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# BULLETIN

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AND THE BRITISH EMPIRE RADIO UNION

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# THE T. & R. BULLETIN

CONTENTS.




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Vol. 11

No. 12


## 56 MEGACYCLES

SETTING a lead, we publish in this issue for the first time a series of 56 Mc. C.W. schedules. We are optimistic enough to believe that this publicity will provide the necessary impetus required to break down the barrier which is preventing DX being worked from Great Britain on this Cinderella band of frequencies.

Up to now too much has been left to chance with the result that many amateurs have lost interest in the band after sending " blind " for long periods without success. We have always advocated both through this Journal and at District meetings a policy of co-operation in all matters connected with our hobby, but we have stressed with even greater emphasis the desirability of co-operation amongst serious experimenters engaged upon the study of 56 Mc. and higher frequencies.

It is gratifying to read from Mr. Blundell's notes, which preface the list of schedules, that a good response was received to the invitation which appeared last month. It goes without saying that many of the schedules will probably draw a blank at least as far as DX working is concerned, but they are putting us on the right track providing we can obtain co-operation from abroad.

Signs and portents have been in evidence lately that the spectrum around 56 Mc. is behaving differently to that previously observed. Harmonics of telephony stations working in the 22 metre band and at least one " CQ 56 Mc." call have been heard in England, whilst from North America news reaches us that contacts between amateur stations in the Middle West, and along the East Coast have been established. There is even a rumour current, which seems to be well founded, that a West Coast amateur has transmitted telephony to New York on 56 Mc. It seems reasonable to suppose, therefore, that before the summer has passed DX work will be possible in Great Britain, for modern gear is fast replacing the cruder apparatus of yesteryear, while more and more serious workers are becoming interested in the band.

Those members who have made a special study of the propagation of radio frequencies could, we believe, render an invaluable service by forecasting the most likely periods when conditions will be especially favourable for long-distance work on 56 Mc. We are, of course, aware that a close liaison already exists between the Propagation Group and other Groups operating in our Research and Experimental Sections, but we should like to feel that the experiences of the former are passed on promptly to all who are interested in 56 Mc. problems.

(*Continued on Page* 518.)

# TRANSMITTER DESIGN

By G. McLean Wilford (G2WD).

Part III.

*Power Amplifiers.*

IN the two previous parts we have discussed crystal oscillators, buffer amplifiers and doubler stages of various types, together with the methods used for coupling one to the other. The coupling methods described can be applied to power amplifiers in exactly the same way as they were applied to the low-power stages.

Before discussing different types of power amplifiers a few general remarks may be of interest.

*Insulation.*

The power amplifier or output stage of a transmitter is invariably operated at a much higher voltage than the previous stages, consequently superior insulation is required if the components are to stand up to the peak voltages applied. Besides offering a high resistance to D.C., the components must also offer a high resistance to R.F. currents and potentials. Poor insulation will cause serious R.F. leakages and consequent loss in efficiency.

*Safety Precautions.*

In the earlier stages of a transmitter the maximum peak voltage applied to any component seldom exceeds 350 volts, but when we consider a final stage operating at a mean voltage of 1,000 volts, it will be apparent that much more care is required in arranging the components in order to prevent accidents or damage.

Readers are urged to regard any voltage in excess of 500 as a lethal voltage, in fact quite bad shocks and burns can be obtained from voltages well below this figure.

Numerous articles dealing with the subject of "Safety First," as applied to amateur stations, have appeared in the T. & R. Bulletin. New readers are recommended to study these articles and also to apply to the R.S.G.B. for a copy of the Safety Recommendations approved by the Council of that body.

Let us say here and now that no part of any D.C. high-voltage circuit should be touched without first switching off the power supply. R.F. currents can also inflict very painful burns, while being more or less harmless otherwise.

An important point to watch for is that the "bleeder" resistance across the high-voltage power supply is not burnt out. If this should occur, the condensers in the filter circuit will not discharge to earth. Consequently energy will remain stored in the condensers for considerable periods, and even though the operator may have switched off the mains a very severe shock can be experienced should the positive high-voltage lead (wherever it is located) be touched.

*The Valve Question.*

As mentioned in an earlier part of the article, the British amateur has until recently been somewhat at a disadvantage in regard to suitable power amplifier valves.

Extremely good low-power work has been effected with the small triodes of the LS5 class, whilst for high-power stages the *Mullard* T61D has been a favourite for some years.

Our American colleagues have, however, always had a big range of suitable triodes for final amplifiers: these include such well-known makes as the 210 for low-power work, the 211 for inputs up to 100 watts, and the 852 for really high-power circuits. The introduction of screened R.F. pentodes immediately appealed to transmitting amateurs, because, besides being more efficient, the need for neutralisation disappeared. Further, by bringing out the suppressor grid to a separate pin suppressor grid modulation became possible, using extremely low values of modulation input.

The Americans were quick to realise that a high-voltage R.F. pentode would meet a big demand, and as many readers are aware, the RK20 and kindred valves had a big sale in all parts of the world.

The foresight shown by a British valve manufacturing company has recently brought on to the home market two R.F. pentodes known as the RFP.15 and RFP.60. These valves can be strongly recommended for final stages, the former as a single-ended amplifier will give an input of between 20 and 25 watts, whilst the latter, although rated at 60 watts input, can be run to 100 watts without difficulty.

Neither of these valves require more than a few milliamperes of drive current.

It must not be assumed that triodes are unsatisfactory, but the advantages gained by using R.F. pentodes place them in the vanguard of any discussion dealing with final stages.

In connection with triodes, it should be mentioned that numerous modern American valves are available at reasonable prices in this country through regular advertisers in the T. & R. Bulletin. This fact gives the amateur considerable scope when planning his transmitter.

*Single-ended or Push-pull?*

When designing a final amplifier the first question to settle is whether a single-ended or a push-pull stage is to be used.

This is to a large extent governed by the power input for which the station is licensed. For instance, a 10-watt station could operate a single RFP.15 to advantage or a pair of smaller valves such as the American 45, 46, 50 and 210 in push-pull.

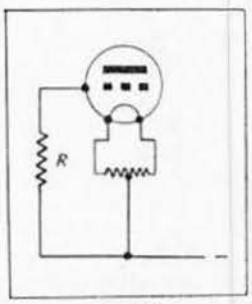



*Fig. 24.*
*The grid leak method of obtaining grid bias.*

For the 25-watt man a *Mullard* T25D, a *362* PX25 or a *362* RFP.15 would prove efficient. If LS5's can be obtained a pair in push-pull will give an efficient power output when operated with an input of 25 watts.

The higher power station has a wide choice of valves, if the American market is also taken into consideration.

In all of these matters the question of drive is

important. For instance, if an RFP.15 is used in a single-ended amplifier a drive current of about 2 mA is all that is required to give full excitation, which means that quite a small triode or pentode can be used in the stage before the final amplifier. In the case of triodes, it is usual for the drive current to be roughly one-seventh of the final amplifier plate current under load. Assuming an input of 1,000 volts at 100 mA, a drive current of about 14 mA would probably be required for efficient operation.

In the case of American valves the recommended excitation (or grid drive) is tabulated in the latest edition of the A.R.R.L. Handbook. At the conclusion of this article the excitation power required to drive certain popular American valves is given (Table 7). As a general rule British valve manufacturers do not publish this information, but it could no doubt be obtained if required.

Once the grid driving power has been ascertained, it is a simple matter to select valves for the previous stages.

*Grid Bias.*

Grid bias supplies can be obtained by :—

(*a*) Dry batteries or accumulators.
(*b*) The grid leak method.
(*c*) The cathode method.
(*d*) A separate power pack.

*Battery Method.*

This is self-explanatory, bias being applied between the grid of the valve (—) and earth (+).

*Grid Leak Method.*

This is illustrated in Fig. 24. The method is simple in application, requiring no high-wattage rating resistances. The bias applied to the grid will vary, depending upon the excitation. From this it follows that the operation of the valve which it controls will be at its best value under varying conditions.

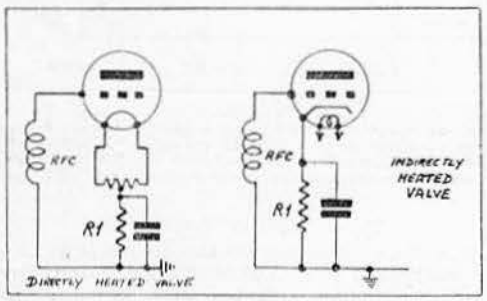



*Fig. 25.*
***The cathode method of obtaining grid bias.***

The disadvantage of the grid leak method lies in the fact that if THERE IS NO DRIVE THERE IS NO BIAS. The results of lost bias on a valve can be, and often are, disastrous, because the plate current will rise until the valve is destroyed unless the H.T. is switched off immediately.

The bias voltage applied to the grid of a valve by this method can be calculated by multiplying the value of the resistance by the grid current in amps (E=IR).

It is recommended that grid leak bias be used *only* on the valve which is being keyed. For example, if a doubler or buffer stage is keyed that stage can be biased by the grid leak method, but the final or following valve should be biased by some other method as its excitation is interrupted by the keying of the driver or buffer stage.

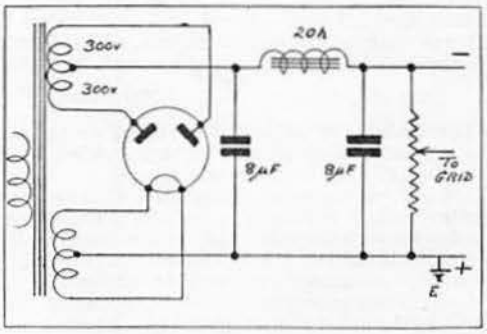



*Fig. 26.*
***Bias supply using a power pack.***

*Cathode Method.*

This method, illustrated in Fig. 25 for both directly and indirectly heated valves, is probably the most familiar type of bias as it is standard in all mains-operated receivers.

In this system it will be seen that the grid of the valve to be biased is joined to the negative H.T. supply lead. In the case of the indirectly heated valve the resistance and its by-pass condenser is in the cathode lead, whilst in the directly heated case it is in the centre tap lead. There is one minor disadvantage when using this method—the bias voltage to be supplied to the valve causes a reduced

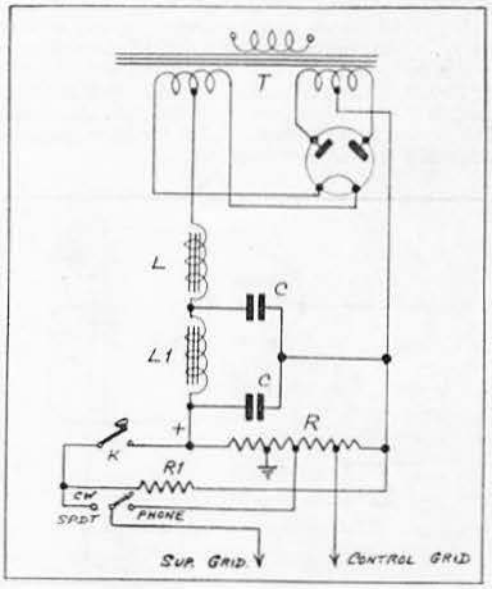



*Fig. 27.*
***A method of biasing R.F. Pentodes.***
***T, 350-0-350 volt transformer.***
***L, L1, 15 or 20 henrys choke 70 mA.***
***C, 8 μF electrolytic condenser.***
***R, 5,000 ohm 60-watt resistance.***
***R1, 50,000 ohms 10-watt resistance.***

voltage to be supplied to the plate circuit, but this can be taken care of by using a plate voltage higher in value by the voltage supplied for the bias. An example follows :—

To ascertain the value of R1 in Fig. 25, let us assume the full load current of the valve to be 130 mA and the grid current 20 mA. If 150 volts are required to bias the valve to cut off (or double cut off), then $R1 = \frac{150}{.15} = 1{,}000$ ohms.

To calculate the wattage rating of R1 we multiply the current passed by the voltage applied to its end, viz., .15 x 150 = 22.5 watts.

It must of course be emphasised that the controlling factor is the value of the plate current passing through the valve, but with cathode bias it is a simple matter to measure the voltage, providing a good high resistance voltmeter is employed.

From these remarks it will be apparent that cathode biasing is the safest method, as the bias is regulated to its correct value in proportion to the plate voltage. So long as plate current is flowing, bias must be applied. If excitation fails no harm is caused to the valve, whilst if the plate supply fails the bias will also fail.

*Power Pack Bias.*

This method, shown in Fig. 26, is quite satisfactory.

It will be seen that the circuit is that of an ordinary full-wave rectified H.T. unit, except that the filtering choke is in the *negative* leg and the positive is earthed ; further, only one choke is used as filtering is not very important. The power pack condensers should be 500-volt rating, especially if used with a high-power stage using around 1,000 volts.

The " bleeder resistance " in this case should have a value between 3,000 and 6,000 ohms, with a rating of 40 watts, as the current flowing is fairly heavy. The grid bias lead is taken off this resistance to the grid of the valve to be biased and is varied by means of the sliding clip. If this type of bias is used, it is best to employ it on the P.A. stage only. The system is not recommended for more than one stage of a multi-valve transmitter.

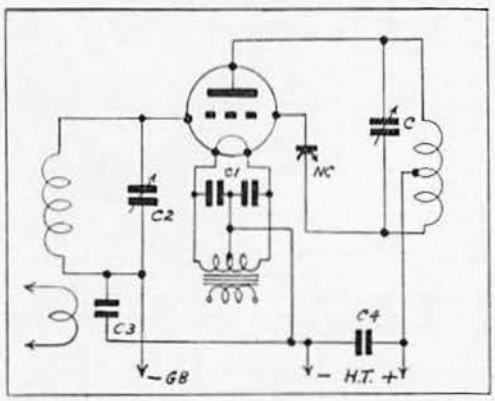



Fig. 26.
***A triode power amplifier circuit using a single section condenser.***
***C, C2, 50 or 100 μμF condenser.***
***C1, .002 μF.***
***C3, C4, .002 μμF mica.***
***NC, 15 to 30 μμF.***

*Special Bias Supply for R.F. Pentodes.*

Since the advent of R.F. power pentodes an extra element (the suppressor) has to be considered. The circuit shown in Fig. 27 is one developed by W1AF and provides a combined suppressor and control grid bias pack. It also caters for a suppressor grid method of keying these valves. The voltage regulation of this bias supply is such that the removal of one tap does not affect the others. We see from Fig. 27 that one tap is earthed at a point to give the correct suppressor grid voltage positive for c.w. and a similar negative voltage for telephony. The correct point has also to be found at a more negative position for the control grid, i.e., further away from the earth point. When the key is closed with the S.P.D.T. switch in the c.w. position, positive voltage is applied to the suppressor grid, the resistance R1 limiting the current as the bleeder resistance is shorted. With the key open the full negative bias voltage is applied to the suppressor grid, and the plate current falls to zero.

This type of keying is almost clickless and requires very little " click filter " indeed. On low power it may need no filter at all, but this is a case for individual experiment.

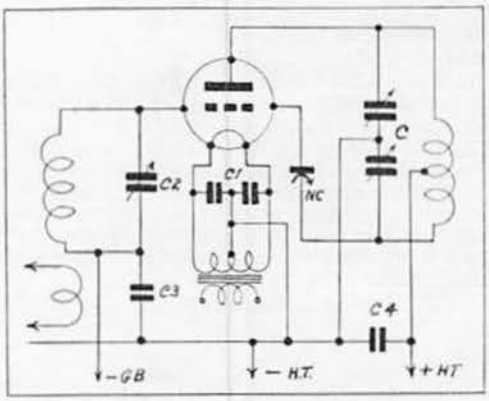



Fig. 29.
***A triode power amplifier using a split stator condenser. Circuit values as for Fig. 28 except C=200-200 μμF (100 μμF effective), or 100-100 μμF (50 μμF effective), or for higher frequencies 50-50 μμF (25 μμF effective).***

*Types of Power Amplifiers.*

It is almost an impossible task to decide which is the *best* type of P.A. to construct, because so many considerations have to be taken into account. For that reason the writer proposes to mention various types from which a reader may choose the one best suited to his immediate requirements.

It can be stated here that most valves used in a P.A. stage operate quite well at reduced voltages ; therefore, the P.A. can be constructed with, say, a 50-watt output valve, which can be under-run until such time as a 50-watt licence is obtained, and the increased power obtained by raising the voltage. This is not a hard-and-fast rule, but the writer is of the opinion that tuning condensers, etc., should be purchased to give a good safety margin against " flash over " and which can be used in the " 10 to 50-watt stages " of an amateur's career.

Very good plate tank condensers (split stator or single section) can be made up from old Broad-

cast receiver condensers of the 500 μμF type. By removing half the rotor and stator plates, and inserting two spacing washers instead of one, a double-spaced condenser results. By this method a condenser of about 125 μμF capacity can be obtained which will withstand quite high voltages across its plates.

As mentioned previously, good insulation is of paramount importance for the D.C. and R.F. leads. As a suggestion No. 16 and 14 s.w.g. enamelled covered wire is excellent for this purpose, just enough of the enamel being cleaned off with sandpaper as is necessary for soldering. We must again stress the point, as mentioned in Part II, that all leads which are earthed should be brought by individual wires to *one* common termination and from thence to earth. It may take a little longer, but it is well worth the trouble.

*Single-ended Triodes.*

The single-ended triode is perhaps the most common of all types used in Amateur Transmitters and is, generally speaking, quite efficient, provided that reasonable care has been taken in its construction. One of the commonest forms of inefficiency in this and any other type of P.A. is that of insufficient grid drive, especially on the higher frequencies. It may be found that a P.A. will operate very well indeed on 3.5 and 7 Mc., but when it is required to work on 14 Mc., the output is not as great as on the lower frequencies. Lack of drive is usually the cause and for that reason link coupling from the last driver stage to the P.A. is most strongly recommended, as it provides a much better match between stages. Whilst this results in an extra control, it makes the P.A. stage very much more stable and almost removes any chance of self-oscillation. This is particularly the case if a split stator condenser is used in the plate circuit. Two triode P.A. circuits are shown in Figs. 28 and 29.

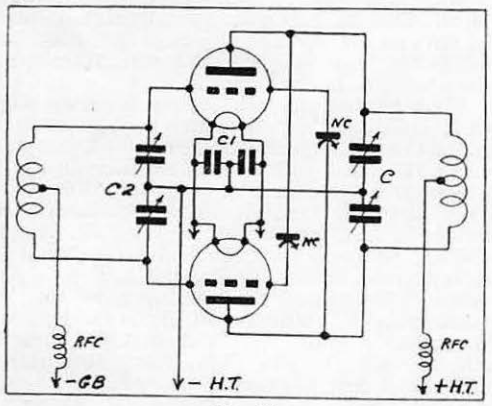



*Fig. 30.*
***A push-pull power amplifier using triode valves. Circuit values as for Fig. 28 and 29, but C2 may be a single stator if so desired, otherwise value may be 140-140 μμF (70 μμF effective), or 50-50 μμF (25 μμF effective) for higher frequencies.***

As stated in a previous part, neutralising is necessary, and where high voltages are used, the neutralising condenser must have sufficient spacing between its plates to prevent "flash over." Alternatively a fixed mica condenser of about 100 μμF capacity, and suitable voltage rating, can be inserted in series with the variable condenser, which will minimise this risk very considerably.

The method of tuning this type of P.A., when link coupling is used, is precisely similar to that given in Part II.

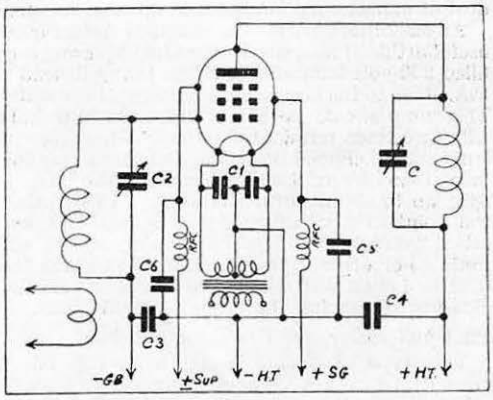



*Fig. 31.*
***A single ended power amplifier using a pentode valve. The circuit values as for Fig. 28, but C may be a split stator condenser, as shown in Fig. 29. C5, C6, .002 μF mica. Owing to the small drive required for R.F. pentodes, either link or capacity coupling may be used, but link coupling is preferable if the P.A. is some distance away from the driver.***

*Neutralising.*

In Part I it was recommended that a 0-20 milliammeter be purchased, and it is for neutralising that this meter is of the greatest possible assistance. Many readers will no doubt remember that first attempts at neutralisation, using either a neon or loop and lamp, have appeared to be quite satisfactory, but on monitoring their signal the note has been far from clean. Using a grid milliammeter as nearly as possible perfect neutralisation can be obtained by carrying out the process of neutralising by the method now to be described.

For the initial tests a neon lamp should be used. First of all adjust the neutralising condenser till all glow in the neon disappears from one end of the plate tank. If the neon is placed at the other end slight R.F. will show. If the grid meter is watched it will be seen that as the plate condenser is swung to and fro the needle flick becomes less as the R.F. disappears from the neon. When this point is reached remove the neon and make a slight adjustment of the neutralising condenser. The needle of the grid meter will probably still flick a little as the plate condenser is tuned through resonance, but if we continue to make minute adjustments of the neutralising condenser, a point will eventually be found where the needle of the grid meter remains absolutely steady, as the plate condenser is tuned from maximum through resonance to minimum. When this condition is obtained the stage is correctly neutralised. The grid meter will also show that the correct amount of excitation is being delivered to the P.A. grid.

When the P.A. is neutralised the H.T. may be switched on and the plate circuit adjusted for minimum plate current. It will generally be noticed that the grid current drops slightly when the P.A. plate circuit is alive. All that remains now is to couple the P.A. to the aerial and transmission may begin.

*Coupling to the Aerial.*

The writer would, at this stage, suggest that when initial tuning up is being carried out (either for C.W. or Telephony operation) an artificial aerial should be used. This will do away with a great deal of unnecessary interference to other amateurs.

An elaborate device is not essential, in fact quite a useful artificial load can be obtained by using a gas-filled 230-volt lamp of a wattage that will load the P.A. stage to the licensed input power of the station. This lamp should be fitted into a Bakelite holder with two leads terminated on crocodile clips. The lamp can be clipped on to the plate tank coil and a point found by trial and error where the lamp will light up to about normal brilliancy. This point is the point of attachment for a Collins Coupler or other " direct on " type of tapping to the plate tank. For other types of aerial systems the lamp may be inductively coupled to the plate tank by a pick-up coil having the lamp across its ends.

*Push-pull Power Amplifiers using Triodes.*

This type of circuit is shown in Fig. 30. In general there is not very much advantage gained in using push-pull over a single-ended P.A. on the lower frequencies, but on the higher frequencies push-pull has a definite advantage. It should, however, be remembered that a push-pull circuit requires *twice* the grid drive of a single-ended stage, but this is a simple matter to arrange when the transmitter is being planned.

The great advantage of push-pull operation lies in the fact that the circuit is balanced, and as a push-pull circuit cancels out 2nd harmonics, there is a diminished chance of *radiating* harmonics which often cause more trouble to B.C.L.'s than the fundamental. The tuning and neutralising of this type of P.A. is similar to a single-ended stage, always bearing in mind that the two neutralising condensers must be kept at a similar setting.

The wiring of a push-pull stage should be kept as symmetrical as possible, in particular the grid and plate leads.

*Parallel-valve Power Amplifiers.*

Most valves will operate quite well in parallel, but again the grid drive required is twice that for a single-ended P.A. Parallel operation is effective on frequencies up to 7 Mc., and possibly higher, but " parasitics " are apt to develop if a " squigger choke " or a 100-ohm non-inductive resistance is not connected in each grid circuit. Sometimes one or the other is satisfactory, at others a combination of the two is necessary.

It can be stated that valves operated in push-pull or parallel will give approximately twice the output of a single-ended stage.

*Single-ended Pentode Power Amplifiers.*

This type of amplifier is shown in Fig. 31. It should be noted that the correct value of screen voltage as described in Parts I and II has a considerable effect on the output from such a stage to the aerial. By-pass condensers and R.F. chokes should be mounted as close to the valve socket as possible. With R.F. pentodes the suppressor grid should be used as a separate element, because increased output may be obtained by biasing this element positive for c.w. operation, and negative for suppressor grid modulated telephony.

