relay but a small battery should suffice.

The only criticism which can be offered is that there is a very small time lag, caused by the retardation effect of the shunt winding, but this is indirectly proportional to the operating speed of the key and its effect is not great.

This key was handed over to G2LU, who uses a commercially built "Bug" and he pronounced, it quite satisfactory.

"T. & R. Bulletin."

ADVERTISEMENT RATES.

	Per insertion.
Full Page	**£6 0 0**
Half Page	**3 0 0**
Quarter Page ...	**1 10 0**
Eighth Page ...	**0 15 0**

Series Discounts—5% for 6 or 10% for 12 consecutive insertions.

Full-page type area $7\frac{1}{4}'' \times 5\frac{1}{4}''$.

Blocks : 100/120 screen.

Advertisements specified for *Covers and Facing Matter Positions* are *not* subject to series discounts.

The T. & R. BULLETIN is published on the 15th of each month. Copy and Blocks should reach us by the 25th, if proofs are required. Final date for Copy and Blocks 30th of month for following month's issue.

All orders, copy, blocks and applications for space or specimen copies should be sent to Advertisement Manager.

PARR'S ADVERTISING LTD.,

Craven House, 121, Kingsway, W.C.2.

Telephone : Holborn 2494.

INDEX TO DISPLAYED ADVERTISEMENTS

QRA Section

Manager: H. A. M. WHYTE (G6WY).

When sending in new, or changes of QRA, members are requested to print their names and addresses in block letters, as frequently signatures and names of streets are illegible. This necessitates reprinting the corrected address in the next issue of the BULLETIN.

