

# The "DX FOUR" for Summer Use

## "VERNIER" CRYSTAL SET

# Amateur Wireless And Electrics

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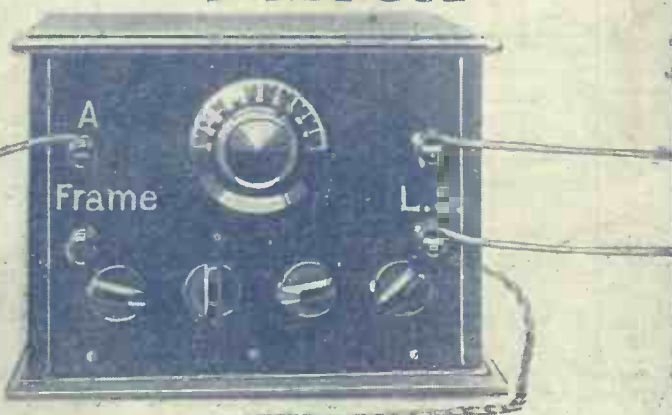
Vol. X. No. 258

SATURDAY, MAY 21, 1927

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See Page 749

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# Amateur Wireless

and Electrics

The Leading Radio Weekly for the Constructor, Listener  
and Experimenter

Vol. X. No. 258

Edited by BERNARD E. JONES  
Technical Editor: J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

MAY 21, 1927

## More "Hi-Power"—Sailing Studios—The Optimist—Television Progress— Limoges Wakes Up!

### Money Talks if the Mike Doesn't!

ACCORDING to a report from America at the WLW (Cincinnati) studio intervals between the conclusion of an item and the beginning of the next announcement are limited to five seconds, and should the announcer exceed that limit he is fined to the extent of one dollar.

### Sailing Studios!

DO you know that there is at least one broadcasting station which is never on dry land? WKMU, a powerful American station, has its transmitting gear and aerial installed on a large motor yacht. No trouble to get a good earth connection!

### The Small Ad!

BY a small advertisement for wireless operators, inserted in a Paris newspaper, the French *Poste* has succeeded in tracking down an illicit transmitter run for the purpose of broadcasting prices on the Bourse to other countries. The four bankers running the station have now found that the small ad. does *not* always pay! But if only some of our Ham-handed Henries could be tracked down in similar manner. . . .!

### Television Progress

THROUGHOUT the country a small army of television experimenters is being recruited every day and at Liverpool where wireless has always had a large following of enthusiasts, there are large numbers of radio experimenters investigating the new aspect of the favourite science. It is strongly rumoured that several are making splendid progress on new lines, relying on light fluctuation and none of the mechanical assistance used in the instruments working to-day.

### SCREENING

Although the use of screening in H.F. amplifiers is often of very great advantage in reducing or preventing interaction between the various circuits it should be realised that there are disadvantages as well. Screens should never be used in such a way that the disadvantages outweigh the advantages.

When any conducting material exists in a varying magnetic field, energy is absorbed by the conducting material and this represents so much energy lost to the circuit which produces the magnetic field.

The thing to remember is that screening can very easily be overdone. An over-zealous attempt to eliminate interaction altogether may very easily result in excessive absorption losses which more than counterbalance the advantages gained by the use of the screens.

More screening than is absolutely necessary to enable the set to be stabilised should never be used and there should always be ample distance between each coil and the nearest screen.

### The Optimist

AN American "Ham" has written to the new Radio Federation *demanding* that they should stop atmospheric. If petitions can do that, we must write to our P.M.G.

### CHANGE OF ADDRESS

Will readers please note that the address of "AMATEUR WIRELESS" is now 58-61 FETTER LANE, E.C.4.

### The Stations Shift

THE Jo'burg apparatus is being moved to Bloemfontein as a more powerful transmitter is being installed in the former station. While the engineers are making the change, a relay will be used for Pretoria. Broadcasting is waking up in S.A.

### A New Note!

A NEW interval signal has been adopted by the Bratislava (Czecho-Slovakia) broadcasting station; it consists of four bells tuned to the notes F, A, C, C. These are continually struck between programme items.

### Swedish High Power

MOTALA, the Swedish high-power transmitter, effects tests nightly on 1,304.5 metres. It frequently broadcasts a programme of dance music (gramophone records) after the Stockholm studio—for which it acts as relay—has closed down.

### Poor Limoges

FOR some little time past the local wireless club at Limoges (France) has been in possession of a telephony transmitter purchased in Paris. Attempts were made to instal it in some disused military barracks, but the French Posts and Telegraphs Administration refused to license the station, a veto which compelled the local authorities to order its removal. The inhabitants of Limoges are now clamouring for its erection elsewhere, and steps have been taken by the town notables to bring the matter to the notice of the French Minister of Commerce, contending that, for some considerable time, a relay station was promised to them, and though frequent representations have been made, up to the present nothing has been heard of it!

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# LONG-DISTANCE WORK IN SUMMER-TIME

By THERMION

MANY wireless men who are enthusiastic enough about DX work at other times of the year, regard the summer as a kind of close season when it is not worth while going to the trouble of trying for distant stations. I have always felt that by adopting this attitude they miss a great deal, for there is no time for really testing out the qualities of a set and for tracking down its weak points like the season of long days and light nights. In winter-time when darkness sets in early and receiving conditions are at their best, almost any valve set that is not a complete and absolute "dud" will bring in a number of transmissions in addition to those of the local station; in summer it is only with a good set, working in conjunction with an efficient aerial and a first-rate earth, that one is able to say "I will tune in this station or that" with a fair amount of certainty that the attempt will be successful.

I would strongly recommend anyone who has abandoned long-distance reception the last month or two to reconsider his decision. Speaking generally, I have always found that the easiest stations to pick up when

the ether has lost its winter liveliness are those which lie above and below the normal broadcast band extending from 300 to 500 metres.

Anyone who has a set of coils capable of tuning in Daventry should be able to receive Radio-Paris, one of the finest of the Continental transmissions from the point of view of quality as well as of signal strength. This station gives a concert at lunch-time every day, including Sundays.