*Push-pull Pentode Power Amplifiers.*

This type of amplifier is shown in Fig. 32 and the remarks made above regarding screen and suppressor voltages apply equally well in this case as in that of a single pentode power amplifier.

The tuning and coupling arrangements from the driver stage are the same as for triodes, but with this type of valve no neutralising is necessary, and the driving power is not as great as for Triodes. As mentioned in Part I, the extra element reduces the inter-electrode capacities which in general makes an R.F. Pentode very much more easy to drive than the average triode. The exception applies to certain types of American Triode valves especially designed for high-frequency operation, which are as easy to drive as pentodes.

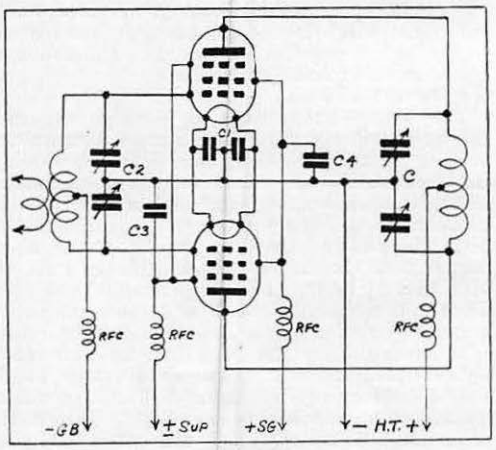



*Fig. 32.*
***A push-pull pentode power amplifier. The circuit values for C and C2 are shown below Fig. 30, the values of C1, C3, C4, as for Fig. 28.***

While this series of articles does not deal with modulation, the fact that suppressor grid modulation requires such a small speech amplifier, it has been decided to briefly mention the method to adopt when using R.F. Pentodes.

With the P.A. fully excited and delivering power to the aerial, note the aerial current with the suppressor biased positive. Now cut off the power and make the suppressor grid negative, this being obtained either by a battery feeding through the resistance and secondary of the modulation transformer, or from the bias supply (Fig. 27). Adjust the bias (with the speech amplifier alive) until the aerial current shown previously is *half* its original value. On sounding a constant note into the microphone the aerial current should rise by about 20 per cent. When the bias has been correctly adjusted to give this result the transmitter is ready to be put into service on telephony.

*Coil Data.*

Although copper tube coil sizes are mentioned in one of the Coil Tables appended to this article, the author does not recommend this class of coil, except for the high-power stages of a transmitter.

Either No. 14 or 16 s.w.g. tinned copper or enamelled wire is suitable for coils in all stages up to about 250 watts; furthermore, such coils are very easy to wind and are cheap to construct.

Copper tubing introduces losses due to capacity between turns, and in a low-power station this is an important consideration.

Wires of the sizes specified are recommended and the spacing between turns should be about the diameter of the wire used.

*Conclusion.*

We have as far as possible attempted to provide interesting and informative data for both the experienced amateur as well as the newcomer.

If the details given have provided but a few hints to those who have paid us the compliment of reading the articles, we shall feel satisfied that the time expended has been well worth while.

*Table 7.*
Drive required for some Valves used in Amateur Transmitters.

| Type. | Max. Plate dissipation. | Grid Drive required. |
|---|---|---|
| RFP.60 | 60 watts | 2 watts |
| RFP.15 | 15 ,, | 2 ,, |
| RK20 | 40 ,, | .9 to 2 watts |
| RCA.802 | 15 ,, | .25 to .8 watts |
| Type 210 | 15 ,, | 1 to 3 watts |
| ,, 801 | 20 ,, | 2 to 4.5 ,, |
| ,, 211 | 100 ,, | 7 to 14 ,, |
| RK23 & 25 | 12 ,, | .25 to 1 watt |

*Table 8.*
Link Coupling Coils.
Grid Circuit.

| Band | Condenser | Diam. | Length of winding, etc. |
|---|---|---|---|
| Mc. | μμF | ins. | |
| 3.5 | 100 | 1½ | 36 turns 20 s.w.g. S.W.D. |
| 7.0 | 100 | 1½ | 20 ,, 18 ,, ,, |
| 14.0 | 100 | 1½ | 10 ,, 18 ,, ,, |
| 28.0 | 100 | 1½ | 4 to 6 turns 18 s.w.g. S.W.D. |

*Note*—S.W.D.=Spaced wire diameter.

*Table 9.*
Plate Tank Coils for P.A. Stages.

| Band | Con. denser | Diam. | Length of winding, etc. |
|---|---|---|---|
| Mc. | μμF | ins. | |
| 1.7 | 250 | 3 | 34 turns 14 s.w.g. S.W.D. |
| 3.5 | 250 | 3 | 11 ,, 14 ,, ,, |
| 7.0 | 100 | 3 | 8 ,, 14 ,, ,, |
| 14.0 | 100 | 2 | 5 ,, 14 ,, ,, |
| 28.0 | 100 | 2 | 2 ,, 14 ,, ,, |
| 3.5 | 100 | 3 | 15 turns copper tube $\frac{3}{16}$ in. diam., spaced $\frac{1}{8}$ in. |
| 7.0 | 100 | 3 | 10 turns copper tube $\frac{3}{16}$ in. diam., spaced $\frac{1}{8}$ in. |
| 14.0 | 100 | 3 | 4 turns copper tube $\frac{3}{16}$ in. diam., spaced $\frac{1}{8}$ in. |
| 7.0 | 50 | 2 | 24 turns 14 s.w.g. S.W.D. |
| 14.0 | 50 | 2 | 8 ,, 14 ,, ,, |
| 28.0 | 50 | 2 | 3 ,, 14 ,, ,, |

*Note.*—S.W.D.=Spaced wire diameter.

# Commercial Ultra-Short Wave Radiophone Circuits

By Douglas Walters (G5CV).

HIGH spots of DX reception are now occurring coincidently with sunspots, and it is quite reasonable to expect some startling results on the higher frequencies during the next year or two. But the more or less frequent appearance of spots on the sun's face may lead to somewhat rash claims of DX reception of amateur stations—especially on the 56 Mc. band.

The writer believes that it is not universally known in amateur circles that quite a number of commercial radiotelephone circuits are in regular operation on ultra-short wavelengths very close, if not actually in the 5-metre band.

The results obtained from some of these commercial circuits are particularly interesting, for several are working daily over distances far greater than the optical range, and others are utilising extremely low power. To make contact with a station when using only one or two watts is quite a different matter from providing a *regular* service with this power—a service which must link up with hundreds of miles of land-line and provide a reasonable signal-to-noise ratio. Yet such circuits are in operation in this country and abroad.

Between the coastguard station at Lerwick and the Post Office at Skerries in the Shetland Islands there is a regular radiotelegraph link on 5 metres. The apparatus is battery driven and works with a power of only 1 or 2 watts.

By far the most interesting circuit and, incidentally, one which reflects great credit on the Post Office engineers, is the new service to Guernsey.

Over a year ago an experimental 5-metre circuit was established between Shaftesbury (Dorset) and Guernsey—a distance of 110 miles. Despite the fact that this distance was considerably greater than the optical range and that the power employed was only some 5 watts, excellent results were obtained and the circuit was regularly used for ordinary trunk calls to and from Guernsey. It was found, however, that satisfactory reception was only obtained during the summer months.

Highly directional aerials were used and the receivers were of the super regenerative type, using, it is understood, a very high quench frequency.

In view of the success of these experiments, the Post Office have now constructed a station capable of handling a number of telephone conversations at Chaldon, near Lulworth Cove, Dorset. This is on the coast and the air line distance to Guernsey is about 85 miles.

The power output has been increased to 200 watts and superhet receivers are used. It is anticipated that the service will operate satisfactorily throughout the summer and winter, for the overall efficiency has been increased 1,000 times by the use of highly directive aerials and a much higher signal-to-noise level is obtained at both ends of the circuit than was formerly obtained on the experimental link *via* Shaftesbury.

New apparatus is also being constructed for use between the Isle of Arran in the Firth of Clyde and the mainland. This will employ crystal control

(*Continued on page* 518)

# THE TRANSMISSION AND RECEPTION OF MICRO-WAVES

By C. G. Lemon, F.Ph.Soc., A.M.I.R.E. (G2GL)

PART II.

## THE SELECTION OF SUITABLE VALVES

FROM the previous article in this series (January, 1936, issue) it will be observed that only the straight filament cylindrical electrode valves (bright emitters) can be used. These particular types were manufactured about 1925, and a good example is the " R " type. This valve had originally a tungsten filament, but was superseded by thoriated tungsten. However, pure tungsten or thoriated tungsten filaments can be used, but not the oxide coated type. This latter can usually be ascertained by observing the actual filament—if it appears to be coated with a white deposit it can be assumed to be oxide coated.

The oxide coated filament is unsuited for Micro Wave transmission on account of the heavy positive ion bombardment which takes place during operation, so severe as to cause the coating to be actually severed from the filament. Apart from this, a large amount of gas is liberated, and, owing to ionisation, oscillations cease.

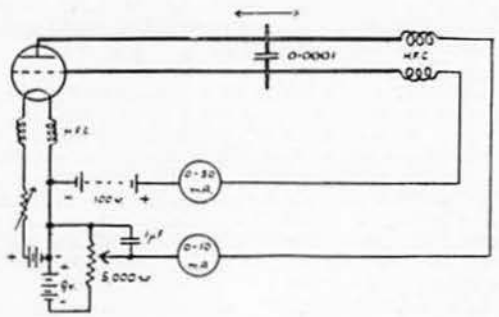



*Fig. 1.*
***The Barkhausen oscillator circuit, which is used for testing the valves.***

We will assume that the experimenter in this field has now sorted out or retrieved several specimens of straight filament valves. The next step is to ascertain if any of them will oscillate at the ultra-high frequencies involved and also the fundamental wavelength produced. Fig. 1 shows the circuit which will be used for these tests. As can be seen, it is a simple Barkhausen oscillator with an adjustable condenser bridge. This bridge condenser, which may consist of an ordinary 0.0001 µF fixed mica condenser having two stiff connecting rods of copper, should be so mounted on a short length of wood as to slide along the two lecher wires without the operator's hand getting too close to the wires (Fig. 2). In addition, the following will be required: One 100-volt H.T. battery or H.T. accumulator (an eliminator is not recommended owing to variation of voltage with different loads), one 9 volt grid bias battery, one 50,000 ohm potentiometer, and one filament resistance suitable for the valve in use. The value should be so chosen as to enable the filament temperature to be controlled from a dull red to a brilliant white—usually 15 ohms suffice for this. The two H.F. chokes in the filament leads have a diameter of ½ in., and may consist of 20 turns of 16 s.w.g. wire supported in air. The anode and grid H.F. chokes may be of the same type, or wound with thinner wire, as the current to be carried is, at its maximum, only 0.05 amp.

The method of constructing the oscillation tester is shown pictorially in Fig. 3. The two lecher wires of about 14 or 16 s.w.g. may be mounted upon a board and held in place by soldering the ends to short nails or screws fixed in the board. The lecher wires must each be one metre long and fixed about 5 cms. apart, and should be strictly parallel. The milliameter required should have a reading of up to 50 mA, although 0/100 mA is suitable.

*Testing the Oscillator.*

Having arranged the oscillator as in Fig. 1, the slider on the 5,000 ohms potentiometer should be set so that it touches the end connected to L.T.—i.e., no bias. The H.T. is fixed at 100 volts; the bridge condenser should be removed from the lecher wires. The filament accumulator is then connected up and the filament resistance adjusted until the milliameter reads 40 mA (grid current) or, in the case of a smaller valve, to 25 mA. After it has been in this condition for five minutes, switch off the accumulator and observe the grid immediately; if it is glowing brightly reduce the grid current by means of the filament resistance to 75 per cent. of its value. If, however, it appears just a red or bright red, the test for oscillation may now be made. It is to be remembered that the

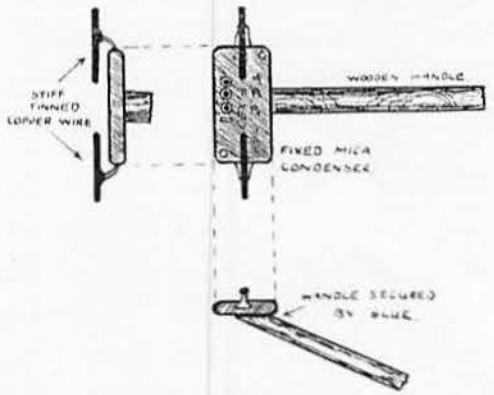



*Fig. 2.*
***Details of the sliding condenser bridge.***

bridge condenser is still out of circuit up to this stage.

We will assume that the conditions have been so arranged to cause a grid current of 40 mA to flow. The bridge condenser is then slid along the lecher wires by means of the wooden handle. Starting at the end farthest from the valve, the condenser is placed firmly on the lecher wires so that the two leads from the condenser make good contact with the lecher wires. The bridge is now slid carefully along the wires towards the valve, and at the same time the milliameter should be closely observed. If the valve is in good condition it will oscillate immediately the condenser is 75 cms. away from the valve. Oscillations are shown by a decrease in the grid current; the decrease may only be a few millaimps. Continue the sliding of the bridge until the greatest decrease in grid current is found.

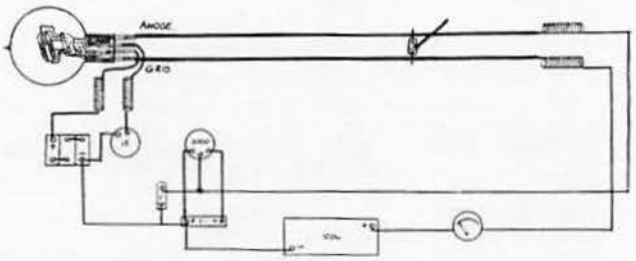



*Fig. 3.*
***Pictorial diagram of the essential oscillating circuit.***

If it is found that no drop in current occurs, adjust the potentiometer until approximately 1.5 volts are applied to the anode and again repeat the bridge condenser adjustment.

This may be repeated in 1.5 volts steps until the whole 9 volts have been applied. Should the valve then still refuse to oscillate, reduce the anode bias to zero and carry out the same tests with the condenser bridge, but each time making an alteration in the grid current by means of the filament resistance. It may be pointed out here that one valve refused to function until the grid current was reduced to 10 mA. This, however, usually denotes gas. If, however, all these adjustments have refused to produce oscillation, scrap the valve and try another. Usually it is not difficult to start oscillation in most straight filament valves. As stated before, oscillations are observed by a decrease in the grid current, and the bridge should be so adjusted until the maximum drop has been reached.

*Measurement of the Wavelength.*

Assuming that the experimenter has now caused the valve to oscillate, it is now necessary to determine the frequency or wavelength. For this purpose a milliameter of 0/15 mA, approximately, will be required. This is connected in the anode circuit, and it will be found that a few milliamps are passing, although a negative bias may still be applied to the anode. The bridge condenser is then adjusted until maximum anode current flows. When this occurs the valve is then nearly oscillating at its maximum. A further lecher wire circuit is then placed near the oscillating circuit as in Fig. 4, a loop being placed about 10 cms. away from the valve end and about 3 cms. under the oscillating lechers, the two parallel wires being fixed up at right angles. Drawing pins can be used to fasten these wires as thin wire of about 26/30 s.w.g. tinned copper can be used. These wires, however, must be supported in air and not allowed to come within 2 feet of the ground or walls. The ends can conveniently be attached to the top of a stool, etc. These lecher wires should be about 3/4 metres long. The actual measurement is carried out as follows. Having fixed the anode current meter in a position suitable for easy viewing, a short circuiting bar consisting of a piece of stout clean copper wire mounted at the end of a long handle, is now slid along these wires, starting from the end farthest from the oscillator. At a certain point a sharp drop (sometimes an increase) in the anode current will be observed; carefully obtain this point by keeping the shorting bar at right angles to the lecher wires and move the bar backwards and forwards a few millimetres at a time. When this point has been found, it may be marked by a small piece of insulating tape. Now, starting at this point, slide the bar in the same direction as before, until the second point is noticed; having marked this, proceed until the third point is found. By measuring the distance between the first and third marker in metres, the generated wavelength may be directly measured. It may be found that the point is not clearly marked; this may be improved by pulling the loop away from the oscillating lecher wires, or by bending them up closer if no appreciable change is noticed.

*Adjustment of Wavelength.*

If, after measuring the wavelength, an adjustment is made to the grid voltage or to the anode bias, an alteration in wavelength will be found to have taken place. An increase in the grid voltage or anode bias causes the wavelength to be reduced. The wavelength can therefore be adjusted until suitable by a combination of these two voltages. At each alteration in voltage the bridge condenser should be moved until the maximum anode current occurs.

(*Continued on page* 518.)

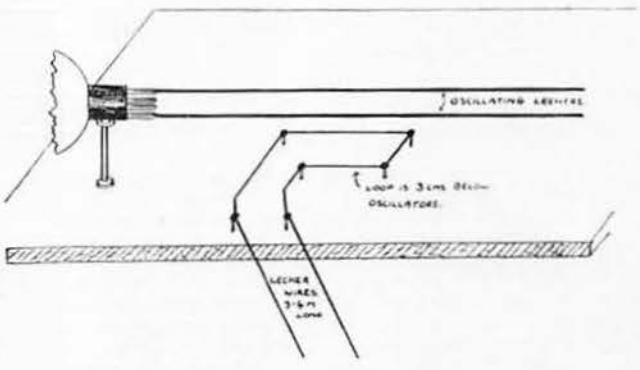



*Fig. 4.*
***How the lecher wires, used for measuring the wavelength, should be fixed.***

# A STABLE DETECTOR CIRCUIT AND AN ELECTRON-COUPLED FREQUENCY METER-MONITOR

By J. MacIntosh (VS1AA).

WE all graduate from small beginnings, and if the truth were told, many amateurs take the plunge without that most necessary adjunct to the station—a frequency meter. The writer for long depended upon the band-spread of his receiver, but accurate as this may have been, it had most definite limitations.

Returning to Malaya from a most enjoyable leave spent in Great Britain, it was decided to conduct experiments with a view to evolving a really stable detector circuit and a reliable frequency meter-monitor.

The ordinary grid leak detector circuit, while reliable enough on the lower frequencies, suffers from disadvantages when used on, say, the 14 Mc. band. It tends to " creep " out of adjustment and variations in plate voltage and/or alterations of the reaction condenser, badly upset the adjustment and throw the signal out of tune.

*The Detector Circuit.*

The writer is very partial to the electron-coupled circuit (see the single-valve transmitter cricuit described on page 86 of the T. & R. Bulletin for September, 1934), and for stability it is excellent. The detector circuit shown in Fig. 1 was eventually decided upon. In the initial experiments the whole coil L2 L3 was tuned by C1, but this had disadvantages, in that, using 6-pin type *Eddystone* coils, the minimum wavelength was rather seriously increased when the secondary and reaction windings were joined together, also, the usual reaction winding proved too large for good reaction control. L1 is the primary of the RF transformer, and consists of the usual number of turns. L2 is the standard secondary, while L3 is the reaction winding. Details of the transformers follow :—

*Bandspreading.*

On 14 Mc., the readings on C3, using a *Utility* 100/1 ratio dial, are as follow :—

14500, 32 ; 14400, 48 ; 14300, 65 ; 14200, 85 ; 14100, 107 ; 1 4000, 132 ; 13900, 156.5 degrees.

The main tuning condenser C1 is set at 83 degrees.

On 7 Mc. (main condenser set at 115 degrees) 7300, 19 ; 7200, 55 ; 7100, 97 ; 7000, 145 degrees. By using .0005 instead of .0001 μF in position C2, band-spread may be made to cover 7500 (18 degrees) to 7000 kc. (170 degrees). In this case, the main condenser is set at 110 degrees.

These readings illustrate that band-spreading may be made most effective by careful adjustment of L2, L3, C2 and C3.

*Reaction.*

This is the most important feature. Adjustment of the potentiometer P provides reaction. It was found that *Mazda* AC/S2, AC/SG VM, and *Osram* MS4 5-pin screened grid valves require only about 20-30 volts on the screen to set up oscillation. The potentiometer P must be above suspicion and the adjusting arm as " velvety " and noiseless as possible. (I am still waiting for the perfect potentiometer for use in the tropics.) A slight adjustment of screen voltage does not send the signal " off the map " while there is no tendency to " creep." True, the initial adjustment of L3 is fine within limits, but the figures given suit the *Mazda* and *Osram* valves named. The point to bear in mind is that L3 should be as small as possible, provided oscillation can be obtained. Use some old wire when making adjustments ; then, when the oscillation control and band-spread are just right rewire with new wire and solder all connections.

| Transformers. | Primary Turns. | Secondary Turns. | Reaction Turns. | Secondary Spacing. Turns per inch. |
|---|---|---|---|---|
| No. 1 | 2¾ No. 28 dsc | 3¾ No. 18 enam. | 1¼ No. 18 enam. | 4 |
| No. 2 | 4½ No. 24 dcc. | 6½ do. | 1½ do. | 10 |
| No. 3 | 12 No. 28 dsc. | 12¾ do. | 2¼ do. | 10 |

The primary may be wound in between the secondary turns, or to provide greater selectivity it may be wound on the former with the reaction winding coming between the primary and secondary. The circumference of one turn is 7¼ ins.

It will be seen that C1 (.0002 μF) tunes the secondary L2 only, while the band-spread condenser C3 is in series with the plug-in condenser C2, the whole being shunted across grid to earth. C3 is an old *Cyldon* reaction condenser, the plates being cut down in number to four fixed and four moving, with double spacing. On 14 Mc. C2 is .00005, on 7 Mc. .0001, and on 3.5 Mc. .0005 μF.

*The Frequency Meter-Monitor.*

The writer possesses a 100 kc. quartz crystal bar, which is a necessity—not a luxury—when making adjustments on a frequency meter or in connection with band-spreading. It was decided to use a 7-pin RF screened pentode in the meter and a *Cossor* MVS/PEN, being on hand, was used.

Fig. 2 gives the circuit, which is essentially that shown in Fig. 1, except that C1 is a plug-in condenser, while C2 is a .00015 μF Series-Gap *Cyldon*.

*Colvern* 6-pin Southern Cross type or *Eddystone* slotted formers are suitable for the purpose. The slots, which are ¼-in. apart, prevent the wire from

slipping and thus throwing out the adjustment of the meter.

Details of the coils are as follow :—

| Coil. | C1 μF | L1 Turns. | L2 Turns. | Circumference of 1 turn (ins.). | Band Mc. |
|---|---|---|---|---|---|
| 1 | .0001 | 3 No. 18 enam. | ½ No. 18 enam. | 6¾ | 14 |
| 2 | .0002 | 5 do. | 2¾ do. | do. | 7 |
| 3 | do. | 10½ No. 22 dcc. | 6¼ No. 22 dcc. | do. | 3.5 |

Readings on C2 are :—

14 Mc. : 14400, 57 ; 14300, 102 ; 14200, 127.5 ; 14100, 147 ; 14000, 161 ; 13900, 173 degrees.

7 Mc. : 7300, 84.5 ; 7200, 120 ; 7100, 147 ; 7000, 168 degrees.

3.5 Mc. : 3700, 38 ; 3650, 90.5 ; 3600, 122 ; 3550, 146 ; and 3,500 kc., 167 degrees.

One coil only could be used and the harmonics employed for locating higher frequency bands, though the writer prefers separate coils. Using coil 1, for example, it is easy to locate the harmonics on the 28 Mc. band.