New QRA's

EI9N.—T. J. GREEN, 19, St. Aidans Park Road, Dublin.
G2DM.—A. S. BINKS, B.Sc., 20, Western Avenue, Queensbury, Nr. Bradford, Yorks.
G2MF.—J. F. MORTIMER, 51, Townhead Road, Dore, Sheffield.
G2XW.—A. W. WELLS, 52, Hazlemere Road, Petts Wood, Orpington, Kent.
G2ZJ.—W. A. NOKES, Chemist, Ingatestone, Essex.
G3BN.—A. E. SUTTON, 29, Rossall Road, Syke, Rochdale, Lancs.
G3GQ.—B. P. BOWDIDGE, 6, Popes Grove, Twickenham, Middlesex.
G3HJ.—J. R. HUGGON, "Ballachree," Dunmail Drive, Cumberland.
G3LF.—D. J. ROBINSON, 16, Greenhill Crescent, Harrow, Mdx.
G3LT.—F. J. HARRIS, 89, Sandhurst Road, Kingsbury, London, N.W.9.
G3LZ.—F. W. DEAN ROUSE, Orchard Dene, Sedgeberrow, Evesham, Worcs., and at 62, Fitzjohns Avenue, Hampstead, London, N.W.3.
G3MD.—R. H. DREW, 22, Benton Road, Ilford, Essex.
G3MF.—D. G. FARQUHARSON, Invercauld, Coombe Rise, Coombe Lane, Kingston-on-Thames, Surrey (incorrectly given as G3NF in July BULLETIN).
G3MI.—J. R. GARRETT-PEGGE, The Meades, Chesham, Bucks.
G3MS.—A. W. HARTLEY, Gordon Hall, Huntley Drive, Nether Street, Finchley, London, N.3.
G3MV.—M. B. EDWARDS, "Upwey," West Park Hill, Brentwood, Essex.
G3NF.—(NZ2EM) R. M. HALL, 42, Beechwood Park, Snaresbrook, Essex.
G3NG.—GEO. GRAY, Mooredge, Carluke, Lanarkshire, Scotland.
G3NH.—JAS. GOUCK, 40, Cairns Street, Kirkcaldy, Scotland.
G3NI.—D. S. BRUCE, 39, High Street, Galashiels, Scotland.
G3NM.—S. R. POUNTNEY, 164, Tennal Road, Birmingham 32.
G3NP.—D. BAKER, "Sunnymead," Marguerite Drive, Pitsea, Essex.
G3NR.—A. W. BIRT, 6, Hempstead Road, King's Langley, Herts.
G3NX.—N. T. E. DUNKERTON, "Commercial Hotel," 86, Old Street, Ashton-under-Lyne, Lancs.
G3NY.—ERIC A. TOPHAM, Market Place, Thirsk, Yorks.
G3OA.—H. COTTIS, 2, St. Mary's Cottages, Church Road, Thundersley, Essex.
G5QS.—J. S. KILPATRICK, 106 Squadron, R. Flight, No. 5 Squadron, No. 2 R.A.F. Depot, Cardington, Beds.
G6CV.—T. S. GARRARD, 34, Shotley Avenue, Sunderland, Co. Durham.
G6HQ.—R. WILLIAMS, "Linacre," Hindeston Road, Neston, Wirral, Cheshire.
G6JO.—J. ROGERS, "Arwenack," Trefiever Road, Mabe, Penryn, Cornwall.
G6QB.—L. H. THOMAS, 7, Blomfield Road, St. Leonards-on-Sea, Sussex.
G8AZ.—RALPH A. SPEARS, 1, West Bank Road, Liverpool 7.
G8BA.—J. R. BARNARD, 28, Wheatley Hall Road, Doncaster, Yorks.
G8DV.—A. P. MORGAN, 19, Temple Fortune Hill, Golders Green, London, N.W.11.
G8QN.—F. WITHERS, Wynberg, Harboro Road, Oadby, Leicester.
GM8RV.—W. VINICOMBE, 330, Galapark Road, Galashiels, Scotland.
G8WG.—E. REDFEARN, 4, Strathallan Road, Baildon, Yorks.
2BVA.—V. BLOOR, 26, Leveson Road, Hanford, Stoke-on-Trent, Staffs.
2CBB.—R. E. WOOD, 25, Kenwood Avenue, Leigh, Lancs.
2CIU.—B. COWEN, 49, Haig Avenue, Bransty, Whitehaven, Cumberland.
2DAY.—C H HOPWOOD, M.B., Ch.B., Gunnislake, Cornwall.
2DDM.—W. MORRIS, 34, Birch Avenue, Romiley, Cheshire. (Send cards direct only.)
2DJJ.—J. L. WINTER, 125, Balmoral Road, Morecambe, W.E. Lancs.
2DJV.—F. SUTTON, 194, Shaw Road, Royton, Lancs.
2DPZ.—J. ELLERY, Lostwithiel, Cornwall.
2DRM.—B. W. W. OLIVER, Stratford Rectory, Saxmundham, Suffolk.
2DWI.—E. W. J. THEOBALD, The Tamarisk, 10, Eastbury Road, Fishponds, Bristol.
2DYN.—MRS. GERTRUDGE HOUGH, 198, West Street, Crewe.
2FBG.—A. E. DEMPSEY, 50, Chaseside Avenue, Enfield, Middlesex.
2FBM.—F. W. ADAM, The Elms, Galashiels, Scotland.
2FBS.—J. WILKINSON, 3, Fore Street, Lostwithiel, Cornwall.
2FBW.—L. STEVENS, 24, Hall Street, Bedminster, Bristol, 3.
2FDI.—L. J. HALL, Beaurepaire Park, Basingstoke, Hants.
2FDR.—E. J. WILSON, 32, Westbourne Road, Olton, Birmingham.