A little lower down the scale of wavelengths the two stations that come in best at this time of the year are Königswusterhausen on 1,300 metres and Hilversum on 1,050 metres. As there is nothing within 50 metres on either side of them, they are easy to pick up.

Now for the other end of the scale. The band of wavelengths between 250 and 300 metres contains, as you will see if you look at a list of regular broadcast transmissions, a large number of Continental stations. The most powerful of these are the German relays, most of them being rated at 1.5 kilowatts. These relays are extraordinarily useful at any time of year when one wishes to receive particular programmes from Germany.

The main stations most of which are on wavelengths between 400 and 504 metres, suffer a great deal from interference due both to Morse and to heterodynes. Often, therefore, if you try to tune in, say, Muenster, on 410 metres you will find that you cannot listen with any pleasure to the programme owing to a continuous whistle, due to spark signals or to C.W. harmonics. But you can still receive Muenster's programme if you provide a set of coils that will take you down to below 300 metres, for Muenster is relayed by Dortmund on 283 metres, and Dortmund is a station that "gets across" to this country exceedingly well at all times of the year.

The 250-300-metre stations that have been coming in best of late besides Dortmund are Hanover on 297 metres, Toulouse PTT on 280 metres, Cassel on 273.5 metres, Elberfeld on 259 metres, and Gleiwitz on 250 metres. In addition to these I have also heard Malmo quite powerfully on certain evenings.

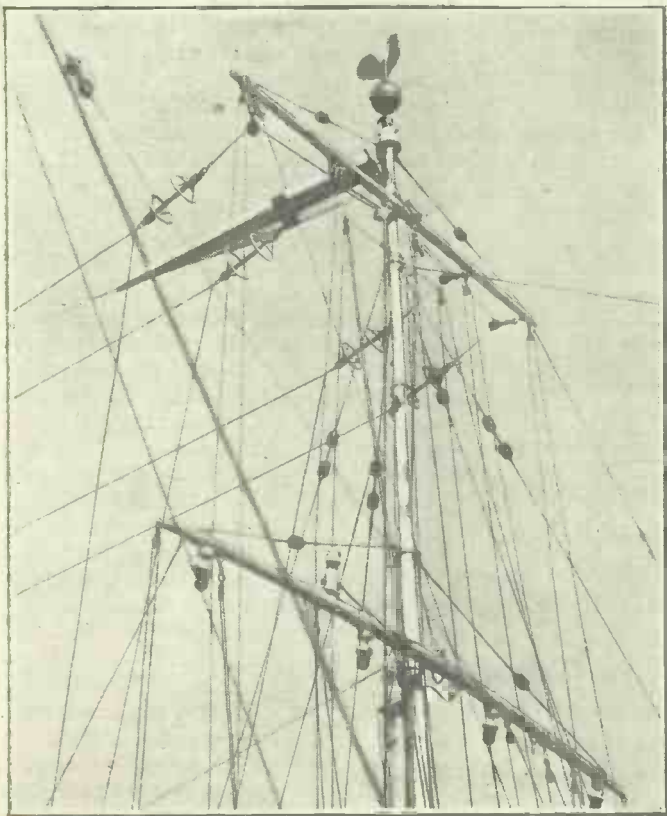
There is one rather important point about summer-time reception that is not always realised. Should atmospheric conditions be bad towards the upper end of the 300- to 500-metre band it is generally useless to try for longer-wave stations such as Radio-Paris or Hilversum; it may, however, be found that the "X's" are much less troublesome when a drop is made to wavelengths lying below 300 metres.

## The Broadcast Band

Of the stations upon the normal broadcast band, those which can be relied upon in summer-time are comparatively few in number. Excluding our home stations, those that I find most powerful just now are Madrid Union Radio, Oslo, Hamburg, Muenster, Breslau, Rome, Toulouse, Stuttgart, Paris, PTT, Frankfurt, Brussels, Munich and Berlin Voxhaus. Unfortunately Morse interference is at present so bad on wavelengths above 400 metres that the majority of these stations are liable to suffer seriously from its unwelcome obligation, and such is the crowding on the broadcast band that if one tries for half a dozen selected stations one is almost sure to find at least two of them heterodyned.

Long-distance reception in summer-time demands the exercise of considerable care in the handling of the receiving set. Since the signal strength of stations is not nearly so great as it is in winter-time, it is more difficult to bring up a transmission to good strength without allowing the receiver to oscillate. On no account should DX reception be attempted with a set in which reaction control is not perfectly smooth. Should there be a tendency to "overlap"—the hall-mark of a bad receiver—it is a moral certainty that interference will be caused to others.

The set should go into and out of oscillation at exactly the same point in the travel of the reaction coil. If overlap is present there is a short period of building up as the coupling is tightened; then the set bursts suddenly into oscillation, instead of gliding into that condition, usually with a pluck or a click. As the coupling is loosened oscillation does not cease until you are some distance past the point at which it began. It is overlap that is responsible for ninety per cent. of the howling that occurs.



The Aerial Gear of a Destroyer

The picture shows part of the aerial equipment of H.M.S. Winchelsea.

# THE "VERNIER" CRYSTAL SET

*A Crystal Receiver Constructed upon Entirely Novel Lines*

By H. BRAMFORD

THE receiver about to be described is a distinct departure from the ordinary type of crystal set. It is, moreover, extremely simple in every respect, being easy to construct, very little material being required for making it up. The originality of the idea itself is embodied in the tuning arrangement of the aerial coil.

**Components**

The components required are as follows: Ebonite panel, 4 in. square by  $\frac{3}{16}$  in. thick (Paragon). Suitable box or cabinet (Eunice). Permanent crystal detector (Brownie). 4 Terminals and coil plug and socket (A. F. Bulgin). Filament rheostat,

the dimensions given in the diagram Fig. 1. It will be seen that the detector is arranged upon the panel by means of two terminals and clips, one of which is used for the aerial connection and the other for one of the telephone connections. The drillings for the coil plug and socket should be extremely accurate, and for this purpose a template should be used. Do not mount the filament rheostat at present. The wiring as made from the back of the panel is shown in Fig. 2, and it will be seen that three pieces of wiring complete the whole process.