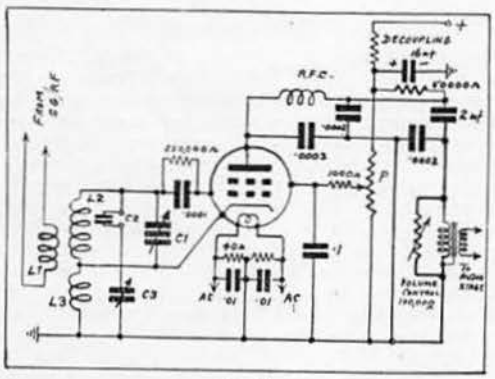



*Fig. 1.*
***The stable detector circuit adopted by the author.***

It was decided not to use variable voltage on the screen of the MVS/PEN owing to the difficulty of obtaining a really first-rate potentiometer. The potentiometer is therefore a fixed one made up of two *Ferranti* wire-wound resistances R2 and R3 in series. Variation of screen voltage may be obtained by changing the resistances, but once satisfactory working is obtained, the resistances need not and should not be touched when coils are changed. The value of the decoupling resistance R1 will depend on the HT available. Values in use are R1, 15,000 ; R2, 60,000 ; and R3, 10,000 ohms. The meter is run from the same AC. LT. and HT supplies as the receiver, a decided convenience unless one wishes to carry the meter about. In the author's opinion the 7-pin RF pentode is preferable to the usual 5-pin type for this work owing to the better screening. (The 7-pin type was not used in the detector circuit because a 5-pin valve holder already existed and there were a number of 5-pin valves on hand.)

*Construction.*

The containing box is made of fairly stout brass with a tight-fitting lid. Wiring is carried out with No. 16 S.W.G., and rigidity is the keynote throughout. All connections are soldered. The box is 11×11×7 ins. high and the front and bottom are in one piece, with flanges round the edges. The upright screen is bolted on to the front and bottom, and all wiring, except the leads to the terminals, is carried out at this stage. The wiring being finished, the remainder of the box—one piece comprising the two sides and back—is bolted in position to the flanges. The leading out wires—two LT, one HT, one earth, one output and one aerial—are then soldered on to the pieces of 14 or 16 S.W.G. wire, which have previously been affixed to the terminal shanks. This soldering has to be carried out inside the box and is a comparatively simple matter, provided all the wires have been previously prepared and tinned. The fitting of the lid is the final stage. The aerial terminal carries a short piece of stout wire fastened to the shank inside the box, the purpose being to increase pick-up should this be necessary when the meter is in use as a monitor. An ebonite panel is fitted more for the sake of appearance than of necessity. The unit is completely screened—holes being bored in the rear to take the terminals, which are mounted on an ebonite strip. Good make mica condensers must be used for the plug-in condensers, C2 in Fig. 1 and C1 in Fig. 2. The plugs may be formed by valve pins securely soldered on to small pieces of copper, the latter being fixed on to the condenser terminals. Suitable sockets should be provided, and may be mounted on an ebonite strip for rigidity.

*Adjusting the Meter.*

Unless one can borrow a calibrated meter it is necessary first to locate the low-frequency limit

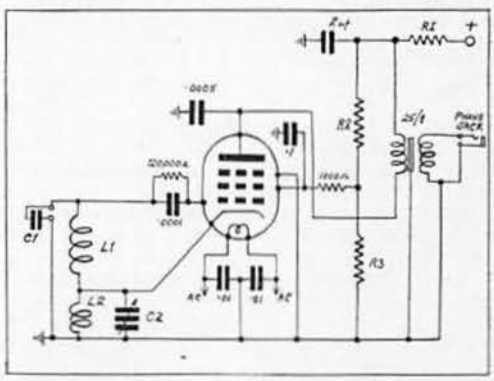



*Fig. 2.*
***The circuit used for the frequency meter-monitor.***

of the 7 Mc. band, *i.e.*, 7000 kc. On the receiver, tune in JNA or some other known station between 7000 and 6900 kc., then switch on the 100 kc. crystal and, if all is working well, it should, by slowly reducing the tuning of the receiver band-spread condenser, be possible to strike the 70th harmonic of the crystal, namely, 7000 kc. Once this is accurately located (tuned in to the silent point), adjustments should be made on the meter-tuning condenser C2. If one is lucky, 7000 kc. should come in about 170 degrees or so and 7300 kc. towards the minimum of C2. The author had to cut, rewind, and resolder many times before getting the three bands just right. Do not forget to affix the lid when taking readings, as its removal will seriously affect the accuracy.

With the receiver adjusted to the silent point on 7000 kc. (crystal switched on), start up the frequency meter, and with coil No. 2 (7 Mc.) and plug-in condenser C1 (.0002) in circuit, tune C2 on the meter until the meter signal also is tuned to the silent point. There may be a small amount of interlocking; if so, move the meter further away. Once one point on a band is accurately set, it is a fairly easy matter to locate other points. Final checking can be effected by adjusting the meter to 3500 kc. and seeing that the 2nd harmonic, the strongest, comes in exactly on 7000 kc. on the 7 Mc. band. This should also be done using the No. 2 coil combination set to 7000 kc., and tuning the receiver to 14,000 kc. When final checks have been made and all is satisfactory, three large-scale graphs could be drawn, one for each coil combination. These graphs enable the operator to read off any frequency within the range of the meter with sufficient accuracy for all but precision requirements. This is not a precision instrument, although it could be made into such with the help of a temperature oven with thermostat control and a precision instrument dial enabling one to read off parts of a degree. Do not forget that readings should not be taken immediately after switching on; leave the valve to heat up, say, for 10 or 15 minutes. Also, do not imagine that readings will "stay put" for ever. Check up against the crystal standard before going into action.

# HARMONICS AND OVERTONES

By D. Gordon Bagg, B.Sc.(Hons.), A.I.C. (G6BD).

FROM time to time points crop up in discussions which appear to indicate a certain confusion of thought concerning the harmonics and overtones of an oscillatory system, and a short exposition of the subject may assist in giving a clearer conception of the matter.

"Harmonics" are defined as being a series of numbers in harmonic progression, that is, their reciprocals are in simple arithmetical progression, namely, 1, 2, 3, 4, 5, *et seq.* The wavelengths specifying the amateur bands are part of a harmonic progression with certain of the harmonics, mainly the odd ones, omitted. If 160 metres is taken as the fundamental, the series is:—

Metres: 160, 80, (53.3), 40, (32), (26.7), (22.9), 20, etc.
harmonic: 1, 2, (3), 4, (5), (6), (7), 8, etc.

The respective frequencies, the reciprocals, as it were, of the wave-lengths, are in simple arithmetical progression:—

Mc.: 1.75, 3.5, (5.25), 7, (8.75), (10.5), (12.25), 14, etc.

(These are not, of course, the exact frequencies of the wavelengths given above, but are selected for convenience.) If 40 metres were taken as the fundamental, the corresponding series would be:—

metres: 40, 20, (13.3), 10, (8), (6.7), (5.7), 5, etc.
harmonic: 1, 2, (3), 4, (5), (6), (7), 8, etc.
Mc.: 7, 14, (21), 28, (35), (42), (49), 56, etc.

The calculation being simpler, frequencies rather than wavelengths are used when considering harmonics, the fundamental frequency being referred to as the first harmonic, twice the fundamental as the second, three times as the third, *et seq.* "Overtone" is another term for a harmonic *above* the fundamental, *i.e.*, the first overtone is the second harmonic, the second overtone is the third harmonic, and so on. This is evident from the name "*over*tone" itself.

The name "overtone," however, is generally reserved for mechanical systems oscillating at audible frequencies, as was mentioned in the R.E.S. notes in the June, 1935, Bulletin. These systems generate harmonics in a manner similar to an electrical system, but the oscillating mechanism possesses inertia and, as a consequence, there is a tendency for the frequencies of the higher harmonics to be slightly less than would be expected from the fundamental. The "power output," as it were, of the higher harmonics is insufficient to overcome completely the inertia of the moving mechanical parts. The name "harmonic," being derived from mathematical theory, is therefore dropped for these "upper partials," as they are termed, and "overtone" (or the expression just quoted) is substituted.

The question which appears to give most trouble is that of the so-called "sub-harmonics." These phenomena can all be explained by a simple application of the rules of harmonics, and a few examples will be given.

The first example is familiar to all amateurs who use an oscillating monitor. The signal obtained by tuning the monitor to the first or second harmonic of the transmitter is unsuitable for monitoring purposes, but it is well known that a large number of beat-notes can be obtained by tuning the monitor between these two frequencies. These are not caused by beating between the fundamental of the monitor and "sub-harmonics" of the transmitter, for the simple reason that the latter do not exist—by the definition given above they would not be harmonics, as their reciprocals would not be whole numbers in simple arithmetical progression. These notes are caused by beating between natural harmonics of the transmitter and natural harmonics of the monitor.

Suppose the transmitter frequency is 1,800 kc., and the monitor is tuned to 2,400 kc. Then the eighth harmonic of the transmitter ($8 \times 1.8 = 14.4$ Mc.) will give a zero beat-note with the sixth harmonic

of the monitor ($6 \times 2.4 = 14.4$ Mc.), and an audible beat-note will be obtained by very slight detuning of the monitor. This note will also include the beat between the 16th transmitter harmonic and 12th monitor harmonic, the 24th and the 18th, etc.

There is an infinite number of these beat-notes, but their intensity decreases as their component harmonics become further removed from the respective fundamentals, and only a limited number will be of use. The example given should be a fairly strong beat-note.

An interesting side-track of this is the reason for the unsuitability of the beat-notes formed by the fundamentals of transmitter and monitor. The note is rough and unpleasant, due to the beating of all the harmonics of both sources of oscillation, for a very long way up the scale. If the beating could be stopped at the sixth harmonic, the note would be pleasant to hear, but the seventh harmonic introduces the first discord, and with the following harmonics the note becomes harsh.

The second example is the locking or driving of an 80-metre oscillator or amplifier by means of a 40-metre oscillator. In the 40-metre oscillator there is no circuit tuned to a lower frequency than that of 40 metres, and a " sub-harmonic " on 80 metres cannot exist, but a strong second harmonic is supplied to the 80-metre circuit, and a circuit cannot oscillate on its second harmonic without being " persuaded " to oscillate on its first harmonic to a greater or lesser extent. The 80-metre circuit responds to the 40-metre second harmonic and inevitably generates a certain amount of 80-metre first harmonic to go with it. The proportion of 40-metre second harmonic in the output from the 80-metre circuit in a single-ended amplifier so driven would be large.

Finally, it has been reported and observed that certain stations transmitting on 80 metres are also audible, at nearly as great a strength, on 160 metres. The transmitter, accurately tuned to 80 metres, cannot radiate any appreciable energy on 160 metres, and the probable explanation lies at the receiving end. The effect has been observed only on receivers in which the aerial is connected straight to a plain detector valve, which, when oscillating, is rich in harmonics. In all probability the second harmonic of such a receiver is sufficiently strong to beat with the incoming signal. It should also be remembered that the harmonics are actually generated in the aerial coil itself—a circumstance which can hardly occur when a H.F. stage precedes the detector valve.

The author trusts that this article may clear up some of the controversy on the subject of harmonics. Briefly, the theory amounts to this, that the lowest possible frequency of oscillation of a given system is its fundamental, and the system can only oscillate on this frequency and whole number multiples of it. An oscillation of a given fundamental frequency can, however, give rise, in another system of which it is a harmonic frequency, to a lower fundamental frequency by supplying certain harmonics which will engender the lower fundamental.

# ATMOSPHERICS

By W. T. Eyton (2AZJ).

ATMOSPHERIC disturbances of the ether are at their worst during the six summer months of the year, anyway in the British Isles. Therefore it may not be out of place to make a few observations on this subject. Everyone knows that atmospherics originate from electrical discharges in the atmosphere; many of these are caused by the ordinary " domestic " thunderstorm. Discharges are often indirectly caused by sunspots. Careful observation has shown that periods of sunspot activity usually herald electrical disturbances in the atmosphere. For instance, the aurora Borealis seems dependent to a considerable extent upon sunspots.

Many years ago the theory that sunspots were cavities upon the surface of the sun was put forward, but since then it has been observed that these apparently dark spots (as compared with the sun's luminosity) move across the sun. At the present day it is believed that sunspots are giant tornadoes of burning hydrogen, which hurl themselves across the sun's surface. These tornadoes are thought to give off streams of electrons and ions, which travel across the intervening ether to our atmosphere. When they collide with our upper atmosphere they set up electric current, which causes auroral displays, as well as providing electricity for ordinary thunderstorms.

Wind friction in the upper atmosphere also generates electricity for storms. This is a more constant, if smaller, source of current than sunspots. To produce a thunderstorm it is necessary for clouds to become charged with electric current. When there is a steep temperature lapse (i.e., a considerable temperature drop with height), clouds rise towards the higher altitudes of our atmosphere, and continue to rise until the temperature lapse is negligible. Here they become charged with the electricity which is generated at these altitudes. Meanwhile the cloud concerned continues to increase in size and weight, owing to continual condensation of moisture, which goes on to much the same extent at this height as it does in the lower atmosphere. With this process the electrified cloud, becoming heavier, tends to subside towards earth. Here the " charged " cloud may meet another electrified cloud, or it may encounter the earth; in either case there is usually a discharge between the two bodies in the form of lightning. It must be remembered that there are a considerable number of " cloud and cloud " discharges, which, while being quite harmless, affect radio to an annoying degree. These are often not visible, and not infrequently accompany hail showers.

When a hissing or buzzing is heard on the radio receiver, this indicates that electrified rain or hail is falling in the vicinity. Often this hissing is unaccompanied by lightning. This indicates that the cloud from which the hail or rain is falling is not sufficiently charged to off-load to earth; that is to say that condensation has taken place too rapidly

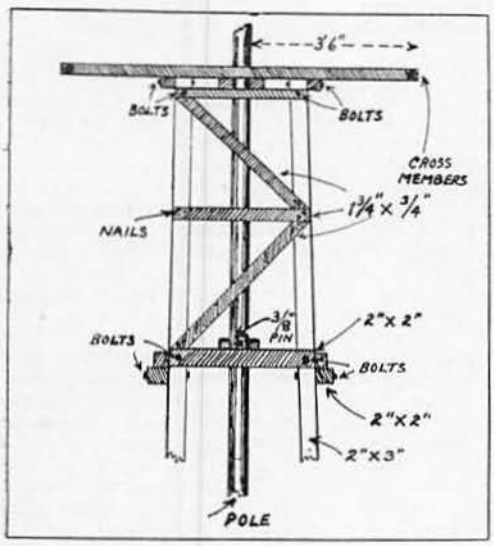
(*Continued on page* 518.)

# A FIFTY FOOT MAST

By N. E. READ (G6US).

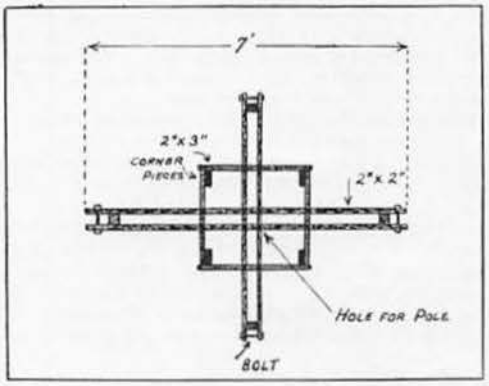
THE writer was recently confronted with the task of erecting a good aerial for work on the 7 and 14 Mc. bands, which normally is not a very serious matter, but unfortunately on this occasion, the only available space was a back-yard 30 feet long, and 8 feet wide. In addition to this, the yard is completely surrounded by a brick wall 18 feet high. The house is a three-storey affair with fairly high chimneys, which, of course, solved the problem so far as the " home " end of the aerial was concerned, but to get the far end of the aerial up to the same height as the house meant a mast of about 50 feet. Owing to the very small space available, this was no easy task, especially in view of the fact that the longest piece of timber which could be brought anywhere near to the rear of the house was 30 feet. Naturally, it would be a comparatively easy matter to balance a 40 to 50-foot pole over the 18-foot wall, but, of course, it was not possible to get this pole near to the wall.

After considerable thought, the following plan was adopted. A strong lattice bottom section, 24 feet long, was constructed. The corner pieces were probably much stronger than was really necessary, but as the timber happened to be handy, it was used up; 2"×2" straight-grained would probably have been quite strong enough. The corner pieces were actually 2"×3" straight-grained pine, and the criss-cross pieces were ordinary slating lath, about $\frac{3}{4}$" thick by $1\frac{3}{4}$" wide.




The lattice section measures 30 inches across the bottom, and 19 inches at the top, and the mast is set in concrete two feet deep. The four feet have plenty of small nails driven in so that they project about an inch all round; this gives a good hold in the concrete.

It is not essential to go to great pains in the construction of the bottom section (this one took about six hours to build), and further, it is not necessary to measure everything out carefully. Simply lay the two side pieces on the ground so that they are about the right distance apart at either end, and then proceed to nail on the cross members; $2\frac{1}{2}$ in. wire nails are quite suitable for this purpose. When the one side has been completed, lay the other two side members directly over the ones which have been made up, and proceed to nail them on, using the first one as a pattern, which means laying on the strips directly over the ones underneath and nailing same in place.



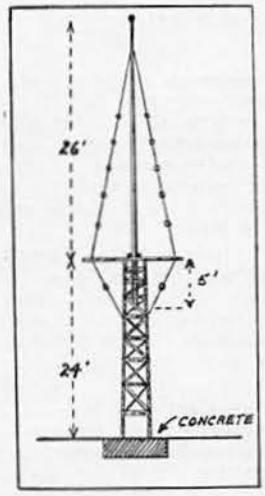

When the two sides are complete, they may be put on their edges and strips nailed across, taking care to see that the ends register with the strips, which are already in place. It might be mentioned here that the cross members are not put in the same direction, but are arranged so that when the whole mast is nailed together, one gets a criss-cross effect when looking through it. Before nailing the whole assembly together, the 30-foot pole was laid inside, with the top projecting through the bottom guide. The butt was secured by nailing it to a pair of temporary cross braces which are fastened N.E. to S.W., and N.W. to S.E. inside; this is necessary, otherwise the pole will flap about while the mast is being raised.

Before erecting the mast it was given a good coat of creosote and left to dry. White paint would probably look nicer, but creosote is so much cheaper and easier to put on!

When the mast was dry, the feet were tied back to prevent slipping, and with the help of two friends and a light ladder, it was pushed upright. When erect, the feet were packed up with pieces of slate, and the hole filled with concrete, which, of course, must be prepared beforehand. The mast was stayed with temporary guys, and the concrete left to harden.

The next task was the fitting of the cross members at the top of the lattice section. These are for the purpose of bracing the pole, as it is not possible to use any guy wires owing to the lack of space. When the cross members were screwed in place they were braced down to the lattice section; wire strainers could be used, but were thought unnecessary in this case. Their use also increases the cost of the mast. The stays were then attached to

the pole (again an easy matter with the help of a ladder) and also the pulley and halyard. It should be mentioned that the brace wires are fitted with small egg insulators every five feet.




The pole was now raised inside the mast. This operation is not nearly so tricky as it might appear. Two ropes are passed down inside the lattice section and secured to the butt of the pole, the ends of the rope are then brought out over the top and down the outside. One helper stood at the top of the ladder and pulled the pole upwards, while two others pulled downwards on the ropes. As soon as the pole reached the required height, a $\frac{3}{8}$" iron pin was pushed through a hole at the bottom of the pole so that the entire weight was taken by the cross members inside. The brace wires were then fastened to the cross members at the top and tightened up.

The result is a really solid mast, and also one which looks good. There is not the least tendency for the mast or pole to " shimmy " or even bend in the highest winds. In the event of the top section requiring lowering (halyards *do* break sometimes), this is easily accomplished by replacing the rope under the butt, in a similar manner to that employed when the mast was raised, and removing the iron pin. The pole can then be lowered, and by this method it would not even be necessary to remove the brace wires during the operation.

The total cost for the completed mast worked out at about 30s., including bolts, nails, and brace wires.

## EMPIRE CALLS HEARD

*A. R. Gilding, BERS311, Ambala, India :—*

28 Mc. : zs1h, vu2au (R9), vk5zc.

14 Mc. : vs1aj (5.8.9), vs2ae (5.5.9), vs3ac (5.6.9), vs6ag (5.5.9), vs6ah (5.6.9), vs6bi (5.6.9), vs8aa (5.7.9), vq3far (5.6.9), vq8af (5.6.7), ze1js (5.6.9), ze1jk (5.5.9), zs4a (4.4.9).

## Denmark.

By OZ7Z.

Conditions on 28 Mc. here in Denmark have been rather bad during April and May. OZ2M has been able to work CP and a few W's. ZS1H is heard daily, but very little DX comes through.

The Danish Postmaster-General has now granted us permission to use the entire international 3.5 Mc. band. We were formerly limited to 3,600-3,500 Kc.

NX2Z.—This station has been very active, judging from the numerous cards received by our QSL bureau. A letter from OZ2Z states, that

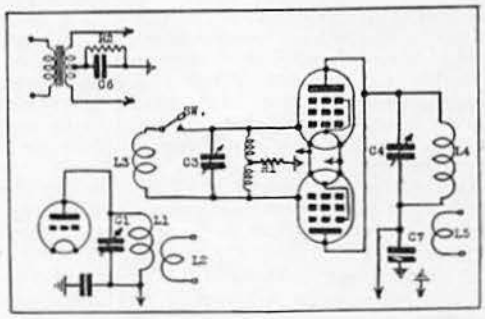
(*Continued at bottom of next column.*)

## Quick Change-Over to Ten

By Guy H. Grossin (F8RJ).

THE following short description of a 28 Mc. circuit used at F8RJ may be of interest to those who possess 14-Mc. transmitters and would like to work on 28 Mc. without the trouble of separate doublers, neutralisation, coil changing, etc.

It will be seen from the circuit diagram that the 14 Mc. transmitter has two alternative outputs—one for 14 Mc. and the other for the 28 Mc. stage. The 28 Mc. stage uses two receiving pentodes, such as the American 47, with their grids driven in push-pull and their plates tied together. By this means a doubler nearly as efficient as a straight amplifier is obtained.




*Circuit of change-over arrangements suggested by the author.*

*L1C1. 14 Mc. tank circuit.*
*L2 14 Mc. aerial coupling coil.*
*L3C3. Tuned to 14 Mc. with very small C.*
*L4C4. Tuned to 28 Mc. with small C.*
*L5. Aerial coupling for 28 Mc.*
*SW Closed for 28 Mc. work only.*
*Ch. Chokes for 14 Mc.*
*R1. 50,000 ohms, 10-watt type.*
*R2. 500 ohms, 6-watt type.*
*C6, C7 .001 μF mica, 1,000 volts.*

The following simple operations are necessary to change from 14 Mc. to 28 Mc. :—

(*a*) Transfer the aerial from L2 to L5 ; (*b*) close the switch " SW " ; (*c*) switch on the pentodes ; (*d*) adjust the grid circuit for maximum anode current ; (*e*) with the aerial disconnected adjust the anode condenser for minimum anode current ; and (*f*) tune the aerial for maximum current.

The pentodes need very little driving, 10 watts input to the 14 Mc. stage being more than enough. The 14 Mc. stage is keyed, and this stage may also be modulated to obtain moderate quality on 28 Mc. That the 28 Mc. stage is efficient is evident from the fact that more than 10 watts output is given for 20 watts input. Further, with this input at 500 volts the valves run cool. Although the aerial used was only 12 ft. high and badly screened (QTH : Paris !) several R9 reports have been received from U.S.A. Other DX is difficult, at any rate on 28,648 kc., since only 28,001 kc. seems to be fashionable now ! All 28 Mc. DX reports from B.E.R.U. members will be welcomed.

his Greenland Call has been illegally used by some Canadian or U.S. amateur. Only active amateur stations in Greenland at present are OX7ZL and OX7ESK.

# RUSTIC RUMINATIONS

By Uncle Tom.

*(In which the Old 'Un leaves his shack, for one month, and leads his readers up the garden.)*

I FIND it impossible to soliloquise in the Shack this month. For one thing, it's too darn' hot; and, for another, there's a nasty smell about the place, which comes, chiefly, from the waste-paper basket. (Yes, you've guessed it—anonymous letters go straight there.) So I am now sitting in the relatively pure air of my mountain fastness, 67 ft. in length, emulating the excellent Irishman with a pipe.

Now a nephew with whom I was talking not long ago suggested to me that it didn't matter in the least whether I was funny or not, so long as *somebody* got a good kick in the pants each month. Possibly he was right. Anyway, I have one here for the 'phone merchants who cultivate an American accent (synthetic). I have been particularly asked to tell them that they copy American hams like the flappers copy Yank film-stars. The only band immune from it, it seems, is 1.7 Mc., and up there we have to put up with discussions on the merits of the various houses of call in certain neighbourhoods, instead.