Cancelled.—G2KV, G2RK, G5IZ, G5PZ, G5WS, G5XZ, G6FF, GW6QN, G8GV, G8IA, 2AAT, 2ABW, 2ADI, 2ADU, 2AKR, 2AOP, 2ALX, 2AQP, 2AUO, 2AUV, 2AXY, 2BAD, 2BDG, 2BSQ, 2BTV, 2BTZ, 2BXB, 2BZT, 2CCY, 2CDS, 2CGF, 2CGI, 2CIW, 2CPG, 2CQU, 2CRO, 2CSG, 2CSL, 2CTH, 2CVQ, 2CWB, 2CWG, 2CXP, 2CXZ, G2KB, G2RS, G2VX, G2ZX, GM5JP, G5OO, 2AAD, 2ABM, 2ADM, 2AHC, 2AIY, 2AJN, 2AKS, 2AOB, 2AQO, 2ATZ, 2AUM, 2AWH, 2AWS, 2BBB, 2BDS, 2BFJ, 2BHC, 2BJV, 2BKT, 2BKW, 2BLT, 2BVY, 2BWR, 2CIM, 2CKD, 2CKW, 2CLU, 2CMH, 2CNL, 2COV, 2CPK, 2CQJ, 2CQX, 2CSC, 2CSX, 2CXJ, 2CXY, 2CZW.

British Calls Heard

Eric W. Trebilcock (*BERS*195), *Powell Creek, North Australia May*, 1938.

7 Mc. C.W.: G5gs, 5py.

14 Mc. Phone: G2hk (2), 2mf (1), 2na (1), 2tr (1), 2xv (1), 3bm (1), 5bm (1), 5dr (1), 5jo (1), 5kh (1), 5ni (2), 5ov (1), 5qn (2), 5zj (2), 6by (1), 6kl (1), 6pc (1), 6tz (2), 6xr (5), 8gq (1), 8ma (3), 8sb (1).

14 Mc. C.W.: Ei2d (1), 3j (1), 4m (1), 6g (5), 8b (3), 8m (2), g2as (1), 2bg (1), 2by (1), 2dh (2), 2dk (3), 2dn (1), 2ft (2), 2gf (1), 2gk (1), 2gr (1), 2hd (1), 2hk (1), 2hw (9), 2hx (1), 2it (2), 2jg (1), 2jt (4), 2km (6), 2ku (2), 2la (2), 2lb (3), 2lk (1), 2lu (5), 2ma (3), 2mb (2), 2nn (5), 2oa (1), 2oc (2), 2pb (1), 2pl (1), 2pn (5), 2pw (2), 2qb (6), 2qo (15), 2qt (3), 2rq (1), 2ru (1), 2so (1), 2tk (4), 2up (2), 2uv (1), 2ux (1), 2vo (1), 2vy (1), 2ww (1), 2xd (2), 2xn (4), 2xs (1), 2yb (1), 2yj (1), 2yl (7), 2zt (2), 2zv (1), 3ad (1), 3al (1), 3am (1), 3bi (1), 3bs (7), 3bu (4), 3bw (1), 3cc (2), 3cn (2), 3cw (7), 3db (1), 3fm (1), 3fn (5), 3gh (3), 3gi (1), 3gu (2), 3gw (2), 3gx (1), 3hh (1), 3ig (2), 3jg (1), 3jr (1), 5ac (4), 5an (5), 5bd (1), 5bj (6), 5bq (1), 5br (1), 5cg (1), 5cv (2), 5cvp (1), 5cw (1), 5dr (1), 5dy (4), 5fa (1), 5ha (1), 5hb (3), 5hz (3), 5if (1), 5iv (1), 5ka (7), 5km (4), 5lh (2), 5li (2), 5ll (1), 5lp (3), 5ly (2), 5mn (1), 5ms (1), 5my (9), 5nd (7), 5ns (2), 5ol (1), 5ov (3), 5oz (1), 5pj (1), 5pq (1), 5py (2), 5ri (2), 5ru (1), 5rv (1), 5rx (2), 5rq (1), 5sr (4), 5ss (4), 5sx (2), 5th (1), 5tz (2), 5ud (1), 5uc (1), 5uf (2), 5ug (4), 5vb (1), 5vh (1), 5vn (1), 5vu (1), 5wp (1), 5wr (1), 5xb (1), 5xc (2), 5xd (1), 5xg (1), 5xh (1), 5yh (2), 5zn (1), 5zt (4), 6ak (2), 6bt (2), 6cj (1), 6dl (2), 6dp (1), 6dx (1), 6fz (1), 6gn (2), 6gt (2), 6hj (1), 6ki (1), 6kp (7), 6lc (2), 6lr (4), 6lw (1), 6nu (1) 6om (1), 6os (1), 6pr (3), 6ql (1), 6qs (6), 6rh (1), 6rd (1), 6rs (1), 6rw (1), 6td (3), 6tm (3), 6tz (2), 6uc (2), 6uf (3), 6uj (1), 6us (1), 6vd (8), 6vf (1), 6vp (6), 6vx (1), 6wb (2), 6wr (2), 6wu (1), 6wy (5), 6xl (4), 6xm (2), 6xq (8), 6yr (4), 6yz (1), 8ab (2), 8ap (2), 8ar (1), 8aw (1), 8az (1), 8bh (1), 8bn (1), 8bp (1), 8bq (5), 8cm (1), 8cz (1), 8df (1), 8dm (2), 8dn (1), 8dr (2), 8fc (10), 8ff (2), 8fl (2), 8fw (1), 8gd (4), 8gl (1), 8go (3), 8gq (1), 8ha (6), 8hh (3), 8hn (3), 8ho (3), 8hr (1), 8il (1), 8im (5), 8ip (3), 8it (1), 8ja (4), 8jo (2), 8jr (2), 8kh (3), 8ki (3), 8kk (2), 8kl (1), 8ks (2), 8lc (1), 8lg (1), 8lu (1), 8nh (1), 8nm (1), 8nv (1), 8nx (2), 8ob (3), 8oo (3), 8pc (2), 8pf (1), 8pi (2), 8pj (1), 8pl (4), 8pv (1), 8qf (2), 8ql (2), 8qs (1), 8qz (5), 8rg (5), 8rf (1), 8ri (1), 8rl (2), 8rq (3), 8rr (1), 8ss (2), 8tc (2), 8tl (4), 8to (1), 8tx (1), 8ub (1), 8uc (2), 8ud (1), 8ug (5), 8uk (1), 8un (2), 8uq (2), 8uy (1), 8vc (2), 8vg (1), 8vh (1), 8vi (1), 8wc (2), 8wp (1), 8wt (1), 8wv (1), 8ww (5).