**Vernier Tuner**

The filament rheostat, which we will call in this case the vernier tuner, must first be prepared in the following manner. The type of rheostat chosen happens to be particularly suitable for the purpose in view. On the other hand, however, any existing make which the constructor may happen to have by him will suit, providing the contact slider makes good electrical connection and that the instructions are followed accordingly. With this type of rheostat the barrel rotates while the contact arm is stationary. On most types the contact arm rotates while the barrel is stationary. This reverse order of things does not matter in the least.

First remove the resistance winding from the rheostat. This course is advisable owing to the fact that the high resistance of the wire used for this purpose is not suitable for use as part of an inductance coil. The next thing to do is to wind some No. 24 S.W.G. enamelled wire upon a brass rod  $\frac{1}{8}$  in. in diameter as shown in Fig. 3. This winding should be made to almost correspond in length to the length of the winding which has been removed from the rheostat. It should, in fact, be just a little bit shorter to give the extra tension when in position. When the winding is completed, it is easily slipped off the brass rod. All that it is then necessary to do is to place it upon the rheostat in a manner exactly similar to the way in which the resistance winding was placed in the first instance. The beginning and end of the winding, it should be remembered, must be cleaned where they make contact with the rheostat terminals. Next remove the enamel right round the winding with a fine file where contact is made between the winding and the slider. This completes the alteration necessary to the filament rheostat, which may now be assembled on the panel in the usual manner, the connections necessary being obvious from the drawings.



**Circuit**

The theoretical circuit is given by Fig. 4. A plug-in coil is used, the vernier tuner being connected in series. The slider of

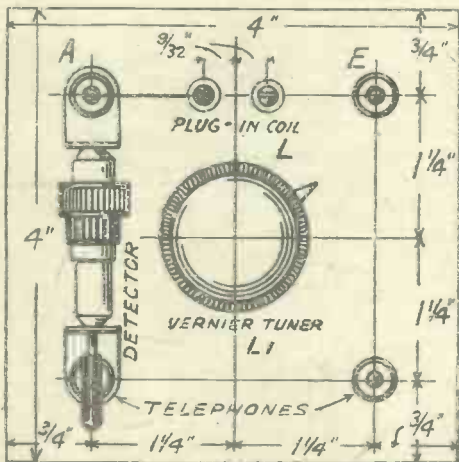
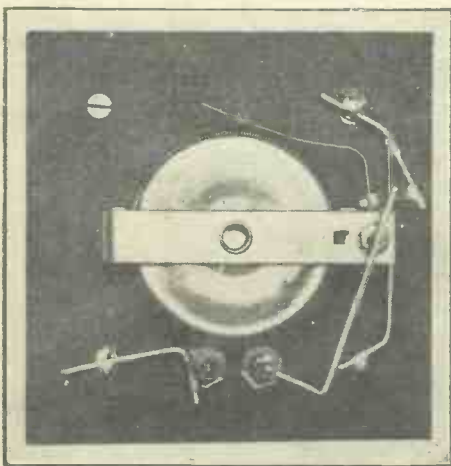


Fig. 1—Drilling Diagram of Panel

old type (Igranite, or any suitable make). Glazite for wiring (L.E.W. Co.). Small quantity of No. 24 S.W.G. enamelled copper wire.

**Construction**

First drill the panel in accordance with



Photograph of Vernier Tuner

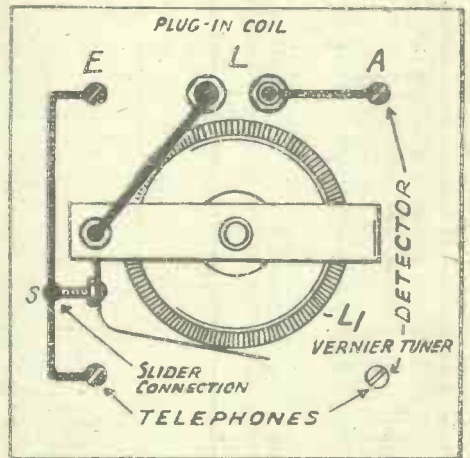


Fig. 2—Wiring at Back of Panel

the vernier tuner is connected to the earth terminal. The inductance of the vernier tuner is equal to about five turns of an ordinary sized plug-in coil, allowing for the diameter of the turns and the shape of the winding.

**Operation**

Operation is simplicity itself. We may consider that the vernier tuner is equal to, say, a five-turn plug-in coil. It is obvious therefore that we have to plug in a coil which comes as near as possible to the wavelength range upon which we wish to receive signals. Tuning is easy to achieve on the vernier tuner, and it is obvious that this tuner gives extremely fine adjustment, much finer indeed than can be obtained even upon the ordinary type of solenoid coil used in conjunction with a sliding contact.

**Results**

The receiver was tested at a distance of 10 miles east of 2LO; using a No. 50 coil for local reception, signals were extremely good. Using a suitable coil, Daventry may also be received, but the set particularly adapts itself to local reception.

(Concluded at foot of next page)

# GRID BIAS AND THE CONNECTION OF RHEOSTATS

A MATTER to which constructors often fail to pay sufficient attention is that of obtaining the correct grid bias on the different valves used in their receivers, and it is not always realised that the grid bias is affected by the connections of the rheostats

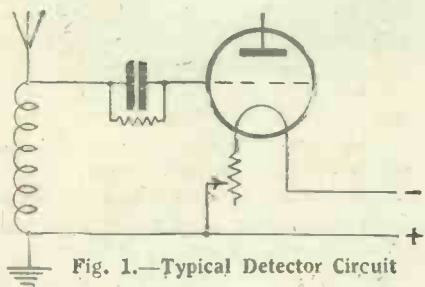


Fig. 1.—Typical Detector Circuit

The grid bias necessary to make a valve operate correctly is considered in relation to the negative side of the filament. Thus if a detector valve requires a positive bias of 2 volts it means that the grid return to the filament must be 2 volts positive in relation to the negative side of the filament.

A conventional detector circuit is shown in Fig. 1. Assuming that a 2-volt L.T. supply is being used and the grid return (via the grid leak and tuning coil) is connected to L.T. positive, then the grid will have a positive bias of 2 volts in relation to the negative side of the filament, which is connected direct to L.T. negative.