You can't get away from it—'phone on 7 and 14 Mc. is becoming as much a "rubber-stamp" business as the formula-QSO's on C.W. Unless two hams who are fairly intimate with one another get together and really talk about what they're doing, the whole thing often savours of a swank-parade for the benefit of local B.C.L.'s.

Two nephews from Cheshire have written to me and asked me to take up the cudgels on behalf of themselves and their Northern brethren. Why, they ask, should they be ticked off in the Bull. because they haven't built a 56 Mc. crystal-controlled transmitter and forwarded an illuminated address on the subject? Just because the lazy gang in London don't do anything, why should the go-ahead Northerners be assumed to be doing nothing?

They ask me to state in emphatic terms that they have got as far as the others who have supplied dope to the Bull., but all they get is a re-hash of what they already know, and a kick for not telling others that they know it! Figure that out, someone. It seems to add up right to me.

Their second point is better still. Now that the B.R.S. merchants don't find it so easy to send thousands of cards per week to European stations, what are some of them going to do for a living? Why can't they do something useful on the 56 Mc. band in the way of receiver designing? Now that the fully-licensed people are hard at work on frequency-stabilised transmitters, it's a bit thick to expect them to do the receiver design as well. Or is it?

And now to more pleasant subjects. My pal Bill Bones, who keeps a radio laboratory equipped with two screwdrivers, one pair of pliers (insulated, 5,000-volt.), several resonance-loops and a neon-tube, has made a discovery at last. Will the annoying gentleman who, some months back, queried "Experimental work—with *what?*" please note?

His pet dog, named Lecher, is a useful tuning indicator, since its tail rises every time he gets his 5-metre TX in resonance with the aerial. Bill came across a currant-bun that was quite inedible—even Lecher wouldn't touch it—and he wondered whether the currants were direct or alternating. So he took a couple of leads from his transmitter and prodded the currants with them.

Nothing happened. He reversed the polarity, and—the aerial ammeter was the first thing to blow. The currants were glowing like neon-tubes, and the plate of the valve was white-hot, and sending "SOS" in visual Morse. He switched off hurriedly, and the valve anode sent "TNX" as he did so.

Well, to cut a long story short, Bill Bones dispensed with his ordinary plate-supply altogether, and used a few of these currant-buns in series, and he found that he was putting out *perfect* spitch, hitherto imagined to be a Continental secret process. Furthermore, when he got down on 5 metres with them, there was poor old Lecher dancing about the garden on his two fore-legs, looking very pained and puzzled because he couldn't get his hind ones down on the deck.

Next came the local B.C.L.'s to complain of their receiving valves being blown. Well, the whole point is—do we go and invade France and confiscate all these potential power supplies? Well, do we? I don't know. What's it all about, anyway?

'Tisn't often I hear from an American nephew, but here's a comment from one, again evoked by the man who said "Experimental work—with *what?*" This chappie says that some of the most ingenious devices he has ever seen in amateur stations (and this in the States, mind you) have been devised and tested with the aid of an assortment of lamp-bulbs as indicators. He thinks that the most valuable effect of amateur radio is its stimulation of originality and ingenuity.

He goes on, "Mind, I am not suggesting amateur activity as a sort of castor-oil for stagnant minds, but I think those who use it as such get the most enjoyment and render ultimately the greatest service. Recent flood emergency work over here has brought out the man who could, and did, establish contact with the assembled contents of the stove and the pantry."

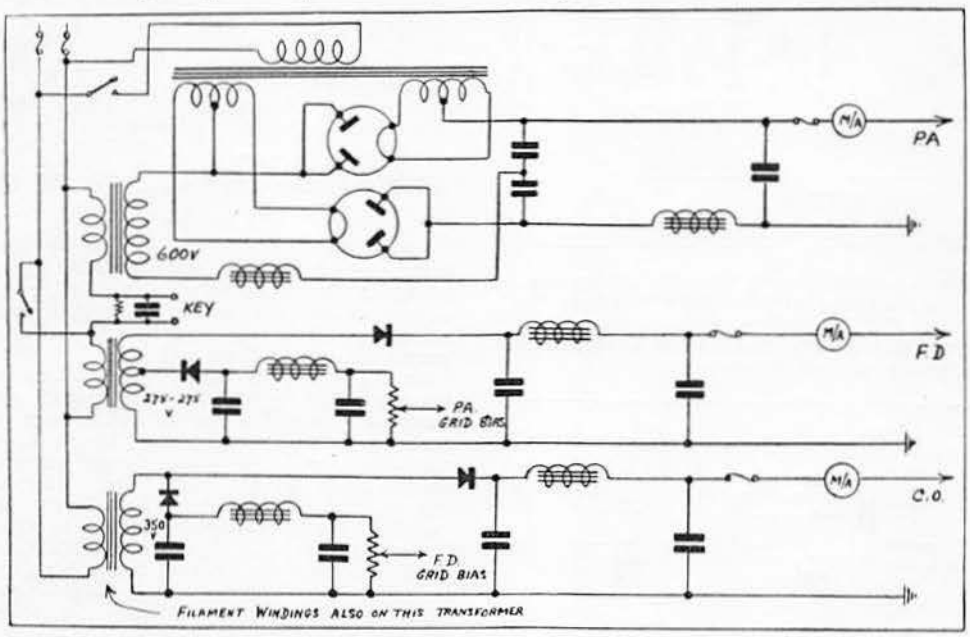
To all of which I say, very heartily, "Hear, hear." It almost sends me back to the Shack to send this nephew my foto-for-foto.

Lastly, I want to make an appeal for co-operation. I hope to produce, very shortly, a monumental Dictionary and Glossary of Ham Terms. Will readers who understand the meaning of some of the less familiar terms please oblige me with them? I mean, I know that "73 cuagn" means "Thank goodness *that* QSO's finished, and may we never have another"; some of the terms, however, are more obscure. Any research and help will be appreciated.

# A 50-WATT POWER PACK

THE following description of an arrangement for obtaining the various voltages required for the operation of transmitting apparatus is not claimed to be original, but it is thought that the reasons for the layout may be of assistance to those contemplating re-building this necessary part of their equipment.

As will be seen from the diagram, the main H.T. is supplied by a voltage doubling circuit. The principal reason for this is because the writer's radio room is seldom entered, and damp consequently attacks anything likely to absorb it, with attendant loss of insulation. As the chief component thus affected is the H.T. transformer, the only courses open are to either use a transformer in an oil bath, or use less volts. The latter is obviously the cheaper method, hence the voltage doubling circuit. As the D.C. voltage required is 1,000 v. or so; were the more usual method of full-wave rectification used; the total voltage across the transformer secondary is some 2,000 v. By using a voltage doubler this voltage need only be 600 v., and the risk of transformer breakdown is thus considerably reduced.




It will be noticed that the smoothing choke is connected in the negative, instead of the positive lead, this is done in order to relieve the windings of their otherwise high potential above earth. A small point, but one which has counted a lot in the author's experience.

Type 83 rectifiers are used, with their anodes strapped, the reason for using these being their low cost! GUI's can be used, but they seem to be wasted on 600 v. A small input choke is included to improve the regulation, and also to help save the cathodes of the rectifiers whilst primary keying is in operation.

The small filament transformer for the rectifiers *must* have very good insulation, not only between the primary and secondary windings, but also between the two secondary windings.

Next we come to the supply for the penultimate stage. This transformer does two jobs, as it supplies grid bias for the P.A. as well. It feeds a half-wave rectifier for anode supply, and on its "idle" half-cycle, feeds another half-wave rectifier for the P.A. grid bias. This supply is taken from a tapping midway on the secondary, and delivers some 250 v. Metal rectifiers are used here in order to simplify things somewhat.

The same procedure is adopted for obtaining bias and H.T. on the small C.O. H.T. winding which is wound on the filament transformer. The actual bias lead is taken from a potentiometer, thus giving continuously variable bias—a valuable asset. This potentiometer should be of as low a value as possible, consistent with the amount of current available from the rectifiers and/or transformer, in order to make as low an impedance as possible for the grid circuit. It must be borne in mind that as much as 30 m.a. may be flowing in the opposite direction, and unless there is a comparatively low resistance here, the regulation will suffer accordingly.

Fuses are inserted in the mains leads, and in each H.T.+ lead, but have been purposely omitted from the bias leads in view of the danger to the P.A. valve, should one blow whilst the H.T. and drive remain on.

A gate switch, although not shown in the diagram, is also incorporated. Another item not illustrated is the inclusion of a 5v. winding on all transformers, connected to 6 v. 6 w. car lamps, acting as pilots. A 5 v. supply is used in order to lengthen the life of the lamps, which are almost immune from mechanical fracture of filament due to vibration.

# CORRESPONDENCE

## THE COLLINS COUPLER

*To the Editor*, T. & R. BULLETIN.

DEAR SIR,—A short while ago I read some correspondence in the BULLETIN about the so-called advantages of the "Collins Coupler." It was suggested that we should do away with the P.A. tuning circuit and feed the valve straight into the "PI filter."

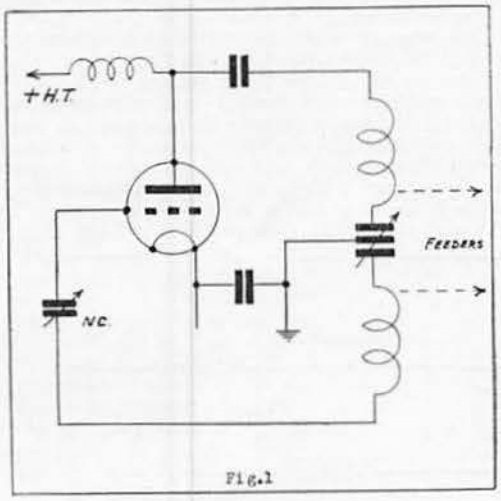



Fig.1

Here was a great discovery for the aerial group, but nobody appeared to know how to adjust the device, and Fig. 1 certainly does look rather odd, amounting to almost a short circuit at resonance and with no aerial feeders connected!

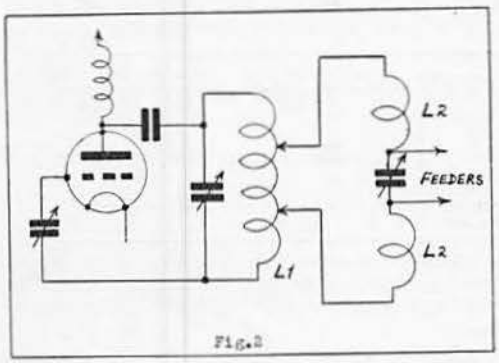



Fig.2

However, suppose we redraw the circuit in the normal (?) manner of Fig. 2. This, I believe, is the "Collins" circuit with L2 drawn vertically.

We now give L1 order to quit and split L1, and make it do double duty, we now have Fig. 3, which many will recognise as normal commercial practice, L1 C1 forming the parallel tuned circuit, C1 tuning the plate current to minimum as usual and C2 being set to a value that will give normal loaded plate current values when the feeders are connected.

This system would appear to offer the advantages of an external filter unit (i.e., harmonic attenuation, etc.) with less complications.

Yours faithfully,
W. B. J. HACKNEY (G5YP).

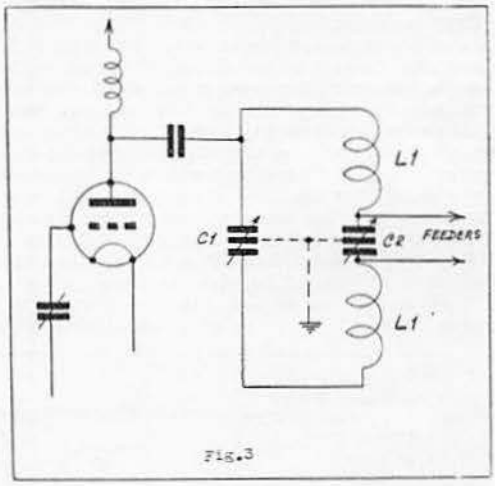



Fig.3

## CRYSTAL CONTROL ON 56 Mc.

*To the Editor.*

DEAR SIR,—I should like to thank Mr. Page for taking my criticism of the R.E.S. 56 Mc. transmitter in the right spirit. Nevertheless, as he seems to have misunderstood certain parts of my letter, may I beg one or two inches of space to correct his misapprehension?

Mr. Page says that had I built the transmitter from his data I should have found that the points I raised with regard to the C.O./F.D. stage are all made use of. He proceeds: "The 7 Mc. tuned circuit has very little capacity across its coil, and the 14 Mc. stage has much more." But if Mr. Page will re-read my letter carefully he will find that those are the very points which I was criticising. He will see that I said that the 7 Mc. tank coil should be kept small (which means high C), and that the 14 Mc. coil should be as large as possible (which means low C). Further, it is, of course, not necessary to build Mr. Page's transmitter to find out what constants he recommended, since these were given in the article!

In his reply Mr. Page gives no explanation of the .001 μF condenser between the 56 Mc. doubler plate and H.T. negative. When such unusual things are done I think a little explanation is called for.

Doesn't it seem rather a pity, also, to spoil the efficiency of a 56 Mc. transmitter in order that it may be suitable as well for the lower frequencies? 56 Mc. work is in a class by itself, and to achieve useful results surely it should be treated as such.

Yours faithfully,
C. S. POLLARD (G2GB).

19, St. Mary's Avenue,
Shortlands, Kent.

# THE 56 Mc. BAND

By L. G. BLUNDELL (G5LB).

IT was proposed in the last issue of the BULLETIN that future work on this band should be carried out on a regular and more business-like basis, and some suggestions were put forward as to how this could be accomplished, with special reference to the use of C.W. It is now, therefore, a pleasure to announce that, in view of the widespread interest and the many expressions of approval received, there will in future be published under this heading a review of band activity, conditions, etc., and it is hoped that this feature will be of value and interest to all concerned.

However, to obtain the maximum value from such a scheme, material must be furnished from sources both far and near, and as pointed out by G2GB, G2HG, G6DH and others, co-operation from foreign and colonial sources is most desirable, indeed, essential—(*Foreign and Colonial Journals please note*)—under the present circumstances. The stations mentioned and others are making (or attempting to make) schedules with DX stations, and it is hoped that all those with facilities on the lower frequency bands will do likewise and forward all available information at the earliest for inclusion in these notes.

Thanks are due to those who have furnished material from which the following information has been compiled. The first list of scheduled transmissions is not so long as was hoped for, but there must be many more active c.w. stations available, and it is requested that all such stations forward details as to their activities for inclusion in future notes, and all listening stations with suitable equipment are asked to do likewise, as reports from these sources will be of great assistance to the transmitting stations concerned.

*Special Tests*

*On Sunday, June* 28, G5FN, Gillingham, Kent, will be testing a rotating beam aerial. C.W. and M.C.W. will be used with an input of 25-40 watts, and the aerial will make four complete revolutions per hour. No details as to the times are to hand, but it is presumed that this test will be made from mid-morning to late afternoon.

*On Sunday, July* 5, BRS2036 and BRS2138 are taking a receiver to the top of Scafell (Cumberland) and will appreciate calls on fone or C.W. from any station. This will be an "all day" test, and it is hoped that energy dissipated will be balanced out by hearing a good number of stations—DX or otherwise!

*Notes.*

During the past few weeks the band has shown signs of that much-discussed property "DX," and as the following items clearly show, long-distance contacts are more than probable during the next month or so.

On May 7, 22.00-22.25 B.S.T., G2HG heard a harmonic of LCJ at R6/4 W5. At G6DH, on the 12th, a signal on 5.2 metres (thought to be a harmonic of a Russian telephony station) was heard at fair strength. On the 23rd G2HG again found the band more than usually interesting, when, at 19.30, mush level suddenly rose to R5, and after a few minutes died again to its normal level (about R2), although giving an effect of "liveliness." At 19.40 a commercial harmonic came through at R5/3, sending figure code and remained audible until 20.15, although by then it had dropped to R3/1, and soon after faded out completely, no call or clue as to origin being received.

At 19.43 a C.C. C.W. signal was heard calling "CQ DX" at R3, with a very bad "flutter," which made it QSA 1. The only parts of the call readable were "9" and "Y" (could it possibly have been W9NY?)

From G6CL it is understood that a W6 has

SCHEDULED C.W. TRANSMISSIONS.

| Call. | QRA. | Frequency. | Days and Times (B.S.T.). | Remarks. |
|---|---|---|---|---|
| G2GB | Shortlands, Kent | 56.784 | Wed. and Sat., 11.30-12.00 | T9 note |
| G2HG | London, S.E.26 | 56.32 | Sat., 14.30-17.00<br>Sun., 10.00-13.00<br>14.00-18.00 | T9 note |
| G2VK | London, N.17 | 56.2 | Sun., 11.00-11.30 | — |
| G5FN | Gillingham, Kent | — | Sat., 15.00-17.00<br>On and from 4.7.36 | Rotating beam aerial. 360° in 15 min. C.W. and M.C.W. |
| G5LB | Beckenham, Kent | 56.72 | Mon., Tues., Thur. and Fri., 18.15-19.00<br>Mon. Tues., Fri., 22.30-23.00<br>Sat., 16.00-19.00<br>Sun., 12.00-13.00<br>14.00-17.00 | T9 note |
| G5JU | Bristol | — | Sun., 11.00-12.00 | |

It is realised that schedules may be occasionally broken up by holidays, etc., but under normal circumstances they will be run to advertised times until band activity and conditions make revision desirable. At the same time, most stations are quite willing to increase their present working periods to cover additional transmissions for local receiver tests, etc., and anyone wishing to take advantage of such services should communicate with the station concerned *direct*.

worked New York, and on May 9 numerous Chicago-New York contacts were made. At G5LB on the 24th a harmonic of EAN was received R6/3 W5 from 12.10-12.15. No signals from this station were heard during the rest of the day, but some T9 unkeyed carriers were heard at the low-frequency end of the band during the late afternoon, all slowly fading from R6 to R2 (these were also heard by G2GB and G2HG). On the 25th at 18.20-40 a very rough signal was heard calling " DOC." The origin call was unreadable owing to car QRM, but later, after some very rapid automatic sending was given again and thought to be " IAC." The QRK was R5/3 QSA3, with very deep fading. Later at 18.55 an R3 W3 T9 signal was heard at the extreme low-frequency limit of the band calling " CQ 56 DX," the call was again lost in QRM. On this day at 19.20 B.S.T. G2HG received IRU calling XOF at R7/3. Signals were quite consistent until 20.45 when they were lost. No other signals were heard during this period, although the band was searched carefully. (This was possibly the station heard earlier by 5LB and read as IAC.) What, then, are the real possibilities of the band ? Until such are known, constant activity with stabilised transmitters and receivers will do much in this quest for knowledge, and conditions will do the rest.

* * *

In order to make these notes as comprehensive and interesting as possible it is requested that all matter for inclusion should reach the writer by the 25th of each month without fail.

## The Ten Metre Band

By Nelly Corry (G2YL).

THE band has now been " open " on practically every day for a whole year, and it is rather interesting to compare present-day conditions with those experienced in May, 1935.

A year ago European and N. African signals were audible on 19 days of the month, but the only DX station which came through was ZT6K, on May 13. The number of countries heard was 20, and from nine of these the only signals were harmonics. In comparison, conditions during the past month show an enormous improvement, a total of 38 countries in all continents being heard, only four of these being harmonics.

Australians (VK 3, 4, 5 and 6) were audible on nine days, including seven of the first ten days of the month. The only Asians reported were J2CE, J3DC, U9AV, U9ML and VS6AH, and none of these was heard after the 10th. South Africans, including ZE1 and FB8, came through as well as ever on at least 22 days ; and Central and South Americans from eight countries were heard on 13 days of the month. In spite of all expectations to the contrary, N. Americans continue to get across well on occasions, and were audible on at least seven days. Europeans and N. Africans in 20 different countries were better than at any time since last August, and were heard on 24 days.

May 24 was easily the best day of the month, and a list of countries heard may be of interest, viz., D, EA, EI, F, FB, HAF, I, LU, OE, OK, OZ PA, PY, SM, SP, SU, SV, VK, YT, ZE, ZS. Africans and Europeans were audible all day, and at 22.15 B.S.T. some were still coming through, with LU9BV and PY1AW (probably a harmonic). At 22.20 B.S.T. W's appeared, and the band was full of them until well after midnight. Districts heard were W 1, 2, 3, 4, 8 and 9, and many, including 'phones, were R8/9. G6DH worked W2DTB at 00.45 B.S.T. !

Conditions were very poor, even for Africa and Europe, on May 13, 16 to 21, and 27 to 30. May 17, when the only stations reported were FA8BG, I1IT and W3HC, shares the distinction, with April 19 (only ZS1H reported), of being one of the two worst Sundays for eight months.

Most of the European 28 Mc. " regulars " have been coming over well at times, e.g., CN8MQ, D4GWF, F8CT, F8HS, FA8BG, OE1ER, OE1FH and SM6WL ; there are also a good many new signals to be heard this year, including three Yugoslavians, SV3Z, of Athens, SP1DC, and stations in EA, HAF, I and OZ.

G6DH worked 19 countries in all continents during the month, and a ship, W7ABY, s.s. *San Vincent*, off Cuba on May 15. He reports peculiar conditions on May 11 and 12. On the 11th, East Coast W's were audible, some of them R9, for only 10 minutes at 23.00 B.S.T., and the following morning commercial harmonics were heard down to approximately 5.5 metres at about 10.00 B.S.T. Unfortunately, he was unable to spend long at the receiver, and the only station identified was a harmonic of EAM on about 6.5 metres.

ZE1JJ and ZE1JU have been audible at good strength at times this month : the former is to be congratulated on working ZL1AR on 28 Mc. on April 1, this being the first ZE/ZL contact on *any* band.

## CORRESPONDENCE

(*Continued from page* 494)

*To the Editor.*

Dear Sir,—Apropos the correspondence in the May Bulletin between G5LB and G6PA, I read a paper about two years ago on laboratory experiments to determine the correct size of by-pass condenser for 56/60 Mc. work, and this was found to be .00028 μF—.0003 μF is the nearest size available commercially.

Theoretically, of course, the larger the capacity of a condenser, the lower its reactance. Why, then, is not .01 μF specified ? The reason lies in the fact that no condenser possesses pure capacity, but has a certain amount of self-inductance, which increases with size. This plays a prominent part when ultra high frequencies are used and explains why 5LB found smaller condensers more effective—because the self-inductance of the larger condensers he used was higher than normal and caused the reactance to rise considerably.

If physically small .0003 μF tag end type condensers are used, little improvement will be possible.

Yours truly,

J. N. Walker (G5JU).

4, Frenchay Road,
Downend, Bristol.

May 19, 1936.

# RESEARCH AND EXPERIMENTAL SECTIONS

## MANAGER :

H. C. PAGE (G6PA), Plumford Farm, Ospringe, near Faversham, Kent.

## ASSISTANT MANAGER :

J. C. ELMER (G2GD), "Aethelmar," Seabrook Road, Hythe, Kent.

## SECTIONS :

**No. 1 : TRANSMITTER DESIGN**

**S.M.** : G. McLEAN WILFORD (G2WD), 33, Bibury Road, Hall Green, Birmingham.

**G.M. : 7 and 14 Mc.**

S. BUCKINGHAM (G5QF), 9, Brunswick Park Road, New Southgate, N.11.

**G.M. : 28 Mc.**

G. McLEAN WILFORD (G2WD).

**G.M. : 56 Mc.**

J. N. WALKER (G5JU), 4, Frenchay Road, Downend, Bristol, Glos.

**G.M. : Artificial Aerials**

A. W. LISTER (G5LG), Royal Military Academy, Woolwich, S.E.

**No. 2 : RECEIVER DESIGN**

**S.M.** : J. MAWBEY (BRS. 1300), 109, Clare Road, Tankerton, Kent.

**G.M. : General**

D. GORDON BAGG, (G6BD), Fresh Woods, Tonbridge, Kent.

**G.M. : 56 Mc.**

J. N. WALKER (G5JU)

**G.M. : Superhets**

T. B. SMITH (G5TS), 115, Novar Drive, Hyndland, Glasgow, W.2.

**No. 3 : AERIAL DESIGN**

**S.M.** : F. CHARMAN (G6CJ), Orchard Cottage, Stoke Poges, Bucks.

**G.M. : General**

F. WILSON (G2XX), 85, Risca Road, Newport, Mon.

**G.M. : 28 Mc.**

L. O. ROGERS (G2HX), "Audwen," Estcourt Road, Gloucester.

**G.M. : 56 Mc.**

**G.M. : Joint Group with Propagation**

G. A. H. ECKLES (G5GC), 57, Sutton Road, Beverley High Road, Hull.

**No. 4 : PROPAGATION**

**S.M.** : J. C. ELMER (G2GD), "Aethelmar," Seabrook Road, Hythe, Kent.

**G.M. : 28 Mc.**

MISS N. CORRY (G2YL), "Redholm," Walton-on-the-Hill, Tadworth, Surrey.