Note—Figures in brackets denote number days relative station heard.

H.F. IMPEDANCE METER — (*Continued from page 69*).

If, however, a D.C. bridge or ohm-meter is not permanently available, it is necessary to have the resistors calibrated. Furthermore, it is also advisable to check them from time to time. If they are calibrated in *micro-mhos* as well as in ohms, then most of the difficulty about parallel calculations disappears. The *mho* is a unit of conductance and is the inverse of the *ohm*; the megohm corresponds to one-millionth of a mho, or one micro-mho. Thus 1,000 ohms correspond to 1,000 μmhos. If the values of the plug-in resistors are translated to μmhos, they may therefore be added to the clips in the instrument just in the same way that weights are added to a balance. When the final combination is reached, the μmhos are added up and the total divided into one million is the answer in ohms.

Coil Table.

L1	7 Mc., 15 turns; 14 Mc., 7 turns; 28 Mc., 3 turns. On Q.C.C. Valve Base Formers.
L2, 3	3 coils 2 turns 2 coils 8 turns 2 ,, 4 ,, 1 ,, 16 ,,
	R.V. Inductances or hand-wound.

To facilitate this "inversion" of ohms to μmhos the scale of Fig. 3 has been drawn. It will be seen that this is simply two logarithmic scales back-to-back, and could be made up from ordinary Log. graph paper. The inversion from ohms to μmhos is made by finding the correct figure on one side and reading the same point off on the opposite side. Thus, suppose three parallel resistors were 500, 1,000 and 3,000 ohms respectively. These give conductances of 2,000, 1,000 and 333 μmhos. which total 3333. This sum translates back on the scale to 300 ohms. The advantage of working in conductance is thus seen.

Results Obtained.

The instrument has already been used for a number of purposes, including the measurement of feeder properties and the adjustment of aerial matching. These will be described in detail later, but it is possible to form some idea of the sensitivity and accuracy obtainable.