Supposing however, that the rheostat is connected in the negative lead, as shown in Fig. 2 then the negative side of the filament is not so negative as the L.T. negative supply, owing to the drop in voltage through the rheostat. Assuming that the rheostat is adjusted so that the valve is

operating at 1.6 volts, the grid will be only 1.6 volts positive in relation to the negative side of the filament. Thus should the maker of, say, a valve which operates at 3 volts recommend a positive bias of 3 volts when it is used as a detector, it is advisable, if a 4-volt accumulator is being used, to connect the rheostat in the negative lead.

If the negative lead is earthed, the rheostat should be connected in the negative lead to the valve, and the grid leak taken direct to the positive lead, instead of being across the grid condenser. The positive bias will then be equal to the voltage at which the valve is operating, as is the case in Fig. 2. This is the method of connecting which becomes necessary when a detector valve is preceded by an H.F. stage.

The grids of H.F. valves should, as a rule, be more negative than the negative side of the filament, and generally they operate better when given a slight additional negative bias. In the older types of receivers it was often necessary to reduce the negative bias (generally by employing

low, sufficient bias is obtained by connecting the rheostat in the negative lead to the valve and the grid return (the IS terminal of a transformer, for instance) to L.T. negative. The negative bias will then be equal to the drop in voltage through the rheostat. With high voltages,

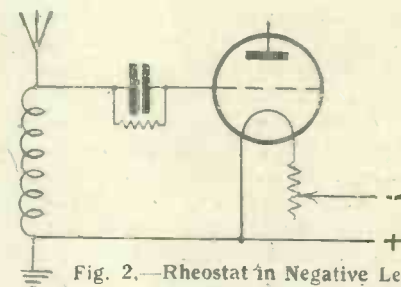


Fig. 2.—Rheostat in Negative Lead

however, additional negative bias is applied by means of a grid battery, the positive of which is connected to L.T. negative and the grid return to a suitable tapping point, in accordance with the valve manufacturer's recommendations. If the rheostat is in the negative lead, the bias applied by the grid battery will be additional to that due to the drop voltage through the rheostat, but if the rheostat is in the positive lead, then the only negative bias will be that due to the grid battery.

The use of correct grid bias has a considerable effect on the efficiency of a receiver, and it is hoped that these notes

will give the reader a clear understanding as to how it can be obtained. The important point to remember is that the grid potential is considered as being in relation to the negative side of the filament, as distinct from the negative L.T. supply, and the above may be summarised as shown by the table printed above.

R. H. B.

Rheostat in negative lead.	Grid return to negative L.T.	Negative bias equal to voltage drop through rheostat.
Rheostat in negative lead.	Grid return to positive L.T.	Positive bias equal to operating voltage of valve.
Rheostat in positive lead.	Grid return to negative L.T.	No bias.
Rheostat in positive lead.	Grid return to positive L.T.	Positive bias equal to voltage of supply battery.

a potentiometer) in order to maintain stability, but with modern neutrodyne circuits this is not necessary. In some modern circuits a slight additional negative bias is applied by the insertion of a grid-bias battery, in the same way as with L.F. valves.

L.F. valves require a negative bias. When the anode voltage is comparatively

as it is generally known that the greater the capacity which is placed across an inductance, the greater the wavelength range. By eliminating capacity, therefore, we have to increase inductance. If, therefore, the constructor has been accustomed to using a No. 40 coil with .0005 condenser in parallel for local reception, it will be probably necessary to use a No. 50 or No. 60 in this case.

Although not yet officially taken over, the 40-kilowatt high-power station at Motala (Sweden) is now relaying the Stockholm programmes nightly on a wavelength of 1364.5 metres.

## THE 'VERNIER' CRYSTAL SET

(Continued from preceding page)

It should be remembered with an instrument of this type that the plug-in coil should be somewhat larger in any case than would be used if capacity was used in



Fig. 3.—Method of Winding "Vernier" Tuner

parallel for tuning purposes in the shape of, say, a .0005 variable condenser. Here we have only to consider the capacity of the coil itself, and therefore it is necessary to have a greater inductance in proportion,

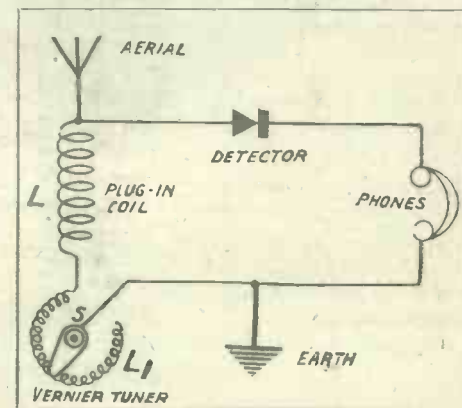


Fig. 4.—Circuit Diagram

# Is Constant Coupling the Right Term?

*A Discussion of Some Considerations of the Loftin-White Circuit*

By J. H. REYNER, B.Sc. (HONS.), A.M.I.E.E.

THE circuits which have been employed in the well-known M.C. receivers, are remarkable for two principal features. In the first place, the sensitivity of the circuit remains constant over the whole of the tuning range, whereby the tuning is greatly simplified, and the number of essential controls is reduced. The second feature is that the circuit gives full amplification at high frequency without any tendency to oscillation due to feed-back in the valve or valves employed.

This stability, as is well known to AMATEUR WIRELESS readers, is obtained because the anode circuit of the valve is adjusted to exhibit a non-inductive, and preferably slightly capacitive reactance. When this is the case, the feed-back through the valve is either zero or negative in sign, so that the effect tends to produce stability rather than self-oscillation. The principle that I have adopted in designing the M.C. receivers has been to allow the feed-back to be negative, so that it compensates for any stray couplings which are existent in the circuit.

A separate reaction control is then provided which brings the receiver up to its point of maximum sensitivity, and, as practical experience has shown, this adjustment remains stable over the full tuning range, and need only be brought into commission if some slight extra volume or selectivity is required. In other words, the process of searching for the distant stations is carried out without the reaction control.