**G.M. : Conditions**

J. HAIGH (G6HA), 2, Greenock Terrace, Leeds, 12.

**G.M. : Literature**

A. T. MATHEWS (G5AM), 24, Woodside Park Road, North Finchley N.12.

**G.M. : Joint Group with Aerial Design**

G. A. H. ECKLES (G5GC).

**No. 5 : VALVES AND INSTRUMENTS**

**S.M.** : D. N. CORFIELD (G5CD), 10, Holders Hill Gardens, Hendon, N.W.4.

**No. 6 : AUXILIARY APPARATUS**

**S.M.** : A. O. MILNE (G2MI), "Southcot," Larkfield, Kent.

**G.M. :**

F. W. BENSON (2BWF), 53, Corona Drive, Thorne, Doncaster.

**No. 7 : MICRO-WAVES (112 Mc. and above)**

**S.M.** : DR. C. G. LEMON (G2GL), 19, Lena Gardens, Hammersmith, W.6.

**No. 8 : CONTEMPORARY LITERATURE**

**S.M.** : A. T. MATHEWS (G5AM), 24, Woodside Park Road, North Finchley, N.12.

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THIS month R.E.S. has little but a few routine alterations to bring to your notice. There must of necessity be times during the year when nothing of interest comes to hand, or when there are no completed articles. The members of R.E.S. who read these words should not look upon this as an excuse. While we realise that experimental work cannot be done to order so far as time is concerned, we do feel that there are a great many people who could provide us with useful data, if only they would be energetic, and public-spirited enough to do so.

*Receiver Design Groups.*

It is with much regret that we have to record the resignation of Mr. R. W. Newton (G5NQ), who for some time has been manager of these groups. Owing to stress of business, Mr. Newton is no longer able to continue as Section Manager. We have been fortunate, however, in securing the services of Mr. J. Mawbey, in place of G5NQ, and we are confident that under his care the section will continue to make good progress. All members whose names are recorded upon our books for Receiver Design will hear from Mr. Mawbey in due course, and it is hoped that they will show him the same loyalty and attention as was given to his predecessor.

*Transmitter Design Groups.*

At the recent R.E.S. Conference, held in London, it was decided to discontinue the Letter Budget system of working, and in its place the Section Manager will issue to each Group Manager a series of problems, which are to be studied by the groups. These questions cover a wide range, and it is felt that everyone should find them interesting.

It was our privilege to be able to inspect the correspondence files of the Transmitter Design S.M. a short time ago, and from this examination it is evident that a number of members do not understand the functions of a Section Manager. In the first place, he is not a general information bureau, which means that all and sundry are not entitled to call upon him for advice. The fact that he has responded so nobly to this heavy correspondence is due to his own kindness, and is not through any wish of ours. In future therefore, members wishing for advice on matters which do not definitely concern the problems their section is working upon should look elsewhere. R.E.S. does not exist for the purpose of supplying general information on all matters appertaining to radio. Such matters as how to obtain a transmitting licence, and questions of a like nature, are no concern of ours. In many cases the answer can be found in works already published.

112 *Mc.*—At the eleventh hour comes an article from the pen of Dr. Lemon (G2GL), who is our Micro Wave Section Manager. We are very pleased indeed to be able to publish this, as Dr. Lemon is well known for his work in this direction, and his remarks may be taken as authoritative. Incidentally he will be very pleased to hear from anyone interested in the subject who would care to join his groups.

H.C.P.

## Reports Wanted.

G5RB (London, S.E.) on his 7 Mc. C.W. transmissions. All reports will be acknowledged.

W1DGC (Stamford, Conn.) on his 14 and 28 Mc. low-power transmissions.

# TRANSMISSION AND RECEPTION ON 2.5 METRES

By C. G. Lemon, F.Ph.Soc., A.M.I.R.E., (G2GL.)

THE transmission and reception of signals on the 2.5 metre band (112 Mc.) is comparable in operation to that of the 5 metre band (56 Mc.), but in a number of instances improved results have been obtained on the higher frequency. It is not desired at the moment to describe fully the construction of an ambitious transmitter and receiver, but hints will be given on the building and operation of a simple apparatus evolved by the writer.

It has been found that it is possible to make almost every small battery triode oscillate very easily at 112 Mc., and once they oscillate, most of the problems relating to amateur use are solved. The power valves are found to be the best oscillators, and the writer actually uses small two-volt power valves for both receiver and transmitter. The transmitter proper consists of a single valve oscillator feeding a half wave antennæ and modulated by a two-volt pentode. Power for both transmitter and modulator is obtained from an H.T. accumulator, although batteries are quite suitable. The current drain of the oscillator is in the region of 12 mA and falls to 9 mA without the aerial. Communication up to a quarter of a mile is possible without an aerial, but, of course, an antenna is recommended. The receiver consists of a single valve oscillator and a separate quenching valve. It will work quite satisfactorily on the cumulative grid principle for short distances, but, naturally, the tuning is somewhat sharp and hand capacity effects are bad. By using a separate quenching valve, hand capacity is almost entirely reduced and tuning is quite as simple as a 5-metre super-regenerative circuit. The aerial consists of a quarter wavelength of wire either arranged vertically or horizontally, depending on the position of the transmitting aerial.

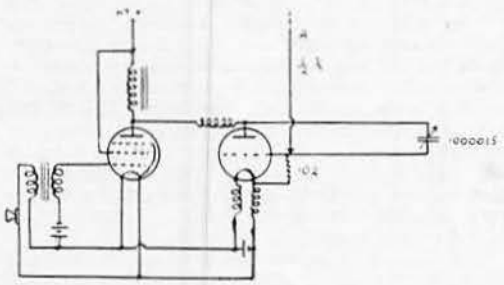


*Fig. 1.*
***Circuit diagram of a 2.5 metre phone transmitter.***

*Transmitter.*

The circuit diagram of the complete transmitter is shown in Fig. 1, from which it will be seen that the connections are quite simple.

A pictorial diagram (Fig. 2) shows in a better manner the actual layout and design of the oscillator. It will be observed that connections are soldered direct on to the valve pins. The variable condenser should preferably be of the type in which extraneous metal is at a minimum.

In the operation of the transmitter, a milliammeter should be connected in the anode circuit, and on switching on an anode current of from 5 to 20 mA will pass, depending on the valve. The current will vary with the setting of the variable condenser. Oscillation is easily observed by touching one of the wires, when an alteration in anode current will be observed. Oscillation will cease when the plates of the condenser are almost fully disengaged.

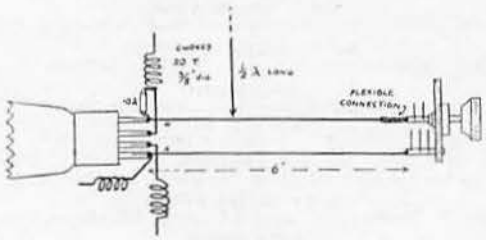


*Fig. 2.*
***Pictorial diagram of oscillator.***

The wavelength is next to be determined and this can conveniently be done by lecher wires. A pair of thin tinned copper wires is stretched from one end of the room to the other, about five yards will do, and the wires spaced about 1.5 inches apart. The ends farthest from the oscillator may be held by drawing pins, etc., but not connected together. At the oscillator end the wires are clamped under drawing pins and then terminate in an elongated loop, which should be loosely coupled to the oscillating system so that the two sides of the loop are parallel with the oscillator wires, but spaced about one inch away. By means of a screwdriver with an insulating handle, the wires are short-circuited at the oscillator end and slowly slid along to the free ends. At about two feet from the start, a sudden increase in anode current will be observed. This rise should be limited to 1 mA by moving the lecher wire loop towards or away from the oscillator. This point is then suitably marked and the short-circuiting screwdriver again slid along until the next point is reached—this is also marked. If the distance

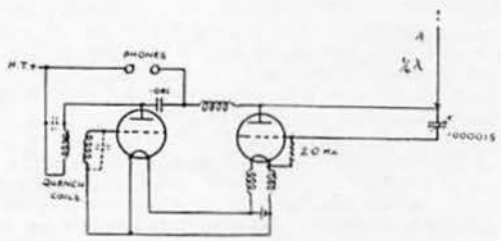


*Fig. 3.*
***Circuit diagram of 2.5 metre receiver***

between these two points is measured in metres, it will indicate half the wavelength. The above method is suitable for ordinary measurements, but is not suitable if a very high degree of accuracy is required. The wavelength can be adjusted by means of the variable condenser until the lecher wire measurement indicates radiation is occurring in the 2.5 metre band.

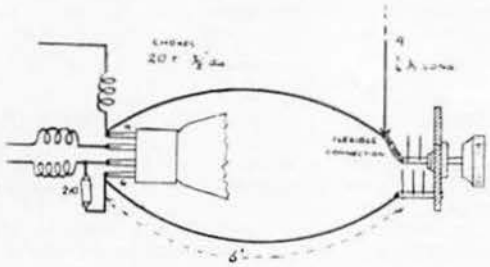


*Fig. 4.*
***Pictorial diagram of 2.5 metre detector valve***

The next step is to couple on the half wave antenna. The position is again observed by means of the milliammeter. A length of wire is cut to exactly the same length as the points on the lecher wires, i.e., half a wavelength, and one end fitted with a crocodile clip. This aerial is now clipped on to the grid wire of the oscillator system. This should then be slipped up and down on the wire until an increase of anode current of about 3 mA is observed. When reading the meter on these tests, keep at least 1½ metres away from the aerial, as it is very sensitive to body capacity. The aerial may either be vertical or horizontal. Modulation is very simple, as can be seen. Instead of the Heizing method shown, transformer coupling can be used, but a low resistance choke or transformer is recommended in order that the maximum high tension be applied to the oscillator.

*Receiver.*

The circuit diagram of the receiver is shown in Fig. 3. It will be seen to be a duplicate of the transmitter with the exception of the grid leak value. The actual valves should be of the same pattern. In order to make the receiver more portable, the valve was placed between the oscillating wires, as shown in the pictorial diagram Fig. 4. The same remarks on the operation of the transmitter also apply to the receiver. This includes the variable condenser and also the method of measuring the wavelength. It is essential to measure this in order to ascertain whether it will pick up the transmissions. The quenching circuit is slightly different to normal practice in that the phones act as the coupling between the quenching frequency and the radio frequency, the actual coupling being a 0.001 uF. fixed mica condenser. The quenching coils are the same type as those used in 5-metre super-regenerative circuits, but an advantage will be found if it is possible to vary the coupling between them, as this has an effect on the quality of reproduction and also the signal strength. The typical rushing sound is heard in the phones, which disappears upon tuning in a carrier.

As can be seen from the above, 2.5 metre operation is just as simple as 5 metres, and in the writer's opinion will, in time, supersede the latter.

The writer would like to express his appreciation to *Messrs. Milnes* for supplying a high tension accumulator and to *Messrs. Stratton & Co.* for the short wave components used in the experiments.

# TRUE STORIES NO. 2

Holding the distinction of being the first Australian station to work Europe on Ten, Roy Belstead, VK4EI, will be listed amongst the amateurs that have made history.

Townsville, Queensland, the home of VK4EI, is a good spot for DX, and the only trouble encountered is static, which is terrific during their summer.

The receiver is home-built, using a tuned R.F. stage, an E.C. detector, a peaked audio stage, and finally an output stage. The valves used are American, and although the receiver is rather out of date he manages to get on fairly well with it, although hopes are entertained of building a single signal super in the near future.

The transmitter, which works on 28, 14, 7, 3.5 and 1.7 Mc., uses a 59 as C.O., followed by a 59 doubler, driving a pair of R.K. 20's in push-pull, with up to a hundred watts output.

The aerial is a full-wave 7 Mc. Zepp, and for 28 Mc. a beam antenna is being erected, using four vertical half-wave antennae, with four vertical reflectors quarter wave away.

This array will be used to contact U.S.A., where there is almost an unlimited number of stations working on this band.

In this year's 28 Mc. contest, VK4EI made some 5,000 points up to the end of February, which is fairly low compared with some of the other VK scores, but hopes are centred on the beam array to make up for the inefficiency of the present aerial.

Up to the present time QSO's with " G " stations have been made on 28, 14, 7, and 3.5 Mc., and now VK4EI is hoping to hear a " G " on 1.7 Mc., as his best DX on this latter band stands at over 2,500 miles.

So how about it, 1.7 Mc. gang ?

## ZT6AQ.

Ten years ago the call G6UO could be heard regularly on the old 45-metre band. Ted Cook, of Gainsborough, was the man behind the key and many enjoyable contacts have we Londoners enjoyed with his QRP station.

Since 1930 Mr. Cook has been a wanderer, spending much of his time abroad, but news reaches us now that he has settled down in South Africa, and is operating as ZT6AQ. His full address is 108, Lucerne Mansions, De Villiers Street, Johannesburg.

His operating frequencies are 7,110, 7,193, 14,220 and 14,386 kc. Reports from G will be welcomed, but Mr. Cook's ambition is to make regular schedules with his old friends in the Home Country.

## New T.R.

Mr. J. Mawbey, BRS1300, has been nominated T.R. for Whitstable, Kent. Members in that town are asked to send reports to Mr. Mawbey.

# NEWS AND VIEWS FROM 53.

## Convention and Exhibition.

Members are reminded that the 11th Annual Convention will be held in London during the period September 3 to 5. It is hoped in our next issue to give an outline of the programme which is being arranged.

As in former years, the Society will run a stand at the R.M.A. Exhibition, which opens at Olympia on August 26. The Secretary will be glad to hear from members who can undertake stand duty during any period of the exhibition. Duty periods will be from 10.30 a.m. to 1 p.m., 1 p.m. to 4.30 p.m., 4.30 p.m. to 6.30 p.m., 6.30 p.m. to 10 p.m.

## Honorary Publicity Manager.

The Council have pleasure in announcing that Mr. A. E. Dyson (G6NJ), 52, Burton Road, Burton-on-Trent, has been appointed Honorary Publicity Manager.

Mr. Dyson will be responsible for making known our work abroad, but he will also be pleased to render assistance to home members who are interested in arranging publicity for the Society.

## Calibration Section.

Our Calibration Manager, Mr. A. D. Gay (G6NF) has asked us to remind members that, in accordance with the information published under Calibration Section Notes, he will be unable to attend to calibration matters for two months, commencing July 1.

## New British Call Signs.

We have been advised by the G.P.O. that call signs in the series G8 were issued during the last week in May.

## Secretary's Vacation.

Our Secretary expects to be on vacation from July 18 to August 4, and from September 12 to September 21. Members are asked to keep correspondence down to a minimum during these periods. Normal routine matters will, of course, be handled as usual.

## A 10-watt Contest.

For some time the Tests and Awards Committee have been considering the possibility of organising a contest for the 10-watt station, but in view of the poor support given to previous contests, they feel it desirable to obtain promises of support from members before proceeding further.

Members who are interested in this project are asked to notify the Secretary not later than July 15.

The Awards Committee do not intend to organise this event unless promises of support are received from at least 30 members.

## "Radio, Ltd."

We have been asked by *Radio, Ltd.* (Los Angeles), publishers of "Radio," to correct a common misapprehension by pointing out that they are *not* connected with the publishers of the "Radio Handbook" (except as one of many selling agencies), and are in no way to blame for the long delay in the appearance of that book.

## Reports for SU Transmitters.

Mr. F. Pettitt, SU1SG, informs us that Imperial Postal Reply Coupons are invalid in Egypt for the reason that Egypt is not a part of the British Empire. International Reply Coupons should therefore be used by members who write to Egyptian amateurs for confirmation of their reports.

## W.F.S.R.A.

We have been asked by Mr. D. Magill (W9DQD), Secretary of the World Friendship Society of Radio Amateurs, to mention that Mr. A. H. Bird (G6AQ) is now in charge of W.F.S.R.A. affairs for the British Isles.

Membership in the Association is open to all amateurs who subscribe to the membership pledge. There are no dues or other requirements, and members receive a certificate without charge.

## Dominican Radio Amateur League.

We are informed that a Dominican Radio Amateur League has been formed with headquarters at P.O. Box 912, Ciudad Thujillo, Santo Dominigo, Dominican Republic, West Indies. The local name for the new association is Liga Dominicana De Radioaficionados.

## University College, London.

We have been informed by Professor R. O. Kapp that the University transmitter was dismantled several years ago.

Members who have contacted a station using the College call will therefore appreciate that a pirate has been at work.

## Overseas Amateurs—Note.

Mr. E. T. Woodhouse-Rayner (G6IO), Publicity Manager, South London and District Radio Transmitters' Society, has asked us to mention that overseas amateurs on visits to this country will be welcomed at meetings of his Society.

Meetings are held at the Brotherhood Hall, Knights Hill, West Norwood, S.E.27, on the first Wednesday in each month, commencing at 8 p.m.

# Calibration Section.

Manager: A. D. GAY (G6NF).

Owing to a change in address the facilities of the Calibration Section will be suspended from July 1 until further notice. No calibrations can be made until the apparatus has been transferred and re-installed.

It will probably take two to three months to get the apparatus into working order and re-standardised, so that members are advised to send their apparatus for calibration during the next fortnight. Members who are applying for transmitting licences are reminded that a crystal certificate is required by the G.P.O., and that we shall not be able to issue any further certificates after July 1 and until the calibration apparatus has been re-standardised.

Finally, if you require your crystals returned promptly, and you wish to assist the Section, *please remit postage separately*. Unless members can assist by following the simple rules printed in the *Guide to Amateur Radio*, they must not expect to receive prompt service.

## QSL Section

Manager: J. D. CHISHOLM (G2CX).

After a lapse of two months, due to an unprecedented lack of material for complaint, we return to these columns with a brand new moan! Will those B.R.S. and A.A. men from whom we receive several requests each week, please look in their atlas for the countries of Europe. It's quick and saves us doing it for them.

Members who have cards for zones in Asia which work under European prefixes, such as Siberia, Georgia, Canary Isles, etc., should write the words "Asia" in large letters on the reverse, otherwise they are liable to be returned.

## R.S.G.B. Slow Morse Practices

A list containing dates, times, and frequencies of the stations sending slow Morse for the benefit of those members wishing to learn or improve their code will be found below. 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 range of transmission and numbers utilising the service. If, however, a reply is desired, a stamp should be sent. It is proposed to discontinue the slow Morse transmissions after the last date given below, and to resume in September next, when a fresh schedule will appear in the September BULLETIN. Will those stations willing to resume in September, and any fresh stations prepared to offer their services kindly write to Mr. T. A. St. Johnston (G6UT), 28, Douglas Road, Chingford, E.4 (Telephone Silverthorn 2285).

SCHEDULE OF SLOW MORSE TRANSMISSIONS.

| | | | B.S.T. | Kc. | Stations. |
|---|---|---|---|---|---|
| June | 21 | Sunday | 0900 | 7100 | G2LC |
| ,, | 21 | ,, | 0915 | 1775 | G6ZQ |
| ,, | 21 | ,, | 1100 | 7233 | G5JL |
| ,, | 21 | ,, | 1115 | 1810 | G6GC |
| ,, | 21 | ,, | 1430 | 1775.6 | G6GL |
| ,, | 24 | Wednesday | 2300 | 1775 | G6ZQ |
| ,, | 28 | Sunday | 0900 | 7100 | G2LC |
| ,, | 28 | ,, | 0915 | 1775 | G6ZQ |
| ,, | 28 | ,, | 1100 | 7233 | G5JL |
| ,, | 28 | ,, | 1115 | 1810 | G6GC |
| ,, | 28 | ,, | 1430 | 1775.6 | G6GL |
| July | 1 | Wednesday | 2300 | 1775 | G6ZQ |
| ,, | 5 | Sunday | 0900 | 7100 | G2LC |
| ,, | 5 | ,, | 0915 | 1775 | G6ZQ |
| ,, | 5 | ,, | 1100 | 7233 | G5JL |
| ,, | 5 | ,, | 1115 | 1810 | G6GC |
| ,, | 5 | ,, | 1430 | 1775.6 | G6GL |
| ,, | 8 | Wednesday | 2300 | 1775 | G6ZQ |
| ,, | 12 | Sunday | 0900 | 7100 | G2LC |
| ,, | 12 | ,, | 0915 | 1775 | G6ZQ |
| ,, | 12 | ,, | 1100 | 7233 | G5JL |
| ,, | 12 | ,, | 1115 | 1810 | G6GC |
| ,, | 12 | ,, | 1430 | 1775.6 | G6GL |
| ,, | 15 | Wednesday | 2300 | 1775 | G6ZQ |

## QRA Section.

Manager: M. WILLIAMS (G6PP).

### NEW QRA'S.

G2LS.—F. G. SPRAGG, 86, Blenheim Crescent, Luton, Beds.
G2VY.—W. BURGESS, "Donna Nook," Cheapside Crescent, Waltham, Grimsby, Lincs.
G2XH.—A. S. WILLIAMSON, 211, Derbyshire Lane, Sheffield, 8, Yorks.
G2XW.—A. W. WELLS, 13, Orpington By-pass, Orpington, Kent.
G5DY.—W. H. DERRY, 74, Albion Road, London, E.8.
G5FK.—F. W. CABLE, 121, Rhondda Street, Swansea, Glam.
G5JP.—W. BEGG, 423, Castlemilk Road, Croftfoot, Glasgow, S.4.
G5KX.—R. M. KERR, 79, Croftside Avenue, Glasgow, S.4.
G5LU.—R. D. TUCKER, Shoulders, Wivelsfield Green, Haywards Heath, Sussex.
G5MW.—S. THACKRAY, 13, Marshall Crescent, Morley, Leeds, Yorks.
G5RB.—R. M. OWEN, 14, Watermead Road, London, S.E.6.
G5RR.—F. B. PRIOR, 47, Stafford Road, Croydon, Surrey.
G5VL.—G6VL.—R. W. LEADER and H. J. POWDITCH, Porth House, Porth, Newquay, Cornwall.
G5WP.—W. E. RUSSELL, Dudman's Farm, Truro, Cornwall.
G5XN.—R. H. CLAFF, 151, Stanwell Road, Penarth, Glam.
G5YN.—A. REID, 27, Great Western Road, Aberdeen, Scotland.
G5YP.—J. H. WOOD, "Deepdale," Marine Road, Prestatyn, N. Wales.
G6AY.—A. F. HEMBURY, 36, Longmore Road, Shirley, near Birmingham, Warwickshire.
G6BC.—C. J. PENBERTHY, Glenroy, Whitecross, Ludgvan, Longrock, Cornwall.
G6GQ.—D. ROBERTSON, c/o Mrs. Dagradi, 37, Cavendish Road, London, S.W.12.
G6HH.—HASTINGS AND ST. LEONARDS RADIO SOCIETY. Secretary: R. M. Sutherland, 72, Mildenhall Drive, St. Leonards, Sussex.
G6KN.—A. W. ATKINSON, 267, Northgate, Cottingham, Hull, Yorks.
G6KY.—F. J. E. STARKEY, Cavendish House, Prestatyn, N. Wales.
G6RL.—R. F. LOOMES, 1, Northampton Road, Croydon, Surrey.
G6SZ.—K. RILEY, 387, Holmesdale Road, South Norwood, London, S.E.25.
G6VQ.—T. E. WILSON, 22, Mythop Road, Lytham, Lancs.
G6YD.—F. J. TAYLOR, 8, Kingswell Road, Ensbury Bank, Bournemouth, Hants.
G6ZC.—J. TWATT, 26, Willowburn Road, Kirkwall, Ches.
2ABW.—S. J. L. PITCHFORD, Elmhurst, Bishop's Grove, Bishopsworth, Bristol.
2AFW.—F. G. WHINFREY, 5, Revill Lane, Woodhouse, Sheffield, Yorks.
2AGR.—W. A. RICE, 70, Wiseacre Croft, Shirley, Birmingham.
2ALR.—J. RICHARDSON, "Chichelea," Clay Lane, Newport Pagnell, Bucks.
2ALS.—S. G. SMITH, 13, Bryn-Wern, Pontypool. Mon.
2AOU.—M. G. BOURKE, "Crediton," Samares, Jersey, C.I.
2ARR.—A. G. COURTENEY, 16, The Paragon, Bath, Somerset.
2ASW.—A. S. WATTS, 196, Pitshanger Lane, London, W.5.
2AVR.—A. V. SPRAY, 11, Alexandra Road, Bexhill-on-Sea, Sussex.
2AWK.—A. W. ALCOCK, 104, Como Street, Romford, Essex.
2AZK.—J. G. KERR, 72, Ochil Street, Glasgow, E.2.
2AZY.—K. H. R. MAYNARD, 7, Wellersley Close, Sidcup, Kent.
2BAP.—C. A. J. PLANT, 9, Hilton Road, Harpfields, Stoke-on-Trent, Staffs.
2BBN.—E. NEAL, 55, Angus Street, New Cross, London, S.E.14.
2BDG.—G. W. GREEN, 17, Jefferies Road, Ipswich, Suffolk.
2BGC.—G. A. CHROSTON, Florence Villa, Chester Road, Whitby, Wirral.
2BGP.—S. Platt, 11, Springwood Avenue, Shaw Heath, Knutsford, Ches.
2BJK.—J. H. EMERSON, Green Gates, Burwood Park, Walton-on-Thames, Surrey.
2BMW.—H. E. WARD, "Brooklands," Mulgrave Road, Sutton, Surrey.
2BPD.—C. PRITCHARD, 57, Park View, Abercynon, near Cardiff.
2BPI.—T. O. I. PICK, Elmwood House, Leeming Bar, Northallerton, Yorks.
2BPN.—C. PARSONS, 26, MacIntosh Place, Cardiff.
2BPW.—E. POWELL, 44, Pritchard Street, Tonyrefail, Glam.
2BQB.—H. H. PHILLIPS, 132, Clare Road, Cardiff.
2BQJ.—E. P. Jones, 118, Robertson Road, Eastville, Bristol, 5.
2BRJ.—J. R. E. DRISCOLL, "Montazah," Crook Road, Brentwood, Essex.