For example, working on 14 Mc., the characteristic impedance of a section of open wire line was measured as 625 ohms, whilst the calculated figure without allowance for wooden spacers was 645 ohms. The sensitivity at 14 Mc. is such that 100,000 ohms can be observed, whilst in making matching stub adjustments an accuracy of adjustment of ¼ in. in 17 ft. was necessary, and was easily observed.

In a future article it is proposed to describe examples from the work carried out with this instrument, and discuss some of the aerial problems which it has revealed.

N.F.D.—(*Continued from page 79.*)

Conclusions

The 1938 N.F.D. event was unquestionably a greater success than any of its predecessors, and although unfavourable weather spoilt the early hours of operation in some Districts, we have little doubt that everyone who took part had a most enjoyable and instructive week-end. J. C.

'UTILITY' TWO TRANSMITTER—(*Continued from page 72.*)

as near the valve holder as possible, will make the filament uni-potential to R.F. and this undesirable effect is completely eliminated.

The anode circuit of the Power Amplifier is quite conventional. A split-stator tank condenser tunes L4 and the value chosen gives high efficiency operation on 7 and 14 Mc. The working capacity is normally low and the inductance high, so that the circulatory current is small and there is no need to use a heavy copper tubing coil for L4. The eddy current losses in such a coil offset the advantage of the low R.F. resistance given by the large surface area, and better results will be obtained with coils wound with 14 s.w.g. enamelled wire, the turns being spaced one wire diameter. Coils of this type are obtainable from *R.V. Inductances* and can be recommended as being strong, rigid and efficient.

The high tension supply is tapped on or near to the centre (this point is not critical) through an R.F. Choke of the heavy duty type, possessing low ohmic resistance, whilst a by-pass condenser, capable of withstanding the applied voltage, is connected between the low (R.F.) potential end of the choke to the chassis, to prevent any stray R.F. passing back into the power supply, the effect of which would be an incurably bad note. Jack 3 is inserted to enable the anode current to be conveniently measured.

Neutralising is also conventional, the only point to be noted being the insertion of C13, a *T.C.C.* low loss ceramic dielectric condenser, which is used to prevent "flash-over" when the anode circuit is tuned to resonance without a load being applied to it. Flash-over is unlikely but it is well to "play safe" as considerable damage might result if it occurred.

The radio frequency power generated in the anode circuit is led away *via* a specially arranged coupling link, further information on which will be given later.

(*To be continued next month*)

EXCHANGE AND MART

(*Continued from Back Cover*)

Patents and Trade Marks.

EXCHANGE AND MART.

RATES.

Members' private advertisements 1d. per word, minimum 1s. 6d. Trade advertisements 2d. per word, minimum 3s. First line, if desired, will be printed in capitals. One inch Semi-Display, 10s. per insertion. Terms: Cash with Order. All copy and payments to be sent direct to Advertising Manager, Parrs, 121, Kingsway, London, W.C.2, not later than the 30th of the month for the following month's issue.

CALLING DISTRICT 1, HILL, G8KS, announces Eddystone stocks at 27, Wilmslow Road, Didsbury, Manchester.—Call, write or 'phone Didsbury 4310.

COMPLETE STATION FOR SALE.—Laboratory Built Transmitter 25 Watts, two crystals, fone and C.W. in three-tier rack. Hammarlund Comet Pro Receiver. All perfect. What offers? —Details from G5OP, 95, Preston New Road, Southport.

EDDYSTONE FOUR TIER RACK, unused, 17s. 6d.; 500v. 250 mA., screened, hefty job, £1; Rec. Fils., 3s.; 250 v 50 mA. Premier, 5s.; Grid Bias Power Supplies, 7s. 6d. Enquiries other gear.—HARROWER, Waverley Crescent, Stirling.

FERRANTI straight 3 AW A.C. Receiver, requires PT4D and VPT4B, 63s.; three 4v. 350v. 80 mA. rectifiers, 3s. 9d. each; Rola energised M/C speaker, pentode output, 10s. All carriage paid.—2CRN, 40, Lower Olland Street, Bungay, Suffolk.