## A Corollary

This most desirable property of stability, which is inherent in the circuit itself and is independent of the valve with which the circuit is employed, is necessarily a corollary of the constant-coupling principle. If it were not for the former effect, then the latter principle could not be utilised satisfactorily, for the effect of the varying frequency would be such as to prevent satisfactory operation.

If one took a normal circuit, say, and

adjusted it in such a manner that it was stable at the top of the tuning range, which corresponds to the lower frequencies, then as the frequency was increased by reducing the amount of tuning capacity in circuit, then the circuit would tend to oscillate, and would actually do so before very long. If, on the other hand, one arranged that the circuit was stable at the highest-frequencies to be dealt with, *i.e.*, at the bottom of the tuning scale, then the arrangement would rapidly become inefficient as the tuning capacity was increased, and at the lower frequencies (higher wavelength) at the top of the scale the receiver would be very insensitive.

## Compensating Effect

The Loftin-White arrangement overcomes this defect by the fact that the sensitivity of the circuit is constant. It is, therefore, possible to adjust the circuit in a stable condition at the bottom of the tuning scale, and this falling off in efficiency which is obtained with normal arrangements does not take place, the circuit maintaining its amplification throughout the range, and it is thus both stable and efficient at all settings of the condenser.

Owing to this dependence of one effect upon the other, one is rather apt to consider this stability effect as of secondary importance. This impression, moreover, is increased by the use of the term "constant coupling" to describe the circuit. It is interesting to note that Loftin himself considers the production of stable ampli-

fication due to what he terms "the non-reactive plate circuit" feature of the invention, to be of considerable importance, and the factor which will quite possibly contribute most to its success and appeal both to manufacturers of receiving apparatus and to the amateur who uses the circuit for his own experimental purposes.

I mentioned in an earlier article that I was in touch with Mr. E. H. Loftin, who is the joint inventor with Mr. S. Young White of the particular system, concerning a number of points of detail, and the following extract from one of his letters will show his views upon the matter. He says:

"I note that you refer to the system in general as embodying constant coupling. While I consider constant coupling a most important feature, yet it seems to me that the non-reactive plate-circuit feature, by which we control regeneration, is also of outstanding importance, particularly in the design of multiple-stage radio-frequency amplifiers. In fact, we designed a multiple stage radio-frequency amplifier for a commercial company for 1926 production that employed three stages of radio-frequency amplification built around a type of single-dial control condenser, which we termed 'Clover Leaf' this by reason of the fact that the stators and rotors were all built around a central shaft of clover-leaf pattern. The arrangement provides for an abnormally large feed-back from the detector stage to the first stage. It was only by introducing a little reverse feed-back in the tuned capacity of each stage, by means of

the non-reactive plate circuit feature, that we could make this system stable, and I do not believe that it could have been stabilised by any other system so far proposed."

It will readily be seen that there is a good deal in this particular aspect of the question. It is interesting to note that when I was first considering the design of the well-known Solodyne receiver, which was the first really practicable gang-control (Concluded on page 764)



A WIRELESS AUTO-ALARM FOR SHIPS

The authorities in this country are on the point of issuing rules governing the installation in merchant ships of a device known as the auto-alarm. This device is actuated by a special signal which in time of distress will give audible warning of the need for help. The photograph shows the Marconi instrument.

THE first ideas of television date back more than a score of years, to the time when Professor Ernest Rühmer, of Berlin, actually showed images over telegraph wires transmitted by an apparatus based on the use of selenium cells.

Some years before this apparatus was made, Mr. William Gamble, of London, described how any photographic picture might be telegraphed in code, and Rühmer's first television experiments were really based upon the "code" method. This method, by-the-way, is quite as likely as not to prove one of the really practical systems of television.

Figs. 1 and 2 show a portrait as reproduced in a newspaper illustration, greatly enlarged and normal size. Every photograph before reproduction in an illustrated paper, by what is known as the half-tone process, is broken up into dots, large and small, masses of large dots giving a dark part of the image, and masses of smaller dots giving lighter parts, and so on.

#### A Code System

Suppose we take the small section of the photograph in Fig. 2, and rule lines vertically and horizontally across it so as to divide it into as many squares as there are dots. If now we examine each dot in succession, working downwards, let us say, along the first "line" of the picture, we see that there are various sizes of dots, and it is quite easy to divide them up into three or four classes, according to size. We might call the biggest, or heaviest dots "A"s, the next smaller "B"s, the still smaller dots "C"s, and the very smallest ones "D"s. The first line of the picture might thus be represented by A A A D C C C A D D B B B A C A, etc., and so on.

If now we go over the whole picture like this, we can convert it into a code message of letters; the line quoted might be shortened, as follows:—3A, D, C<sub>3</sub>, A, DD, 3B<sub>2</sub>, A, C, A, this method greatly reducing the number of letters where perhaps ten or fifteen dots are of practically the same size.

It sounds very laborious, but it is surprising how quickly one gets to code and decode a picture in this way. It can be seen that by taking a very simple portrait as reproduced with a coarse screen in a newspaper, it is quite within the limits of experiment to transmit it in the form of a code message from any wireless transmitting station to a receiving station.

#### Decoding

The message having been received, it is converted into a picture by marking out on a piece of squared paper, square by square, the dots as indicated by the letters of the message. If A's represent the heaviest dots, the whole square can be inked or pencilled in; for B's a black circle with diameter nearly equal to the side of the square can be made; for C's a heavy cross will answer well, and for D's a small point

## THE BEGINNINGS OF TELEVISION

*Describing a simple method of sending wireless pictures without special apparatus.*

By T. THORNE BAKER  
"A.W.'s" Technical Adviser in Television

or dot, thus indicating the value. These are of course marked in, on the squared paper, in the same sequence or position as the code letters. Some quite good results can be obtained in this way, pencil sketches or line drawings, if quite simple, being much easier and quicker as there will be correspondingly fewer letters to code or decode.