2BVJ.—V. J. Flowers, 72, Willifield Way, Golders Green, London, N.W.11.
2BXP.—W. J. Prestidge, Broom, Bidford-on-Avon, Warwickshire.
2BYC.—J. K. Coomber, 61, High Street, Knaphill, Surrey.
2BYG.—L. H. Gray, Windlesham, Surrey.
2BZW.—W. R. Worden, 39, Halifax Road, Nelson, Lancs.
The following are cancelled.—2AFG, 2AJT, 2AOP, 2ARL, 2ASL, 2BFW, 2BPB.

## NEW MEMBERS.

HOME CORPORATES.

J. A. Smith (G2OT), 47, Bolingbroke Road, Balkwell, North Shields, Northumberland.
A. T. Dobson (G5PU), 28, Green Street, Cambridge, Cambs.
A. G. Burgess (G5RG), 189, Gunnersbury Lane, Acton, W.3.
H. N. Simmons (G5SI), 21, Wrotham Road, Gravesend, Kent.
A. B. Wright (G6FW), 106, Knowsley Road, St. Helens, Lancs.
P. Modridge (G6PM), 125, Church Drive, Kingsbury, N.W.9.
A. Straughan (G6SD), 38, Main Street, Keswick, Cumberland.
J. R. Tuck (G6TD), 8, St. Ann's Road, Coventry, Warwicks.
W. Brook (2ACJ), 2, Boyle-Hall Cottages, near Wakefield, Yorks,
J. Teasdale (2AJS), 1, St. John's Terrace, South Shields, Co. Durham.
E. K. Morris (2AMK), "Hillside," Mount View, Ludgvan, Longrock, Cornwall.
A. G. Archer (2ARL), 5, Aldwych Avenue, Blackpool, Lancs.
J. W. Tourtel (2ATT), "Regent Radio," 105, High Street, Shirley, Southampton, Hants.
A. Dawson (2AUC), Oldfield Road, Honley, Yorks.
I. Williams (2AWS), 5, Alexandra Road, Gorseinon, near Swansea, Glamorganshire.
H. R. Haigh (2BRR), "Youngwoods," Alverthorpe, near Wakefield, Yorkshire.
H. K. Basterfield (BRS2386), 118, Stourbridge Road, Halesowen, near Birmingham.
F. Roberts (BRS2387), "Gorlas," Waen, St. Asaph, N. Wales.
W. D. Manson (BRS2388), 653, Oldham Road, Newton Heath, Manchester, 10.
H. Bradden (BRS2389), 14, North Street, Guildford, Surrey.
W. S. Sykes (BRS2390), 22, Lindley Drive, Gt. Horton, Bradford, Yorkshire.
A. G. Courtney (BRS2391), 16, The Paragon, Bath, Somerset.
L. B. Dexter (BRS2392), 71, Suez Road, Cambridge.
H. Newman (BRS2393), Hale Street, Tivetshall (Norwich), Norfolk.
W. H. G. Metcalfe (BRS2394), 128, Stamfordham Drive, Allerton, Liverpool.
E. W. Lark (BRS2395), 11, Winnipeg Road, Lowestoft, Suffolk.
W. Dall (BRS2396), 9, Ivanhoe Place, Taybank, Dundee, Angus, Scotland.
T. Law (BRS2397), Hatch Lane, Basing, Basingstoke, Hants.
E. R. Ayre (BRS2398), Lordings Farm, Billingshurst, Sussex.
F. W. Foster (BRS2399), 562, Woodborough Road, Mapperley, Nottingham.
L. Gee (BRS2400), 90, Mottram Road, Hyde, Cheshire.
W. May (BRS2401), 6, Hazelwood Road, Chellow Grange, Bradford.
J. B. Longridge (BRS2402), "Rathlin," Mobberley, Cheshire.
D. W. Haigh (BRS2403), "Geneva," Burton Road, Derby.
E. C. Capley (BRS2404), 53, Middle Market Road, Great Yarmouth, Norfolk.
H. T. McFarlane (BRS2405), 15, Rotherfield Road, Enfield Wash, Middlesex.
T. G. Luff (BRS2406), 3, Lennox Avenue, Stirling, Scotland.
T. P. Meany (BRS2407), V3, Dormitory, C Squadron, E. & W. School, Cranwell, Lincs.
J. Nelson (BRS2408), 283, Dodworth Road, Barnsley, Yorkshire.
F. W. Davidson (BRS2409), "The Rosary," Ballater, Aberdeenshire, Scotland.
A. Mears (BRS2410), 34, Vine Road, East Molesey, Surrey.
J. D. Wightman (BRS2411), 45, Davyhulme Road, Davyhulme, Manchester.
E. H. Simmonds (BRS2412), c/o Arks, 63, Lincoln's Inn Fields, London, W.C.2.
B. Atkins (BRS2413), 3, Sawley Street, Leicester.
J. Roy (BRS2414) "La Haule," South Erskine Park, Bearsden, Glasgow.
W. D. Hamer (BRS2415), 71, Portelet Road, Stoneycroft, Liverpool, 13.
A. V. Spray (BRS2416), 11, Alexandra Road, Bexhill-on-Sea, Sussex.
J. M. Barrett (BRS2417), 69, Marlborough Street, Oldham, Lancs.
J. P. Comben (BRS2418), "Oldbawn," Gordon Avenue, Foxrock, Co. Dublin.
A. G. Menear (BRS2419), 9, All Saints' Street, King's Lynn, Norfolk.
J. Hudson (BRS2420), 1, King William Street, Tyldesley, near Manchester.
N. L. Williams (BRS2421), 69, Langdale Road, Sale, Cheshire.
W. L. Pollard (BRS2422), 23, Llanover Road, Plumstead, S.E.18.
W. H. Cooke-Yarborough (BRS2423), Wadworth Hall, near Doncaster, Yorkshire.
C. G. Ince (BRS2424), 26, Strathmore Road, Wimbledon Park, S.W.19.
J. Campbell Robb (BRS2425), 26, Grosvenor Gardens, London, S.W.1.
A/A D. C. Derry (BRS2426), Flight Y2, A Squadron, E. & W. School, R.A.F., Cranwell, Lincs.
R. E. Dicker (BRS2427), "Sunnydale," Dean's Grange Road, Blackrock, Dublin, I.F.S.
R. Jones (BRS2428), "Palm Villa," No. 1, Victoria Street, Craig-y-Don, Llandudno, N. Wales.
D. A. Bailey (BRS2429), "Standeford," Langland, Swansea, Glamorganshire.
T. Jarrett (BRS2430), 171, Drewry Lane, Derby.
M. A. Flower (BRS2431), Piddletrenthide, Dorset.
523037 AC2, Hanham B. E. (BRS2432), Hut 76, West Camp, No. I.A.T.W., R.A.F., Cranwell, Lincs.
C. J. Shewry (A.), Boys' Squadron, E. & W. School, R.A.F., Cranwell, Lincs.

DOMINION AND FOREIGN.

F. Taylor (VE5GI), 4374, Locarno Crescent, Vancouver, B.C., Canada.
J. Hillhouse (VK4ZO), Collinsville, North Queensland, Australia.
J. W. W. Ellison (VU2BU), Assam Co., Nazira P.O., Assam, India.
A. W. Bailey (ZL2QA), 48, Main Street, Palmerston, North, New Zealand.
G. E. Billson, junr. (ZL3KG), 75, Gardiners Road, Harswood, Christchurch, New Zealand.
R. C. Wilkinson (BERS351), Room 4, "A" Squadron, Royal Air Force, Aboukir, Egypt.
C. Currie (BERS352), Combined Supply Depot, Sarafaud, Palestine, Egypt.
Maung Ba Thwe (BERS353), "Burma Wireless House," Building, Merchant Street, Mandalay, Upper Burma.

## Quadruplex Telephony

An interesting experiment was carried out recently by four well-known Kentish stations whereby each one of them was able to converse with and also receive the other three simultaneously.

This is how it was done :—

G2OV, of Rainham, transmitting on 1.7 Mc., had two receivers working : one on 3.5 Mc. tuned to G2MI, of Larkfield, and one on 1.7 tuned to G5MM, of Hoo, both of whom he re-transmitted. G2MI took advantage of the heavy modulation of both G2OV and G6IL, of Gravesend, coupled with the fact that they were only about 2 kc. apart, to receive both and re-transmit them on 3.5 Mc. G5MM on 1.7 Mc. re-broadcast G2OV, thus hearing G5IL and G2MI as well, and G5IL, tuned to G2MI, heard G5MM via G2OV via G2MI, G2OV via G2MI and, of course, G2MI direct. What would have been necessary to have included another station in the party ? No prizes offered !

## Still They Come !

John Hunter, G2ZQ, made W.A.C. in 1 hour 14 minutes on May 19. All contacts were on 14 Mc.

The following six stations were worked between 19.57 and 21.11 G.M.T. : U8ID, ZS1AH, VK4EJ, PY2JO, U3CY and K5AG. Next please !

## HS1PJ.

We learn from G5RV that the only active amateur station in Siam is that operated by the Superintendent Engineer of Siamese Broadcasting at Saladeny, Bangkok, Siam, under the above call. ON4AU recently contacted this station on the 14 Mc. band.

# 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), Durham, and Northumberland (Middlesbrough is in this district.)
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.)
Mr. J. J. CURNOW (G6CW), "St. Anns," Bramcote Lane, Wollaton Notts.

**DISTRICT 5 (Western).**
(Hereford, Oxford, Wiltshire, Gloucester.)
Mr. R. A. BARTLETT G6RB), 31, King's Drive, Bishopston, Bristol, Glos.

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

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

**DISTRICT 8 (Home Counties).**
(Beds., Bucks., Cambs., Herts. and Hunts.)
Mr. G. JEAPES (G2XV), 89, Perne Road, Cambridge.

**DISTRICT 9 (East Anglia).**
(Norfolk and Suffolk.)
MR. H. W. SADLER (G2XS), Redways, Wootton Road, Gaywood, King's Lynn, Norfolk.

**DISTRICT 10 (South Wales and Monmouth).**
Capt. G. C. PRICE (G2OI'), The Mount, Pembroke Dock.

**DISTRICT 11 (North Wales).**
(Anglesey, Carnarvon, Denbighshire, Flintshire, Merioneth, Montgomery, Radnorshire.)
MR. D. S. MITCHELL (G6AA), "The Flagstaff," Colwyn Bay, Denbighshire.

**DISTRICT 12 (London North).**
Mr. S. BUCKINGHAM (G5QF), 9, 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 (Eas'ern)**
(East London and Essex.)
MR. T. A. ST. JOHNSTON (G6UT), 28, Douglas Road, Chingford, E.4.

**DISTRICT 15 (London West and Middlesex).**
MR. H. V. WILKINS (G6WN), 81, Studland Road, Hanwell, W.7.

**DISTRICT 16 (South-Eastern).**
(Kent and Sussex).
MR. A. O. MILNE (G2MI), "Southcot," Larkfield, Maidstone, Kent.

**DISTRICT 17 (Mid-East).**
(Lincolnshire and Rutland.)
REV. L. C. HODGE (G6LH), The Bungalow, Skirbeck Road, Boston, Lincs.

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

**SCOTLAND.**
MR. JAMES HUNTER (G6ZV), Records Office, 51, Camphill Avenue, Langside, Glasgow.

**NORTHERN IRELAND.**
MR. W. GRAHAM (GI5GV), 5 Ratcliffe Street, Donegal Pass, Belfast.

NEW MEMBERS ARE CORDIALLY INVITED TO WRITE TO THEIR LOCAL DISTRICT REPRESENTATIVE.

## DISTRICT 1 (North-Western)

*LIVERPOOL.*—Twenty-nine members attended the May meeting, and as this was the last before N.F.D., all arrangements for this event were finally made, and directions given to those intending to visit the site. After the next meeting, to be held on June 17, no further meetings will be held until September 16. The T.R. believes that so many members will be away during July and August that meetings in those months will not be sufficiently supported.

2BRM is now G6QJ and BRS2361 and 2367 are welcomed as new members.

*Manchester.*—An attendance of 28 was recorded at the last Manchester meeting, which was devoted to discussion of N.F.D. G2OI gave a brief description of transmitters he had been testing for N.F.D. purposes; 6GV brought along the very fine petrol-driven generator unit built up by him for power supply for N.F.D., the generator being kindly loaned by 5YD. Much interest was shown in this well-constructed power unit and 6GV was complimented on the work involved in building same.

It is a pleasure to see so many taking an active part in the preparation for field day this year—5YD fixing up suppressor units for the power unit; 2BK making the smoothing system and filters,; 2OI working on the transmitters; 2WQ looking after the N.F.D. funds.

Many members promised to be present on Saturday and Sunday, while quite a number expected to make flying visits during the event.

The following stations report active: BRS2327, 1897, 2145 and 2051, G6GX, 2BK, 5PX, 6TL, 2LK, 5OZ, 6GV, 2DH, 2WQ, 2WP, 5CH, 2JC, 28W, 2ATZ, 5YD, 2BLO, 2ABR, 5OL, 2DF, 2OI and 5US.

Ex G5FA, now VQ3FAR (one of the old Manchester group), made contact with 5US, and sent best wishes to all; please look out for him working just above the American fone band on 14 Mc., with a steady R5 signal.

By the time these notes are in print the Field Day will be over, and the T.R. wishes to thank all those who contributed to its success.

*Rochdale.*—G6AX, 6QA, BRS1152 and 1680

have reported active. G6QA reports working K7UA at 07.35 G.M.T. on April 15, 1936.

G6QA has been using link coupling between the tank coil and antenna coil on his Zepp. Reports show that harmonics are greatly reduced and the neutralising of the P.A. is much easier.

Will Rochdale members please send in reports ? The T.R. is sorry but he has no time to go round to each member to collect them.

*Southport.*—The meeting held at G6SX on May 1 was rather poorly attended, only seven members turning up. Of these six were R.S.G.B.—G6SX, 5UT, 5ZR, BRS1947, BRS2140, and 5NU. A talk was given by 6SX on " Television and its Application to the Ultra High Frequencies." After this business was discussed, the excellent refreshments supplied by 6SX's mother were satisfactorily disposed of.

For next meeting see District Calendar. It has been decided to continue these meetings throughout the summer.

G5ZR and G5NU are willing to run Morse classes for AA and BRS men, providing that there is sufficient support. Will all interested please drop, them a card ?

Here are individual activities :—G6SX is QRT. 5UT is thinking of staging a " come-back." 2LM is active on five metres. BRS2140 and BRS1947 are enaged in receiver-design. BRS1947 is building RES single signal super. 5ZR and 5NU are still on UHF. Best wishes from all to 6KY, who left Southport at the end of April to go to NorthWales. During Easter 5NU went " shack-visiting " in Black pool, and wishes to thank all for their hospitality. Those visited included 5SO, 5AD, 6KK, 6MI, 5TH, 5MS, 6YV, 2AMH, BRS2281, and many others.

*Nelson.*—The next meeting will be held on Wednesday, June 17, at the Short Wave Club room, Southfield, Co-op Branch.

Members reporting active : G5CX, 5ZN, 2RB, 2ATY, 2BWW, BRS1933, 1934, 1975, 2221, 2307.

G5XC has been making alterations to his aerial equipment, and apparently has met with success, as he worked a ZL on 7 Mc. G5ZN is continuing with his tests on the W3EDP aerial. G2RB is building a superhet and experimenting with an ECO as driver stage. BRS1933, 1934 and 1975 are collaborating on 56 Mc.

### DISTRICT 2 (North-Eastern)

*Huddersfield.*—A successful meeting held at 2ARN was attended by G5VD, 5QN, 6RO, 2AHA, and BRS1487. All reported active. The home drawn large scale map of the world at 2ARN was much admired. G5VD only requires SU for WAC on phone.

*Newcastle.*—A very interesting meeting was held at South Shields on May 7, when final arrangements were made for the Field Day station, G6GCP. G5WZ is now on 25 watts, G6GC is moving nearer the sea to a new QRA. Field Day topics were discussed at the last meeting of the Tynemouth section on May 3. Arrangements are being made whereby the Tynemouth, North Shields and South Shields sections will hold a meeting once monthly so that members will have a chance to meet each other. The North Shields area, under the management of 2ARY, is now running satisfactorily, after some initial difficulties, a good attendance being recorded each alternate Wednesday night. North Shields and Tynemouth joined forces this year for the Field Day. An attempt is to be made to start an R.S.G.B. Club in the Whitley Bay district, and all members interested are asked to get in touch with G2LD, 4, Priors Terrace, Tynemouth.

*Sheffield.*—Activity is up to the standard, and membership increasing. The meetings at the Angel Hotel are now suspended until the autumn, and G2JY thanks all members for their interest, and invites them to make full use of the portable station now in operation. The last meeting was held on May 14, 23 being present, including the D.R., G6PY and G5IU. A talk on Pentode C.O.'s was given by G6PJ, and a discussion on N.F.D. followed. BRS2124 becomes 2AFW, and G5HK is now testing on 3.5 Mc. Active stations are : G2AS, 2GN, 2DJ, 2JY, 2HQ, 5LZ, 5TO, 5HK, 6LF, 6PJ, 5UA, 5UJ, 2AVC, 2AWQ, 2BGM, 2BKN, BRS1625, 1800, 1851, 1944, 2282, and 2293.

*Stockton-on-Tees.*—Regular meetings are now being held at the homes of members each fortnight, when AA members take the opportunity to improve their Morse. 2BHF has built a 10-watt rack and

## FORTHCOMING EVENTS

JUNE 17.—District 1 (Liverpool Section), 7.30 p.m., at 38, Mason Street, Liverpool.

JUNE 21.—District 4 (East Midlands), 3.30 p.m., at St. James Restaurant, St. James Street, Derby.

JUNE 22.—District 14 (Southend Section), 8 p.m., at G5UK, " Newhaven," 19, Meadway, Westcliff-on-Sea.

JUNE 23.—District 14 (East London Section), 8 p.m., at 2BPY, 16, Halley Avenue, Barkingside.

JUNE 25.—District 4 (Leicester Section), 8 p.m., at G6IM, 2, Wigston Road, Oadby, near Leicester.

JUNE 25.—District 13, 8 p.m., at Brotherhood Hall, West Norwood.

JUNE 28.—Provincial District Meeting at Cambridge.

JULY 1.—District 1 (Manchester Section), 7.30 p.m., at Brookes Café, 1, Hilton Street, Manchester. Lecture on " Microphones and Amplifiers."

JULY 1.—S.L.D.R.T.S., 8 p.m., at Brotherhood Hall, West Norwood.

JULY 3.—District 1 (Southport Section), 7.30 p.m., at BRS2140, 3, Wesley Street, Southport.

JULY 5.—District 17 Conventionette at Cranwell.

JULY 5.—District 7 Conventionette at Winchester.

JULY 12.—District 13, Conventionette, Wellington Hotel, Tunbridge Wells.

panel outfit, and is starting modulation experiments. 2BQA is testing two 47's in push-pull for a C.O., and 2BLG is active again. It is suggested that advantage be taken of the new 56 Mc. portable outfit permits, to arrange Field Days with the Darlington members. G2FO has been busy with the N.F.D. transmitter with the assistance of 6ZT. 5QU is trying to contact VK. Duplex phone on 7 Mc. occupies 6CV and 5XT, and the latter is busy trying to overcome a ripple on the carrier. 2BQO is busy with Morse and designing a 40-ft. mast.

*Dewsbury.*—The post of T.R. has been taken over by G5YV, and members in the area are asked to give him their support and reports. The local club has suffered a loss of interest owing to change of QRA, and an effort is to be made to revive it. G6AO is active again from his own QRA. G6SP and 5ZB are working regularly and getting good results. Duplex work is being done by G5YV and 5HB occasionally, the latter now using a Comet Pro and liking it well. A Collins Coupler with end fed antennas is being tested by 5YV to his satisfaction. G6PL is working on 7 and 1.7 Mc. G6XT is a new station in Morley, where also are 5MW and 6MY, chiefly on 7 and 14 Mc. BRS1151 is testing 56 Mc. receivers, but only hears local harmonics.

*Bradford.*—Informal meetings are being held at the local Society every Tuesday evening, and a 56 Mc. Field Day is soon to be arranged, probably on a Sunday, when it is hoped that all those members having receivers will turn up. Many of the transmitting members have been heard on the air, and the BRS and AA stations are active, learning Morse and building gear. Mr. Sykes and Mr. Clegg are now members, the latter with an AA licence.

In order to assist the Scribe in compiling these notes, T.R.'s are asked to send in notes in the form set out as an example a while ago, and, if possible, type

## DISTRICT 4 (East Midlands)

The Midland Provincial District meeting was held on Sunday, May 24, at the Welbeck Hotel, Nottingham. A most enjoyable gathering, at which over 45 members were present. Many visitors from all parts of England were welcomed, and we trust the journey and trouble taken was amply rewarded. The attendance of the district members was, indeed, poor, and unless better support is forthcoming, this may be the last time we shall have the honour of being selected for a P.D.M.

After the business meeting in the afternoon a large party visited the Hucknall Aerodrome by kind permission of the Commandant, when a most interesting and instructive tour of the hangars, armoury and bombing sections was enjoyed by all present.

Activity in the Nottingham District has increased, and several members have now completed rebuilding with great success.

News from Derby, Lincs, and Northampton is very scarce, and the T.R.'s are not getting the support they deserve.

The next meeting of the Northern Section will be held at St. James Restaurant, St. James Street, Derby, at 3.30 p.m., on Sunday, June 21, and the Southern Section at G6IM, 2, Wigston Road, Oadby, nr. Leicester, at 8 p.m., on June 25, 1936.

## DISTRICT 5 (Western).

*Bristol.*—Twenty members and friends took part in an interesting D.F. Field Day on May 10. The TX was operated on 1.7 Mc. by G5KT, G5UH, and 2BHV, and was ultimately located by G6LM and 2ACQ in Doddington Park. Interest in the new club room is well maintained, and the rooms are rapidly being made ready for occupation. An interesting talk was given by G5FS at the last meeting on the new *Eddystone* All World 2 receiver. The circuit was explained and a model exhibited. Active stations are G2GQ, 5JU, 5KT, 5UH, 5WI, 6DJ, 6VF, 6GU, 6VK, and 6RB.