FOR SALE.—American Double Button Microphone, Thordarson transformer and adjustable tablestand, 27s. 6d.—S. G. ABBOTT (G3JU), Tetworth, Sandy, Beds.

FOR SALE.—Power Pack, 350v. 120 mA., 6.3v. 2a., 4v. 2a., 6L6, 6A6, PX4; Brooks 7191 kc, xtal, open holder; 50 mA, 100 mA M.I Meters; R.A.F. key; bargain, 45s. lot.—19, Merewood Terrace, Headington, Oxon.

G5KT.—ATTRACTIVE NEW DESIGNS QSL's. Finest quality, lowest prices, samples will convince.—State G, AA, BRS, SWL.—33, Howard Road, Westbury Park, Bristol, 6.

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

G8JK. for QSL's of highest quality at low prices. Send for samples.—Trees Avenue, Hughenden, High Wycombe, Bucks.

HALLICRAFTER Super-Skyrider 1936 (November) Crystal, speaker, A.C. £12, or best offer.—113, Red Hill Road, Arnold, Nottingham.

"HAM-AID" QSL CARDS.—More Striking Designs just issued. Samples from G6XT, Tillotson Brothers, Commercial Street, Morley, Yorks.

HAM SELLING UP.—Hallicrafters Sky-Chief, 1938 model, new, take nearest £11; 10-watt rack transmitter, Collaro Gram. unit in rack, 2 valve head amplifier, mikes, etc.—Box 24, "PARRS," 121, Kingsway, W.C.2.

KEYS.—Straight type 8s. 6d. (post 6d.); Bug, 21s. (post 9d.). Literature on request.—ADGIL INSTRUMENT CO., 35, Manor View, Finchley, London, N.3.

KILOCYCLES METRES CONVERSION TABLES.—New Pocket Edition. Price 1s. Postage 1½d.—From H. C. VAN ROOD, Technical Publications, 93, Berrylands, Surbiton, Surrey.

OLD TIMERS. Have a special QSL. First Grade QSL's, new designs. State G, AA, BRS, SWL.—Samples from G6MN.

1 AMPEREX 211G (Carbon anode 150 watt rating) and Fil. Transformer. Few hours used. Offers or exchange.—G6CU, Maidenhead.

PRESELECTOR FOR SALE, with new tube; cuts out all second channel interference and increases signal strength. Accept £1.—G8KP, 125, Oakwood Avenue, Flanshaw, Wakefield.

QSL's.—250, 4s. 6d., post-free; samples gratis; satisfaction guaranteed. G Log Books, 2s. 3d. —ATKINSON BROS., Printers, Elland.

RME 69. Condition perfect, latest Crystal Gate. 230/240, £30. Spare valves for above, £1 10s, DB 20 Preselector, almost new, £10. — G2AI, "Walcot," 71, Uphill Grove, Mill Hill, N.W.7.

RADIO BARGAINS.—1939 press button car radio six or twelve volts, list £10 19s. 6d., cash £7 10s. Pilot A.C. six-valve; covers 20, 40, 80, 160 amateur band FB list, £16 16s., cash £8 8s. 1938 Super Skyrider, list £32, hotted; cash £25.—G5ZT, 109, New Hall Lane, Preston, Lancs.

TOBE Amateur Communication Superhet, Four Bands, Beat-note oscillator, A.V.C., etc., £7 10s. or nearest. Special Bryan Savage Transformers (mains), Ferranti Milliammeters and components for S.W. Transmitters and Receivers, cheap.—Write for particulars, E.R.S., 52, Dougla Street, Largs.

80 WATT ROTARY CONVERTER, 24VDC, to 220AC Perfect. Used Gi 5SJP, N.F.D. £2.—C. F. GRAHAM, 5, Ratcliffe Street, Belfast.

(*Continued on previous page.*)

Printed in Great Britain for the Inc. Radio Society of Great Britain, 53, Victoria Street, London, S.W.1, by Loxley Brothers, Ltd., 50, Southwark Bridge Road, London, S.E.1.