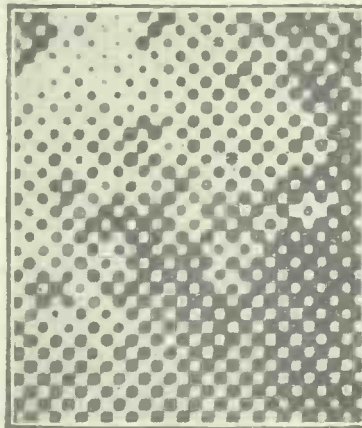


Fig. 2.—Composition of Half-tone Picture

Professor Korn some years ago invented a machine for breaking up a half-tone photograph into code letters and a typewriter for the recipient of the telegram to



Fig. 1.—Half-tone Photograph showing "Screen"

reconstruct the image, the typewriter merely having four or five keys making dots of the different areas. Some reasonably good pictures were sent in this way from New York to Rome and were published in an Italian newspaper.

To return to the television experiments of Rühmer, and—more recently—Deves von Mihaly,—both of which were really based on the code idea. Instead of breaking up the image by photographing it through a half-tone screen, the image is thrown by lens upon a number of light-sensitive cells arranged like the squares of a draught-board. In this way each light-sensitive cell,—corresponding to the dot of a half-tone image—creates more or less electric current according to the intensity of the illumination falling upon it, i.e., to the brightness of the image at that particular spot.

#### Reproducing the Original

Each electric current is made to regulate the strength of light emitted by a small electric lamp illuminating a square section of the viewing screen, so that on the screen one sees a facsimile of the original subject.

An enormous number of cells would be necessary, and some exceedingly high speed mechanism to throw the successive circuits into action with sufficient rapidity to make possible the use of one telegraph line or wireless circuit (instead of as many lines as there were squares). Rühmer contented himself with a few selenium cells only and was able to see by television just simple letters of the alphabet. Mihaly went a step further in 1920, and was able to transmit quite recognisable faces by wireless.

Some of the latest methods involve a similar "mosaic" of photo-electric cells, and it is only the difficulty of connecting a sufficient number of them, in proper sequence and with sufficient rapidity, with the illuminating units of a viewing device that prevents the idea being worked out to a practical conclusion.

#### Transformer Ratios

WITH two or more transformer-coupled stages of L.F. amplification, the first transformer, i.e., the one following the detector valve, will in general have a lower step-up ratio than the second. The reason is that the impedance of the primary windings should, if possible, not be lower than the A.C. resistance of the valve to which it is coupled.

Generally speaking, a detector valve has a higher internal resistance than one specially designed for L.F. working. Therefore there should be as many turns as possible in the primary windings of its transformer, which, in turn, limits the step-up ratio attainable.

B. A. R.

The Rome high-power station (about 5 kilowatts) is effecting tests nightly on 1200 metres between the hours of 8.25—9.25 and 10.0 to 11 p.m. B.S.T.





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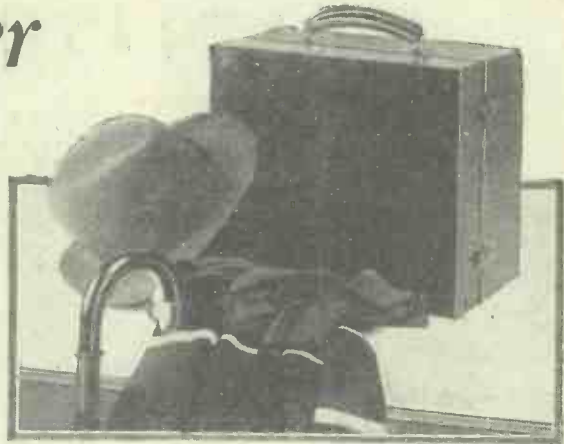


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&c.

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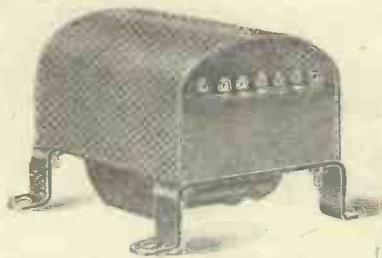
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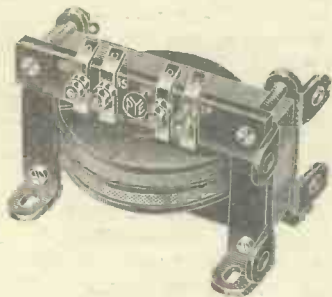
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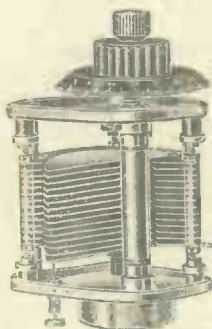


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# On Your Wavelength!

## European Extensions

APPARENTLY, our list of European broadcasting stations is far from being completed, and by the end of the current year, if all schemes mature, many more transmitters will have taken the air. As you know, considerable extension is planned for the broadcasting system of Italy, where apart from a high-power station at Rome, increased energy is to be given to Milan and further transmitters are to be erected in five other cities. It is probable that when the scheme is complete we shall be able to pick up the capital programmes from various Italian sources as it is suggested that an interchange of entertainments on the S.B. principle is contemplated.

In Czecho-Slovakia, a 2-kilowatt transmitter is to be installed at Kosnice, which up to the present has been a wireless telegraphy station temporarily adapted for the spasmodic broadcast of programmes from the Prague studio. But other cities are also clamouring for the possession of a local broadcaster, and Pilsen, famous for its light lager, will not be denied. I understand that plans have already been submitted for the necessary plant to add a fourth relay to Prague's broadcasting service.

In France again, rumour has it that another private transmitter is proposed for Paris, and at Chambéry, the capital town of the Department of Savoie, some fifty-five miles south-east of Lyons, a small group of wireless fans has decided that a 1-kilowatt must be immediately purchased and installed.

## Three Valves Enough?

With all these proposed stations, the advent of high-power stations such as Motala and Moscow, and the prospect of equally big noises from Berlin (Zeesen) Kallundberg (Denmark) Oslo, Stamboul, Ang-cra, Vienna, Buda-Pesth, Rome, Belgrade, Amsterdam, Lahti, and I believe others, the possessor of an ordinary three-valve receiver in the near future should enjoy a hectic time. The logging of stations will not be a mere matter of patience; we shall require a new shorthand system for jotting the calls down, as we twirl the condensers! But, and this is a big but, according to the powers-that-be, on the long-wave band, there is only room for some twelve high-power transmitters, if between them an effective separation is maintained such as to prevent interstation interference. It strikes me therefore that the European broadcasting authorities will shortly be faced with a problem equal to that with which they are now coping on the 200-to-600-metre band.