*Gloucester.*—Interest in this area has been centred on N.F.D., for which G2HX built a special TX and G5HC the receiver.

*Oxford.*—The usual stations are continuing active.

*The Exeter Conventionette, May 10, 1936.*

## DISTRICT 6 (South-Western)

The great event of the past month was the Conventionette held at Exeter. Sincere thanks are due to G5WY for the success of the venture, as he had the local organisation in his hands. What was originally intended to be an informal gathering turned out to be a much more notable affair. There was a total attendance of 37, which is remarkable considering the distances most members had to travel; the D.R. made the average 42 miles per member! Can any other District in the country boast such a record? It says much for the enthusiasm of the members.

There was ample reward for this enthusiasm in the unexpected presence of "Clarry" and 5AR. This was quite a surprise for nearly everybody, and ensured the success of the meeting.

Members assembled at the White Lion Hotel, and at 1 p.m. luncheon was taken. Afterwards the toasts of His Majesty the King, R.S.G.B., and District 6 were given.

After luncheon the usual order of things was reversed as an experiment. Advantage was taken of the fine spring weather to do the station visits. What the Exeter folk thought of the string of thirteen cars careering over the city has evidently not been recorded, but the D.R. expected to find something in the way of letters to the local press! Anyway, visits, without serious mishap, were made

to the stations of 5QA, 2FP, 2SH, and 5WY, in that order. The D.R. has not had complaints regarding missing gear!

A meat tea was partaken of at 6 p.m., and then, largely due to the help of 5YR, last year's Provincial and N.F.D. films were shown.

Afterwards the D.R. addressed the assembly, and gave a short outline of progress in the district. The most notable point was that in two years the membership has increased by 300 per cent.

"Clarry" then rose and said he would talk for a few minutes! He spoke for nearly an hour! His speech, which dealt with present operating conditions, was much appreciated. Other speeches by the T.R.'s, 5WY, 6RF, and 6FO, all mentioned

*G5SY, our South-Western D.R., with his Town Representatives. Left to right, G6FO (Bideford), G6RF (Plymouth), G5SY, G5AK (Taunton), BRS190 (Taunton), G5WY (Exeter).*

points of interest. The question of the difficulties attending the finances of N.F.D. were then discussed, and while it was agreed that in future years, when the local meetings were well established, a fund should be kept up for various district expenses, including N.F.D., it was essential to make some special effort for this year. It was decided that as it was not fair to expect the D.R. and one or two others to stand most of the cost, as in former years, the members in the District be asked to contribute a minimum of one shilling per head, to be sent as soon as possible to the D.R., or to the nearest T.R. The D.R. hopes that all members will sportingly do as requested.

After more informal discussions and a final cup of coffee, the meeting finally broke up the other side of 10 p.m. Altogether a most enjoyable day, thanks to all who attended.

A special report from Cornwall says that they are still holding their monthly meetings. A meeting was held at Lanner Inn on May 17, and was attended by 2AZW, 2BXT, 2AQB, 2AMK, 2AHV, 2APB and BRS2252. 2BPB has passed his morse test and is now awaiting his radiating permit. Congratulations OM. The Letter Budget is still going well, as is one in the Taunton area.

## DISTRICT 7 (Southern).

Full details of the Annual No. 7 Conventionette appear elsewhere, and members are asked to let the D.R. know as soon as possible if they wish to attend as the caterer requires to know the approximate number attending by the end of June. Please send your post-card NOW.

The April meeting at Weybridge was poorly attended, but we were pleased to welcome G5IS and G6NF from District No. 12.

*Reigate and Horley District.*—G6JF now on 14 Mc. and requires Oceania only for WAC. G5LK, 5PR, 2AIG are active. G5XG working Transatlantic fone on 14 Mc. with only 20 watts input and HRO receiver. Reigate and district members were pleased to entertain the Tunbridge Wells amateurs on a return visit.

*Portsmouth and District.*—The May Meeting of the South Hants R.T.S. was held in Southsea. After a talk on "Measurements and Impedance Matching," by A. Wheeler, D.I.C., there was a lively discussion. The Field Day transmitters were also on view. Renewed activity is shown on 56 Mc., G2VH having received Southampton stations on this band. 2XC, now also on 3.5 Mc., is co-operating with BRS1907 with a mobile 56 Mc. receiver. 2AIV, and 2BBG are busy assembling transmitters, while 6NZ hopes to get the summer portable going after N.F.D. 6WS, trying Collins again, finds increase in harmonics radiated. (This is contrary to my own experience, o.m.—D.R.) Welcome to BRS2362, G6SS, 2BHR, 2BCM, BRS1964, 2342, 2105 all report active.

*The car parade during station visits at Exeter.*

*Guildford and District.*—G5CM reports active on 56 Mc. and would welcome co-operation on this frequency from West Surrey or Sussex amateurs. 5WP has not left the district after all, having taken a position locally instead of in Cornwall! 6GS is another fone convert (?) and has worked across the Pond on 14 and 28 Mc. 2BVZ, a newcomer to Guildford, hopes to operate a portable 56 Mc. RX from a boat on the river.

G6LK still active on 14 Mc. fone and has also been working W stations on 28 Mc. fone after midnight here.

*Kingston and District.*—2BJK has been very successful with new receiver, and is busy now on transmitter building. He says that G5IN is coming back from Gibraltar and hopes to settle in Camberley. 6NK is still active, but business QRM limits his time on the air. 2GK reports working many W6 stations on 14 Mc., and has been successfully experimenting with series modulation. 5ZK, of Camberley, is moving his gear to Kensington, but

unfortunately finds mains are D.C. 2BNS has built electron coupled s.g. detector plus 1 L.F. receiver and finds it encouragingly stable. Also been experimenting with the tritet c.o .in preparation for a new TX. G6BI is working splendid DX on 14 Mc., and hopes to be on 56 Mc. shortly. 2BHU is also active on 56 Mc., and hopes to have full licence shortly. 2AUB has moved to the Kingston area, and hopes to have full licence soon. 6RS has covered 4 miles with R9 fone on 56 Mc.,

**DISTRICT 7 CONVENTIONETTE**

*SUNDAY, July* 5. 1936

at

**GREAT WESTERN HOTEL, HIGH STREET, WINCHESTER**

(near King Alfred Statue).

| | |
|---|---|
| Assemble ... ... ... | 12 noon |
| Lunch ... ... ... | 1 p.m. |
| Business Meeting ... | 2.30 p.m. |
| Tea ... ... ... | 4.30 p.m. |
| Inclusive charge ... ... | 4s. |

Reservations to Mr. E. A. Dedman (G2NH) not later than June 25.

using 0.8 watt. The Kingston and District A.R.S. held a 56 Mc. field day on May 24, with four separate transmitters, and no less than 12 separate receiving parties.

*Farnham and District.*—The local S.W. club held a meeting on May 26, when the chief discussion centred round 56 Mc. aerial arrays. 2ACV has been busy on 28 Mc., and is building a tritet, using an RFP 362 valve. He would appreciate a word or two from members who have a similar transmitter in operation. 2BAU is now awaiting Morse test for his full licence.

The D.R. is pleased to welcome Mr. C. R. Emary, ex VS6AX, who has returned to the Military Signals at Aldershot.

### DISTRICT 8 (Home Counties).

At a meeting held at Cambridge on May 8 the attendance increased to 22 members. The D.R. opened the meeting with remarks concerning the increase in "off frequency" operation, and expressed the wish to keep the district clean from this "technical crime." Increased licence facilities were made known to those present, the 25-watt concession being received with great acclamation. The method of sending in monthly reports to the D.R. is to be standardised, in order to facilitate the compilation of the letter budget. Quarto size paper to be used, written with indelible pencil, and a carbon copy sent in with same, in order that the budget can be speeded up by circulation in two directions. Those members who have not attended these meetings are asked to notify the D.R. if they wish to be included in the circuit of the budget. Members when writing the D.R. on matters needing a reply are asked to enclose a stamped addressed envelope. A discussion on various antenna systems was opened, and many interesting notes compared with enthusaism.

G2PL sends a further interesting report on his continued aerial experiments, he has now constructed a 56 Mc. doubler using a type 59 tube, and a beam antenna is under construction.

6HD has finished his modulator and one power pack : the R, F, stages are now reciving attention ; 6WA has also to give some attention to power supplies owing to a "blow out" ; his operation is now limited to 1.7 Mc. temporarily. 6LX reports QRT at present. 2AXS becomes 5DR ; he wasted no time, having hooked VU and W3 within 10 days of getting on the air. 5JO is doing some fine work on 14 Mc. fone, having now contacted nearly all the workable countries. BRS1670 has now moved into Cambridge from St. Ives, reports great activity on 14 Mc. 2AGC is getting trouble with his Tx. 6BS has his station located at Cambridge, but owing to business at Luton can only operate at week-ends ; he is, however, livening things up over there. The D.R. (2XV) has almost completed the rig mentioned in the last report, but has trouble with PA neut condensers.

*Peterborough.*—2NJ has purchased a hand-generator ready for portable operation at a later date on the Norfolk coast ; 2UQ is testing aerials. 6LX and 6PD are at Cambridge and Nottingham University respectively. 2075 is Secretary of the local Radio Society. 2171 reports activity. The date for the P.D. Meeting is drawing near, and it is essential for those wishing to attend to apply in writing to the D.R., for accommodation before *June* 28. This request must be complied with by *all* if the meeting is to be a success. owing to the necessity of making the reservations at the venue accordingly. *GET THAT CARD OFF NOW.*

### DISTRICT 9 (East Anglia).

The meeting held in Norwich last month proved quite a success. However, only 15 members turned up, and we hope to see more next time. After a ragchew and tea, the meeting concluded with visits to the local stations. It was decided

**EASTERN PROVINCIAL DISTRICT MEETING**

*SUNDAY, JUNE* 28, 1936

at

**CAMBRIDGE**

| | |
|---|---|
| Assemble at Drinking Fountain, Market Place ... | 10.30 a.m. |
| Visit to Pye Radio, Ltd. ... | 11.0 a.m. |
| Lunch at Red Lion Hotel, Petty Cury ... ... ... | 1.0 p.m. |
| Business Meeting ... ... | 2.30 p.m. |
| Tea ... ... ... ... | 4.30 p.m. |
| Conducted tour to well-known Local Beauty Spots ... | 5.30 p.m. |

Inclusive charge, 5s.

Reservations to MR. G. A. JEAPES, G2XV, 89, Perne Road, Cambridge, not later than June 23.

to hold the next meeting in King's Lynn towards the end of October.

What about this District being well represented at the Provincial District Meeting to be held at Cambridge on Sunday, June 28? It is hoped that all members intending to be present have by this time let the D.R. know.

Please note, only four reports received this month.

*King's Lynn.*—2JS is rebuilding on the rack principle. 2XS is on 7 Mc. 6FB has been visiting Scottish hams prior to sailing for LA.

*Lowestoft.*—5QO is now active on both fone and CW. Local monthly ragchews are held at this QRA.

*Norwich.*—5IX has at last finished his shack, and hopes for DX with his new aerial. 6QZ is still on 28 Mc. and has now worked ZS, SU, etc. The vertical half wave Windom aerial on this band is giving good results. 2UT, the QRP station, is preparing for 14 Mc. fone. We welcome BRS2393 as a new member, and also 5MG, who has moved into the District.

The D.R. has pleasure in mentioning that 5IX and 6QZ have taken on the position of District scribes.

### DISTRICT 10 (South Wales and Monmouth).

Individual reports are few this month, but at the time of writing preparations for N.F.D. are in full swing.

Activities have been considerably increased in the Cardiff area, and the Short Wave Club can bost two new full licences. 2ASL is now G5XN, and 2BMA will have his call by the time this is in print. Other new calls are 2BPW ex BRS 1855, 2BPD and 2BPN.

The following members also report active:—2AVV, 2BHZ, 2BQB, 2BBO, and 2BSN. We welcome a new member in BRS 2376.

In *Swansea* the meetings have been suspended until the Autumn, but it is hoped to organise some field days during the summer, and to exchange visits with the Devon group.

G2UL reports erratic conditions on 14 Mc., and has applied for 28 Mc. G6JW is applying for QRO. G5KJ is active, and a new member, 2AWS, is welcomed to the fold.

2BVV is going on a trip to the States, and hopes to make some personal QSOs with W's.

Members active in the *Newport* area are, G2JL, 2NG, 2XM, 2XX, 5BI, 6BK, 2BAQ and 2AIJ. 6BK is now using fone and c.w. every Sunday on 1.7 Mc. and 7 Mc., from the club-rooms in Blackwood. Field days are being arranged, and the first will be held on Sunday, June 21, weather permitting. Details from 6BK.

On May 21, about 25 members of the Cardiff S.W. Club paid a visit to the G.P.O. in Cardiff, and spent a very interesting 2½ hours inspecting the apparatus and methods of handling telegrams, etc., but they were very disappointed when they learned that the YL operators were off duty at 8 p.m.!

Congrats. to 6GW on the arrival of a junior op. Best of luck, OM. We sincerely hope that a worthy member of the Cardiff Club has now realised that A.C. gear will not function properly on D.C. mains!

BRS 1943 has just returned from a trip to Australia, where the Ham spirit was at its highest. During the fortnight he was there he had only six meals on the ship, the rest were taken with Mr. and Mrs. VK6CA, Mr. and Mrs. Heinrich, and with Mr. and Mrs. Walker. He has asked us to express his gratitude to the above and to the other VK amateurs for the wonderful time they gave him; he will remember it and them for very many years.

### DISTRICT 12 (London North).

The D.R. wishes to thank everyone who so kindly donated towards District N.F.D. expenses. Will those members who have not sent in their crystal frequencies please do so at once, as they are holding up the completion of the register. There will be no monthly meetings until September.

**SOUTH LONDON CONVENTIONETTE**

*SUNDAY, JULY 12, 1936*

at

**WELLINGTON HOTEL, TUNBRIDGE WELLS**

| | |
|---|---|
| Assemble ... ... ... | 12.30 p.m. |
| Luncheon ... ... ... | 1.15 p.m. |
| Visits to Mortley Sprague Generator Works, Local Stations, etc. ... ... ... ... | 2.15 p.m. |
| Tea ... ... ... ... | 4.30 p.m. |

Inclusive charge, 5s.

Reservations to Mr. J. B. Kershaw (G2WV), 13, Montpelier Row, Blackheath, S.E.3, before July 8.

### DISTRICT 13 (London South)

The monthly meeting on May 28 had the usual good attendance, and many N.F.D. points were cleared up, including the question of operators. As Field Day, 1936, will be a thing of the past when these notes appear, there is no need to make further comment. The D.R.'s thanks are due to all those who helped with the various arrangements.

Reports this month are a little better. 2AOP has now received his full licence, and is on the air with the call G5RB. Good luck OM. G6AN is using 7 Mc., phone each evening from 22.00 to 24.00 B.S.T., and would welcome reports. He promises a confirmation card to all those reporting to him direct! We should like to congratulate Mr. and Mrs. Stuart-Williams on the birth of a daughter, this event explaining the absence of G5JW from N.F.D. this year. G5HG reports the reception of DX harmonics on 56 Mc., and is hoping for some contacts very soon.. A cordial welcome is extended to all new members of the district, and the D.R. hopes to meet them in the near future. The following further stations report active: G2GZ, 2ND, 5WG, 6QN, BRS2422. It is with regret that we have to announce that G2UW has left South London to take up his new duties in the R.A.F. He will be missed by many, and we feel sure that every member will join us in wishing him success in his new sphere of life.

An announcement appears elsewhere in this issue of the South London Conventionette which is to be held on July 12. In this connection we would express our gratitude to Mr. Allen (G2UJ), whose assistance in making arrangements has been so valuable. No business meeting has been placed on the agenda for the Conventionette, in order to make the event in every way a social gathering, and

we trust that members of South London will assist the D.R. in making the day an unqualified success. It is hoped to arrange transport for many members without cars, so please write to the D.R. early. The next District Meeting will take place on June 25 at the Brotherhood Hall.

### DISTRICT 14 (Eastern).

*Southend-on-Sea.*—At the May meeting held at G2KT, a record of 32 attended, which included a party from Witham. The T.R., G5UK, who presided, was welcomed back from his recent extensive tour abroad. The D.R. also brought a party from Chingford. The chief topic discussed was the local " Great Circle Contest." At the June meeting the " B " station 1936 film will be exhibited. G2WG, who has been touring Scotland, was well cared for by the members over the border.

*Chelmsford.*—The first meeting held in this area was organised by G6LB, and held at G5RV, Chelmsford, when an attendance of 26 was recorded ; this included a party of 15 from Southend. BRS1572 of Witham, is now 2BGP.

G6ST, of Witham, was previously 2BNC and not 2AMF, as mentioned in the last notes—apologies to both !

*East London.*—At the May meeting held at G6AU, Forest Gate, the attendance was 15. As was to be expected, N.F.D. arrangements were to the fore, a collecton to assist to defray expenses was made. G2CD has at last become interested in DX, and has worked W, using 6 watts. BRS1960 of Romford, is now 2AWK.

### DISTRICT 15 (London West and Middlesex).

Twenty-eight members attended the May meeting, the last to be held before the autumn. The D.R. would like to hear from someone willing to " house " the September meeting.

The number of reports this month is not so good, and no outstanding work has been accomplished. Congratulations to BRS1889, who is now 2ASW.

*Twickenham.*—G2LA, 2ZY, 5XY and 6GB report active, while 2NN is rebuilding. Individual reports from G2BY, 6WN and 2AUB are the only others received.

The T.V.A.R.T.S. 7 Mc. Field Day was held between 11.00 and 17.00 G.M.T. on Sunday, May 17, when the following stations were on the air, G6GBP, on Box Hill, Dorking ; G5LCP, on Chobham Common ; G2VVP, on The Hog's Back, near Guildford, and G2KIP, at Hindhead. The contest was again won by G6GBP with 85 points, while G2KIP came a close second with 82 points. G2VVP and G5LCP obtained 60 and 57 points respectively. The contest was marred by a very bad thunderstorm. The prizes will be presented at the Society's next General Meeting.

### DISTRICT 16 (South Eastern).

There is nothing outstanding to report. The Scribe has returned to Folkestone, and future reports should be sent there as before and not to Tenterden.

*Ashford.*—Reports full activity on 56 Mc.

*Bromley.*—G2HG and 5LB are producing 56 Mc. P.A.'s. There is considerable activity on 56 Mc. CW, and those interested are asked to communicate with 5LB, 45, Monivea Road, Beckenham.

*Folkestone.*—Usual activity on 56 Mc. 2IC carried out a test as a mobile station, and had an R8 QSO with 2FA when doing 50 M.P.H. two miles away, the signal being perfectly stable, but there was too much wobble when only doing 20 M.P.H.

*Medway Towns.*—Usual activity. 5FN is carrying out tests on 56 Mc. with a rotary beam, 800 feet up, on the last Sunday in June, and those willing to co-operate are asked to get in touch. CW and ICW will be used.

*Gravesend.*—The T.R. sends his usual full report.

*Brighton and Hove* also report activity.

*Tunbridge Wells* has not reported but are no doubt too busy with N.F.D. arrangements.

### DISTRICT 17 (Mid-East).

By the time these notes appear N.F.D. will be over, leaving behind, we hope, happy memories and a good score.

Everything suggests that this year's Conventionette at Cranwell will be a most interesting time for every member. Not only is the E. & W. School a place of immense interest, but we shall further have the great pleasure of the presence of our Secretary.

A programme has been drawn up by G2LR and is printed here as a foretaste of good things to come !

14.00 Assemble at first hangar on right-hand side of Main Road through the Camp from Sleaford.

14.10 Inspect aircraft used at the Electrical and Wireless School, including Vickers Valencia flying class-rooms.

14.30 Electrical Block Laboratories, including a showing of a talkie instructional film, " The Electric Current."

15.15 Aircraft Instruments section—robot pilot, etc.

15.30 Radio Block—aircraft and ground station equipment ; Oscillograph demonstration.

16.30 Signalling Section. Members may have their Morse tested by the School Tester.

16.45 Visit to R.S.G.B. Shack.

17.30 Tea at Sleaford. Negotiations not yet completed, but probably at " The Lion," Northgate. Cost, about 1s. 6d.

18.30 Business Meeting.

19.00 The Secretary's talk.

## MID-EAST CONVENTIONETTE

*SUNDAY, JULY 5, 1936*

at

**CRANWELL**

| | | |
|---|---|---|
| Assemble Cranwell Aerodrome | 2. 0 | p.m. |
| Tour of Electrical and Wireless School begins ... ... | 2.10 | p.m. |
| Tea at Sleaford ... ... | 5.30 | p.m. |
| Business Meeting ... ... | 6.30 | p.m. |

Inclusive charge, about 1s. 6d.

Reservations not later than July 1 to Mr. Dunn (G2LR), 22B, Married Quarters, Cranwell, Lincs.

All who intend to come are requested to send their names to G2LR, either direct or through their T.R. The D.R. thinks that this is a good opportunity for having a photo taken, and will arrange for this provided sufficient members signify their willingness to purchase one.

No further announcement about the meeting will be given as the above seems adequate. Anyone who wishes to bring forward any business at the business meeting is asked to notify the D.R. well beforehand so that it may go on the Agenda. Too much time must not be taken up as everyone will be anxious to hear "Clarry"; to whom we all extend a cordial welcome. See you on July 5!

### DISTRICT 18 (North-Eastern).

*Hull.*—The T.R. regrets lack of support in his new office. If members cannot at least send a P.C. by the 19th, he can only infer that he is not wanted, and will act accordingly. His address is G2QO, 364, Endike Lane.

G6UV, the only member to report, is developing a new peaked audio amplifier and is rebuilding transmitter as tritet CO regenerative amplifier and P.A. suppressor, modulated on middle stage. P.A. to feed Zepp, possibly using phasing device to alter direction of propagation. He likes idea of bulb in series with crystal as visual indication of excessive R.F.

G5JD's business duties prevent him coming to meetings. G5GC, N.F.D. transmitter and phone work. G5MN trying duplex, but little success as yet. G6OS completed SSS receiver and delighted with it. G5BP active on 14 and 28 Mc. Worked Asia on 28 Mc.

The following are specially asked to report:—G2KM, 2FS, 5BP, 5JD, 6MN, 6OY, 6OS, 6KN, 6GA, 6PQ, all AA men and BRS's.

G2QO trying to make a report with no material. Been working duplex using superhet.

Will all members please let the T.R. have their crystal frequencies for a crystal register?

*Scarborough.*—Stations active:—G6CP, 5HZ, 5MV, 5TP, 2CP, 2BGS, various BRS's.

6CP testing N.F.D. gear. 5HZ active when possible on phone, but experiencing trouble with poor radiation.

5MV recently completed field strength meter and finds it of great use for precision tuning. 5TG—New station on the air, making total of 7 active stations, is awaiting acceptance of membership. Uses CO. PA. with 362 final at 10 watts, suppressor grid mod. Frequency 7110 kc. Reports required.

5GI inactive last month, but will be on again, using new CO stage giving both fundamental and double frequency output from the one valve. 2CP active on QRP 2 watt CO only.

*Bridlington.*—2APU is building his transmitter and is contemplating the purchase of a RFP 15. This will obviate completely the need for neutralising. 5VO is testing on 14 Mc. and would welcome QSO's and reports. G6OO is busy with R.N.W.A.R duties. No reports from 6UJ or 6WP.

## Scotland.

News this month is largely devoted to that ever popular event on the R.S.G.B. Calendar, National Field Day, which will be over for another year by the time this appears in print.

"A" District had the misfortune to lose their "A" station site just prior to the event, and had to find a new site at very short notice; accommodation was secured near their "B" station, some two miles from East Kilbride. Details of the gear are lacking at the time of writing.

The gear at the two stations in "B" District was supplied as follows:—1.7 Mc. transmitter by G6LG, 3.5 Mc. transmitter by G6VO, and the 7 and 14 Mc. transmitters by G6BM and G5TA respectively.

Details of the gear used by the other districts has not yet come to hand.