## How to Get Them

Of course there is always the possibility that as the different countries instal high-power stations, so it will enable them to reduce their number of 1½, 2, or 4 kilowatts, but so far as can be seen from the plans put forward by some of our neighbours, it would not appear to be the policy they intend to adopt. As regards reception to-day on the broadcasting band, there is no doubt that the efforts made by the Geneva authorities have in some instances proved successful, but on the other hand, the arrival of new stations or the deliberate jumping of claims by others has spoilt much of the good work achieved. If a regular nightly tour is made, it will be found that in the case of certain French and Spanish stations, some three wavelengths have to be taken into consideration. To put it in a nut-shell, if you want to pick them up you must adopt the following procedure: (1) Tune in to the wavelength allotted to the particular transmitter by Geneva; (2) should this not prove successful, try again on that advertised by the station in its programmes; (3) and if there again you do not meet with success, make a further search for the wavelength on which the broadcaster has *arbitrarily decided* to operate. As a mathematical problem, it is an amusing one: given two known factors, what is the value of X?

## Five-metre Work

Have you a receiver that will go down to five metres? If you haven't you had better set about making one straight away or you will be out of the fun on June 11, 12, 18, and 19, when all the amateur 5-metre stations in the world will be heard at work trying to make contacts with one another. The fun will start at 10 p.m. on Sunday, June 11, when the New Zealand stations will be calling for ten minutes. At 10.10 p.m. Australia will start up, also for ten minutes. At 10.20 stations in Asia will have their turn and Africa will come on at 10.30. At 10.40 Central and Eastern Europe will chip in and France, the British Isles and Eastern Europe will have their turn at 10.50. The American stations will start at 11 and will continue working by zones for half an hour. That will be the end of the first spell.

The next test will be exactly twelve hours later, that is, it will start at 10 a.m. G.M.T.—all the times I have given are G.M.T. This test will follow exactly the same course as the first. The whole thing will be repeated a week later. No one knows, as yet, how far 5-metre signals can be heard. This is the great test. We do know that signals from Italy on this very

high frequency band have been heard in the United States and that stations on the Atlantic coast of the States have worked with others on the Pacific coast. This has squashed the theory that 5-metre signals can only be heard a matter of six to ten miles. The actual wavelength given to these tests is from 5 to 5.1 metres but owing to the difficulty of exactly determining the wavelength there is likely to be some overlap which will prevent much interference even if a number of stations are to be heard. The American Radio Relay League is giving prizes for the best reception over great distances and for the best two-way working.

## Another American Short-wave Station

Yet another American short-wave broadcasting station has come into operation within the last few weeks. This is 2XAD on about 24 metres. It is owned by the General Electric Co. and apparently is transmitting the programmes of WGY, though not at the same times as 2XAF. So far reception has not been quite so good as from 2XAF but that may be due, in some measure, to the difficulty in holding the receiver constant on such very high frequencies. On the other hand there is distinct evidence of audio-frequency fading in the transmission. Whilst 2XAF is one hundred per cent. readable on the nights when it is at work I have found 2XAD only about fifty per cent. readable on speech. I have not yet obtained its precise wavelength, though I have heard it given on three separate occasions. With 2XAF on 32.77 metres, PCJJ on 30.4 metres and now this new station on the 20-metre band there is much to listen for on the higher frequencies.

## A Reaction Snag

Many readers who have either converted old sets or made up new ones using capacity reaction have probably found themselves unable to obtain satisfactory reaction effects. The trouble in such cases is to be found nearly always in the high-frequency choke used in the plate circuit of the rectifying valve. Whenever a set is made from a published description care should always be taken to use the particular choke specified by the designer. I have come across not a few cases where the use of a choke of different pattern has completely spoilt the working of the set. It is a great pity that most makers do not publish the inductance value of their chokes. If they did matters would be very much easier, for we should then know where we were.

Much the same criticism applies to low-frequency chokes. To follow a medium-impedance valve of the type generally used

::                    ::                    **On Your Wavelength! (continued)**                    ::                    ::

as rectifier, a low-frequency choke with a high inductance value is needed in choke-capacity coupled circuits, if there is to be no suppression of the lower notes. One of much smaller value will suffice for coupling valves of the power type. But how many makers give any indication of the inductance of their L.F. chokes? You may want a 200-henry or a 20-henry choke for use in some position on the low-frequency sides, but when you sally forth to buy it what you are offered in nine cases out of ten is a component about which no figures are available.

#### Loud-speaker Fashions

Though many people swear by loud-speakers of the horn type there is no doubt that the paper-cone instruments are becoming increasingly popular. I have an idea that they owe their rise in favour very largely to the prominence given of late to the importance of reproducing the bass notes in music. In fact I have several friends who, when you go round to their houses, keep on calling attention to the way in which their loud-speakers bring out the bass strings or the biggest organ pipes. I fancy that some people are apt to pay too much attention to the bass with the result that they do not get the reproduction of the higher notes as brilliant as it should be. The lower notes are admittedly very fine, but if they are made unduly prominent at the expense of the higher, both speech and music are apt to sound somewhat "cardboardy." My own scheme has been for some time past to use one loud-speaker of each kind, the two working together in parallel. This seems to me to give by far the best results and to bring out all musical values as they should be brought out.

#### Neglected?

So much attention has been focused on high-frequency amplification for the last couple of years that we are rather apt to neglect the note-mags as a most important factor in long-distance work. With modern valves and transformers, such an enormous degree of amplification per stage can be obtained with perfect stability on the low-frequency side that weak and distant signals can be brought up to respectable strength with ease. There is a good deal to be said for strengthening them in this way rather than by the use of extra H.F. amplification or by increasing the amount of reaction. Either of these methods is liable to bring up mush and other unwanted accompaniments besides strengthening the desired signal. Quality is always at its best when the set is not in too sensitive a condition; better reproduction is therefore often obtainable when the strengthening is done by L.F. rather than by H.F. methods.