This month we have only a single change to record: "B" District: Mr. Reid, 2ARR, is now G5YN.

G5TA is experiencing very good results on 14 Mc. fone, receiving R7/8 reports from W. G6IS is now WAC and WBE, which is quite creditable for the short time he has been on the air, and this is genuinely QRP work.

Mr. Lamb (G6LD), District Officer for "C" District, is retiring from this position, owing to his going south for a few months; at time of writing his successor has not been elected.

"A" District held their annual dinner on May 27; while there was an enthusiastic gathering, the numbers present were not so great as could have been wished for.

Members will be interested to hear that Mr. J. Stove, G5ZX, has sailed on board the *Daily Record* yacht, *Rosalind*, as wireless operator. The *Rosalind* is starting on a world cruise and Mr. Stove expects to be away for about two months, during which various ports in the Baltic will be visited.

Next month we hope to announce the full details of the re-apportionment of some of the Districts, which matter has been engaging our attention for some time past.

## Northern Ireland

The last meeting of the Radio Transmitters' Union of Northern Ireland took the form of a visit to the new Northern Ireland Regional transmitter at Lisburn. After the visit the party adjourned to the Merrythought Café, Belfast, for tea. After tea, GI6WG and 6YW described their activities as amateurs from the early days, and it is hardly necessary to state that everyone was greatly interested in the very real difficulties the early amateur had to surmount.

GI5UR again reports active with a long list of DX.

By the time these words are read, N.F.D. will be over once more. It is unfortunate that circumstances reduced the operating staff at each station, and the D.R. wishes to convey his thanks to those who so heartily co-operated to make the event "run" smoothly.

As 1936 sees the tenth anniversary of the Radio Transmitters Union of Northern Ireland, it is proposed to celebrate the event by holding a dinner on October 17 next.

## EMPIRE CALLS HEARD.

*BRS*2178 (*London, W.3*), *from April* 6 *to April* 15. 14 Mc.: velae, as, aw, hk, 2bg, dg, dm, dr, fg, il, 3hc, jv, ni, 4cv, du, kx, lx, ru, tj, 5fg, gi, vk2af, az, bk, bq, bw, cc, cg, dp, el, fy, hv, mt, ow, ph, px, ql, rd, tc, tf, uu, wj, zr, 3bj, cx, cz, dd, gp, gs, gu, hk, nw, op, pg, tw, vw, zx, 4hr, ry, us, 5gw, jw, kl, lb, wr, 7ab, volj, z12ap, bu, fa, ju, oq, pc, qa, 3cc, gr, ja, jr, kg, 4bq, zt2c.

# Empire B.E.R.U. News.

## B.E.R.U. REPRESENTATIVES.

*Australia :* I. V. Miller (VK3EG), P.O. Box 41, Tallangatta, Victoria ; Sub Representatives : J. B. Corbin (VK2YC), 15, Yanderra Flats, East Crescent Street, McMahon's Point, Sydney, N.S.W. ; R. Ohrbom (VK3OC), 22, Gordon Street, Coburg, N.13, Victoria ; A. H. Mackenzie (VK4GK), Fire Station, Wynnum, Brisbane ; G. Ragless (VK5GR), South Road P.O., St. Mary's, S.A. ; J. C. Batchler (VK7JB), 21, Quarry Street, North Hobart, Tasmania.

*Bahamas, Bermuda and the Eastern Part of the West Indies :* P. H. B. Trasler (VP4TA), Point à Pierre, Trinidad, B.W.I.

*Burma :* W. G. F. Wedderspoon (VU2JB), Government High School, Akyab, Burma.

*Canada :* C. S. Taylor (VE1BV), Stewiacke, Nova Scotia ; Earle H. Turner (VE2CA), 267, Notre Dame Street, St. Lambert, P.Q. ; W. P. Andrew (VE3WA), 1337, Dougall Avenue, Windsor, Ont. ; A. E. Howard (VE4CJ), 2401, 25th Street West, Calgary, Alberta.

*Ceylon :* G. H. Jolliffe (VS7GJ), Frocester, Govinna.

*Channel Islands :* Capt. A. M. Houston Fergus (G2ZC), La Cotte, La Moye, St. Brelades, Jersey.

*Egypt, Sudan and Transjordania :* F. H. Pettitt (SU1SG), Catholic Club, Mustapha Barracks, Alexandria.

*Hong Kong :* G. Merriman, (VS6AH), Box 414, Hong Kong.

*Irish Free State :* Captain G. Noblett, M.C. (EI9D), Barley Hill House, Westport, Co. Mayo.

*Kenya, Uganda and Tanganyika :* W. E. Lane (VQ4CRH), P.O. Box 570, Nairobi.

*Malaya and Borneo :* J. MacIntosh (VS1AA), Posts and Telegraphs, Penang, S.S.

*Malta :* L. Grech (ZB1C), 18, Constitution Street, Zeitun, Malta.

*Newfoundland :* E. S. Holden (VO1H), Box 650, St. John's, Newfoundland.

*New Zealand :* C. W. Parton (ZL3CP), 69, Hackthorne Road, Cashmere Hills, Christchurch.

*North and South Rhodesia :* R. A. Hill (ZE1JB), P.O. Box 484, Bulawayo, S. Rhodesia.

*North India :* J. G. McIntosh (VU2LJ), Baghjan T.E., Doom Dooma P.O., Assam.

*South Africa :* W. H. Heathcote (ZT6X), 3, North Avenue, Bezuidenhout Valley, Johannesburg.

*South India :* J. Shepherd Nicholson (VU2JP), c/o Kanan Devan Hills Produce Co., Ltd., Munnar P.O., Travancore.

## Ceylon

By VS7GJ.

VS7 is now within the inter-monsoon period where evening thunderstorms are in evidence, leading to uneven distribution throughout the day.

VS7RP has been working chiefly on 7 Mc., and reports conditions extremely bad, QRN in the evenings being R9, and very few stations outside VS7 heard. VS7JW, at an elevation of nearly 6,000 ft., states that conditions on 14 Mc. have greatly improved and some fair DX work has been done with G, ON, W6, D3, KA and J2.

With the exception of some local work, the 7 Mc. band has been left severely alone at VS7JG ; only week-end working has been attempted, and this has been confined to the 14 Mc. band. Numerous G stations have been worked from about 1700 to 1930 G.M.T. ; in addition QSO's have been established with D4, PAO, F8, ZT, ZS, HAF, XU, VQ4, whilst at unexpected intervals LU, CP, CE, W8, SU, OH, VP5, X, HP, HB have been worked. 7GJ recently converted his transmitter to a unit system. VS7RP is sailing this month for G and we all wish him a very pleasant holiday.

VS7RA reports conditions on the 14 Mc. band variable, nevertheless he hears a good many stations and finds no difficulty in getting QSO. 7RA uses a 66-ft. Zepp aerial with 50-ft. feeders coupled to a Collins network coupler.

Complaints from active members in VS7 have been received concerning amateur stations using the 14 and 7 Mc. bands for private messages and conversations to friends. Unfortunately the call sign has not been detected, but suspected to be from Burma ; this station is becoming a nuisance. VU2CQ, an amateur station in Bombay, at times causes colossal interference by his extremely wide bandspread and badly modulated signal.

## Egypt, Sudan and Transjordania

By SU1SG *via* G2PL.

We are glad to report that the monthly district meetings, organised during last month, have proved a complete success. During the first Cairo meeting held on May 6, SU1RO was elected D.R. for that district, and in future all members are requested to keep in touch with the B.E.R.U. Representative through SU1RO. SU1RO has in hand the organisation of the Cairo portable station, for the construction of which most of the district is contributing parts. It is regretted that information of this station could not be included in last month's notes, as details arrived too late. The complete portable station supplied by SU1KG for participation in

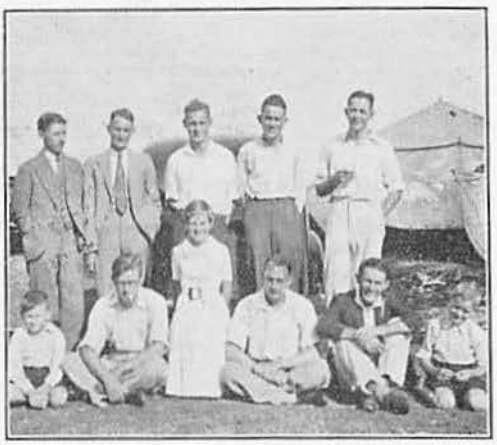
N.F.D. has been tried out on two occasions, and has proved the most successful station built for this purpose during the past three years. SU1SG will make an attempt to take a film of the event, which it is hoped may turn out well enough to be shown at Convention. The 56 Mc. transreceivers were not quite so successful, as it was found impossible to maintain reliable communication over a greater distance than 200 yards. It is proposed to carry out some future experiments on this frequency, using a stabilised transmitter of more ambitious design. SU1WM has been active on 28 Mc., using an ultra-audion oscillator and indoor antenna. He found conditions very poor, but managed to contact G6DH. Further experiments have been curtailed, owing to his departure for G on leave, where he hopes to get some first-hand information from the R.E.S.

## Hong Kong.

By VS6AH, *via* G6CJ.

General conditions have been very perplexing, alternatively good and bad. The 7 Mc. band is almost deserted, as all the group are on either 14 or 28 Mc., but so far only 6AS and 6AH have made 28 Mc. respond! The former puts a good signal into Europe and Africa using a RK20 doubling from 14 Mc. 6AH has tested an indoor aerial and has worked good DX with it, but for all-round results he prefers the outdoor vertical dipole. 6AQ is running a phone schedule with Peru. 6AF and AG continue active with phone, but only on 14 Mc. 6BD will have a 10-watt 14 Mc. station on his yacht signing VS6BB. 6AH now runs a successful schedule with his brother G6GM, the latter using 10 watts from batteries, "*Nil Desperandum*"!

Active stations are:—VS6AF, AG, AH, AK, AI. AN, AO, AQ, AS, AZ and BD.



*SOME WELL-KNOWN AUSTRALIAN AMATEURS.*

*A photograph taken by our Queensland Representative, VK4GK, whilst on holiday at Redcliff.*
*Back row, VK4AW, 4RY, 4UL, 4UR, 4BB.*
*Front row, VK4AP, 4YL, 2LZ, 4HR.*
*VK4YL is daughter of VK4GK; his other Junior operators are at the left and right of front row.*

## Irish Free State.

By EI9D.

The I.R.T.S. assisted as usual in connection with the Leinster Motor Cycle Races on May 9. Three stations were on the air using telephony on 3.5 and 7 Mc. The work was carried out efficiently, and was appreciated by all concerned.

EI5F is still doing good DX on 14 Mc., and was WAC again recently. EI7F and EI9F are also on 14 Mc. with QRO. A number of EI stations are now on 'phone; these include EI4D, 9D, 8F, 8G, 2J, 6J and 8J. EI2J is doing very fine DX 'phone with 10 watts on 14 Mc., whilst EI9D has been QSO W1 and W2, also using QRP to an RFP15. EI8G is putting out very fine quality on 7 Mc., and has worked VE on 14 Mc. 'phone. EI5J expects to be on 'phone shortly.

## Malaya and Borneo

By VS1AA.

VS1AF is getting his gear ready slowly; his FBX receiver has arrived and sounds good. He is to experiment with the Windom, that most intriguing of aerials!

2AG reports with a long list of DX.

1AA is doing a little "commercial activity," and has been driving a pair of neutralised push pull 4211 E's on 28 Mc., with a P.T.25 used as a frequency doubler. Results indicate that the arrangement works, but how well is somewhat uncertain, as radiation tests have still to be made. Incidentally, 1AF reports hearing stations on 28 Mc. 1AA has listened at odd moments, but had no luck.

BERS 244 reports some interesting 20-metre phone; W3, W9, VR, OA4, SU1, etc.

The Letter Budget has got marooned somewhere. Will those responsible please expedite circulation?

## Northern India.

By VU2LJ *via* VS6BD, G5WY and G5AN.

VU2FD (ex G5IL) has now obtained his licence. As no power is available at his station he is using dry batteries until a motor generator is ready.

Conditions on 28 Mc. continue to give good results, and 2AU only requires South America to complete his W.A.C. Conditions on 14 Mc. are very patchy and poor, but phone is still on the increase.

It is interesting to note that 2BG has never been on 28 Mc., so all his signals on this band are harmonics. He has rebuilt, and is using a T61D in the final, low-power modulation is used, and excellent phone is being put out daily.

As anticipated in the April Bulletin, 2LJ has been completely rebuilt! 28 Mc. continues to give good results and 2AU only requires South America for WAC. 14 Mc. is very patchy and on this band fone is still on the increase ruining many excellent contacts. There are many QSL cards waiting to be claimed and cannot be forwarded, due to lack of QRA. The annual clean-up takes place in August!

## Rhodesia

By ZE1JB.

Several new licences have been issued since

the new regulations came into force, and for the benefit of those who have not a recent call book, a complete list of recent licences is appended.

Mr. Whitmore (ZE1JJ) is to be congratulated on obtaining the first Rhodesian WAC on 28 Mc., when he worked VS6AS on May 10. He commenced 28 Mc. work on March 6, 1936. He is now using a pair of Philips TCO4/10 tubes in the final and reports conditions below average.

ZE1JB is on 7 Mc. with a low power (5 watt), Class B modulated telephony transmitter loaned to him for the time being. ZE1JD is a new licensee and expects to be on 7 and 14 Mc. in a week or so. ZE1JG is another new licensee and is already on 7 Mc. ZE1JL is the third new licensee, but will not be on the air for some little time. ZE1JM has installed Class B Modulation and is now putting over some excellent telephony on 7 and 14 Mc. ZE1JN is in the Union on six months' leave, but at the last minute decided not to take a transmitter with him. ZE1JR is not at present operating, as there has been some difficulty about the renewal of his licence.

We have received no news from any stations except ZE1JJ, and there is nothing to report this month.

A list of first contacts between Southern Rhodesia and overseas on 28 Mc. is given below :—

ZE1JU : G6WN, D4ARR, OK1AA, W4CYU, PA0AZ, CN8MG, YM4AA, FA8IU, ZS2A, VU2BL, EA4AO, VK3GU, ON4AU.

ZE1JJ : ZL1AR, FB8AB, LU1EP, OA4J, ON4CJJ, VS6AS.

ZE1JN : F8OZ.

*New Licences.*

ZE1JD : P. Lowth, Telegraph Staff, Rhodesia Railways, Bulawayo.

ZE1JG : L. Madgwick, Postal Staff, General Post Office, Bulawayo.

ZE1JL : D. Sutherland, Plot 85, Highlands, Salisbury.

## South Africa

By ZT6X.

Activity on the 7 Mc. band has been very pronounced of late, due to most of the local amateurs taking up telephony work ; the band is a veritable " rag-chew " medium on Sunday mornings. On 3.5 Mc. one gets an influx of static, while on 14 Mc. bad fading is prevalent, on the latter band DX is good, though somewhat erratic.

ZS6AM is attending to alterations on his modulator unit. ZS6C is awating a 14 Mc. crystal and expects to do his share on 28 Mc. ZT6AD is active on 14 Mc., and gets good results from his tri-tet. ZU6P is directing his attention to 56 Mc., we wish him luck with the new venture. ZU6V is active on 7 and 14 Mc., and is interested in the study of propagation. ZT6AQ (ex G6UO) is active on 7 and 14 Mc. and hopes to try his luck on 28 Mc. ZT6X has built a portable transmitter and receiver, and has acquired a National H.R.O. ZU5P is welcomed as a member of the B.E.R.U., and several others have intimated their intention of joining in the near future.

Items of interest for inclusion in these notes will be very welcome, and should be sent to ZU6V, c/o ZT6X at 3, North Avenue, Bez Valley, Johannesburg.

**EDITORIAL.**—(*Continued from page* 477.)

To further this liaison we recommend that a special transmission be broadcast bi-weekly, on a suitable band, preferably 3.5 Mc., from a central station which would act as a distributing centre for all 56 Mc. information. In the early days of 28 Mc. work a similar form of broadcast was transmitted, and a special DX Letter Budget issued.

To all who are engaged in a study of this subject we offer our best wishes, knowing that enthusiasm and perseverance will carry them far along the road of progress even as it did those pioneers who placed short-wave radio technique upon the map nearly twenty years ago.

J. C.

**COMMERCIAL RADIOPHONE CIRCUITS.**—(*Continued from page* 483.)

and be capable of handling up to six separate telephone conversations.

Other P.O. 5-metre radiotelephone links in regular operation are between Port Patrick and Belfast (37 miles) and across the Bristol Channel, where the first ultra-short wave experiments were originally conducted by Post Office engineers.

The best known ultra-short wave telephone links abroad are between Italy and Sardinia, Barcelona to the Balearic Islands and in the Hawaiian group of islands, where the high mountains provide ideal sites for the stations. It is interesting to note that distances up to 200 miles are reported to be covered regularly by these Hawaiian stations using sites elevated several thousand feet above sea level.

It will therefore be realised that telephony signals heard around 5 metres may not necessarily emanate from amateur stations, as it is possible for the receiver to be in line with the beam from one or more of these commercial ultra-short wave circuits.

**MICRO-WAVES.**—(*Continued from page* 485.)

If it is desired to operate at say 75 cms., and to attain this wavelength, the bridge condenser is 10/20 cms. from the free end of the lecher wires, these extra 10/20 cms. can be cut off. It will be found then that a further adjustment may be necessary to the bridge condenser in order to revert to the 75 cms. wavelength. A further improvement in tuning the oscillator can be effected by substituting for the bridge fixed condenser a small variable condenser. Having marked the position on the lecher wires which produces the 75 cm. oscillation, connect at these points the variable condenser. One having a maximum capacity of .00005 $\mu$F is preferred, and fitted with an extension handle. By rotating the condenser, it will be found to affect the wavelength, and this control proves useful finally in matching up the wavelengths of the transmitter and receiver.

Having accomplished all the foregoing, we find we have now an oscillator capable of producing oscillations varying from 50 cms. to probably 150 cms. This apparatus is fundamentally the transmitter, and in a later article the methods of modulation will be given. At the same time, it is essentially the circuit of the receiver and while carrying out tests to determine whether valves are suitable, it should be remembered that two valves are required, one for the transmitter and the other for the receiver. Two valves, therefore, should be selected which produce almost the same wavelength under the same conditions. It will be an advantage when selecting the receiving valve, to find one which will oscillate at the correct wavelength at a grid current of 10 mA ; lower than this is also desirable, in order to enable the receiver to be operated from dry batteries.

The next article will describe the completion of the transmitter.

**ATMOSPHERICS.**—(*Continued from page* 489.)

in proportion to the process of charging the cloud from the residual electricity of the upper atmosphere.

Mountainous districts are always more prone to atmospherics than flat ones, as electric storms appear to prefer to travel along valleys if they can. This may be in some degree controlled by the nature of the sub-soil and the amount of water in these valleys. Information upon this point is at present rather scarce, but there does appear to be some indication that this may be the case.

A question which is often asked is : " Do auroral displays affect radio like ordinary lightning ? " There can be no doubt that they do affect radio, but not to any great extent in the British Isles.

There is still much research work to be done on the subject of atmospherics and their origin ; it is a most interesting subject to study, and much valuable research work can be done by any amateur who is sufficiently keen at very little cost.

## Roumania

We have been informed that a Roumanian Short Wave Amateur Association, to be known as " A.A.R.U.S." has been formed with Headquarters at 89, Carol Davila St, Bucharest.

The President is Dr. A. Savopol (YR5AS) and the Secretary Mr. I. Niculesco (YR5EV).

The QSL Manager is Mr. V. Cantuniari (YR5VC), and all cards for Roumanian amateurs should be sent to him at Str. Matei Basarab No. 3, bis Bucarest IV.

We wish the new Society good luck.

## Tail Piece.

G5... received a card one morning with the following phrase written on the envelope : " Sorry, number not recognised at C....D Prison ! "

The envelope was addressed to G5... of C....D, Essex.

## A SILENT KEY

We have to record with deep regret the passing of Kunio Shiba, J2HJ. Mr. Shiba was an enthusiastic member of our R.E.S., and one of the first Japanese amateurs to work on 28 Mc. He finished 5th in our First International 28 Mc. Contest.

Our sympathies are extended to his brother, Baron M. Shiba and other members of his family.

# EXCHANGE AND MART.

**Private members' advertisements 1d. per word, minimum 1s. 6d. Trade advertisements 2d. per word, minimum 3s., cash with order. First line, if desired, will be printed in capitals. Copy to reach 53, Victoria Street, or the Advertising Manager, Parrs, 121, Kingsway, W.C.2. not later than the 1st of the month preceding date of publication.**

BRS1558 desires employment. Willing to do anything but canvassing. Good references.—A. TAYLOR, 50, Oxford Street, Barnsley, Yorks.

G5KT.—Attractive new designs QSL Cards. Lowest prices obtainable. Finest quality. Samples will convince.—QRA, 33, Howard Road, Westbury Park, Bristol, 6.

G6DS.—Known the world over for quality. QSL cards, Log Books and Pads. Send for Samples.—QRA, Inglenook, Orlando Drive, Carlton, Nottingham.

G6MN FOR QSL's.—Up-to-date designs and modern type.—Send for samples to G6MN, Worksop.

G6US.—150 foot 14 gauge enamelled Aerials. 5/6 post free.

G6US.—The RADIO HANDBOOK in stock. 4/6 post free.

G6US.—Raytheon receiving and transmitting Valves at real Ham prices.

G6US.—Gives technical information where required with all apparatus purchased.—N. E. READ, 37, Willow Street, Oswestry.

QSL's WITH STATION FOTO, 500 two colour, 17s. 6d. BRS cards from 3s. per 100. Samples, G6PD/LX, 222, Eastfield Road, Peterborough.

REBUILDING? House your gear in "PAREX" Aluminium Cabinets. Chassis, Racks to your specification. — E. PAROUSSI, 10, Featherstone Buildings, W.C.1.

STAMP COLLECTING HAMS. Send for list of Jubilee Mints; current Colonial Mints; sets and separate. We want supplies of current Colonial issues.—BORDER SERIES, 8, Woolmarket, Berwick-upon-Tweed. (G5BA).

SURPLUS GEAR: Transformer, 670-0-670 volts, 150 m.a., 3 L.T.'s with two '81 rectifiers, 37s. 6d., or best offer. List of other gear from G6LX, 222, Eastfield Road, Peterborough.

T. & R. SINGLE SIGNAL SUPERHET. All specified parts can be bought from WEBB'S RADIO STORES, 14, Soho Street, off Oxford Street, W.1. Tele.: Gerrard 2089. The official "Eddystone" Service Depot.

WIRES. Enamelled, D.S. covered; Tinned and Bare Copper. 7/30 slip-back Wire, 12 yards 1/6 post paid. Sleeving, 12 yards 1/9 post 3d. Silk Battery Cords, 5-way 1/-, 6, 1/3, 7, 1/6, 9, 2/-. Single and multiple flexible Cords. Tons of Wire in stock. State your specific needs.—L. WILKINSON, 204, Lower Addiscombe Road, Croydon.

WANTED, QST January, 1928, September, 1929. State price. 7185 kc. thick cut Crystal. perfect, 10s.—G6TI, 33, Lattice Avenue, Ipswich,

## SEMI-DISPLAY ADVERTISEMENTS

As and from the JULY issue, semi-display advertisements to occupy one inch space in this section will be accepted. No blocks may be used. Cost per insertion 10/-. Cash with order to

**PARRS ADVERTISING, LTD., 121, KINGSWAY, LONDON, W.C.2.**

YOUR STATION CALL SIGN.—3½-in. polished aluminium letters on aluminium plate, polished bead, black background. Delivery by return. 7s. 6d. post free, cash with order.—BRS844, 104-106, Rook Lane, Dudley Hill, Bradford.

A BARGAIN EVERY TIME, YE AMATEURS! Re my advertisement last month: Very much regret printed lists not yet ready. Will mail you all a copy as soon as available. Thank you all for numerous enquiries. Sincere regrets to the few I have not replied to. Please watch this advertisement column. Shall be away a fortnight as from the 11th, and regret cannot attend just now. Hope even more business on return. 2BLA (ex-BRSI098), "VILLETTE," 20, The Drive, Roundhay, Leeds, 8.

## Patents and Trade Marks.

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