#### Tracking The Oscillator?

I have recently discovered an entirely

new although I fear, impracticable method of tracking the oscillator. The other evening when testing a multi-valve receiver, I tuned in to Manchester just around the sunset period, about the worst period for stations 200 to 300 miles away. A good receiver will pick up the direct wave from these stations and will enable them to be received upon the loud-speaker in daylight. At night-time the indirect wave is deflected from the Heaviside layer to reinforce the direct wave, and the reception of such stations becomes a fairly simple matter, granted that one has the necessary selectivity to eliminate the local station.

Just at the sunset period, the upper atmosphere is in a violent state of ionisation, and this produces freak effects with the result that the signal strength is very materially reduced. The effect is known as sunset fade and I was endeavouring to observe the effect of sunset on the particular receiver. I therefore left it tuned in, in a somewhat critical condition towards the edge of reaction, and sat down to listen to the results. Within a very short time, I was surprised to hear the most surprising

#### CHANGE OF ADDRESS

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series of squeals and howls radiating from the loud-speaker. Every time I went near the instrument however, the squealing stopped and I thought I had encountered some variety of hand effect. This was not actually the case; however, and I finally pulled back the reaction quite a considerable distance, when I found the real trouble to be due to a neighbour who was oscillating quite merrily on Manchester's wavelength. The effect of his oscillation was sufficient to push my receiver over the edge of oscillation, with the result that it was "squegging" in fine style.

I give this idea to the Post Office for what it is worth. There are certain difficulties in its application but no doubt it is a very valuable discovery!

#### Summertime Transmissions

Undoubtedly the department at Savoy Hill which is doing overtime at the present is the Outside Broadcast Department under the able leadership of Mr. Gerald Cock. There is hardly a part of southern England that the microphone has not visited of late. Its new resting place is on top of the Club House at Epsom from whence it will tell the story of the great classic—the Derby.

A similar procedure to that which was so successful at Liverpool will be followed. The story will be given from one microphone but others will transmit "colour" from the downs whilst those in the paddock

will "feature" the jockey, trainer and owner. It all sounds so simple but what of the O.B. Department? They bear their sorrows lightly.

We are undoubtedly going to have another Tattoo from Aldershot while some well-known microphone voices will be relayed from the seaside where they have gone for the summer season.

#### "Noises Off"

Mr. Alfred Whitman, the official noise merchant of the B.B.C., is shortly leaving broadcasting for the films. It would be more correct to say that he is returning to the films from where he came.

A remarkable young man—he was not content with developing and dressing "effects" for radio drama for he succeeded in writing and adapting some of the most successful broadcasts that there have ever been. Mr. Whitman was responsible for the Radio Tattoo and several adaptations from famous novels. I shall be surprised if he does not become a successful director of stirring epics, for he has the large minded view of dramatic pictures.

He leaves behind a host of friends and also a new chamber of horrors wherein arc taps, tubes, electric engines and a host of other gadgets to be used in the illustration of dramatic stories. One is reminded of the sorcerer apprentice and it is hoped that his hundreds of instruments will behave as well for his adept pupil in whose charge he is leaving them.

#### The Autumn Conference

An international conference of wireless authorities is to be held this autumn at Washington, when many important points will be brought up for discussion. Not the least of these is the problem of spark interference with broadcasting. This has become a particularly urgent question in Europe, though it is possibly not quite so pressing in the States, since comparatively little use is now made of spark transmitters for coastal and shipping work over there.

I do not myself think that the position in Europe will ever be quite satisfactory until a band of wavelengths is allotted exclusively to broadcasting. At the present moment we have three areas in the normal broadcast band in which spark transmissions may legitimately take place—and about three hundred in which they *do* take place in defiance of regulations and agreements. If, for example, you have tried lately for Frankfurt you have most likely encountered a spark signal of tremendous power which even in inland localities has ruined every transmission between about 415 and 435 metres. At any rate, you must be familiar with the spark chorus which greets you directly you descend below about 340 metres. Let us hope that the Washington conference will be able to do something in the matter

THRMMION.

# JUST PLUG IN AND LISTEN!

*Further Aspects of the New "A.W." "Simpler Wireless" System.*

By J. F. JOHNSTON.

IN articles published in AMATEUR WIRELESS Nos. 253, 256, and 257, particulars were given of a new method of connecting up valves wherein the grid of one valve was directly connected to the plate of the valve in front. This new method, besides possessing the advantages due to the omission of any coupling device between each pair of valves, makes it very easy to obtain all the current requirements of the set from the lighting mains.

## Advantages

The results of tests with the new system (some of which have already been published, undoubtedly indicate that the method is destined to be of considerable importance in the future. It may be as well, at this stage, to review the situation and try to obtain a clear idea of the precise advantages possessed by the new method as compared with methods already in use.

There is a great temptation for those associated with the development of any new idea to over-estimate its importance and to claim for it advantages which do not, in reality, exist. Consequently we are constantly being assailed with "revolutionary" discoveries and "epoch-making" inventions of which, after a week or two, nothing more is ever heard.

We will therefore not make any extravagant or fanciful claims for the new system. It will be sufficient if we can decide, after a critical examination of its merits, that it is a distinct advance on anything that has been done previously.

## Direct Coupling

The direct connection of the grid of one valve to the anode of another valve which has a tuned-circuit, choke, or resistance in its plate circuit, is made possible by the fact that the filament of the first valve is made suitably positive with respect to the filament of the other valve.

For instance, let us suppose that we have a valve with a resistance in its plate circuit and that between the filament of this valve and the end of the resistance we apply a difference of potential of sixty volts. Let us also assume that the value of the anode resistance is twice that of the internal resistance of the valve. Then, if the difference of potential has been applied the right way round, the plate of the valve will be twenty volts positive with respect to the filament.

If the grid of another valve is directly connected to the plate of the first, and the filament of the second valve is made twenty volts positive with respect to the filament of the first valve, the grid of the second valve will be at the same potential as the filament of this valve. (In ordinary sets, of course, the filaments of all the valves are at the same potential which makes it necessary to employ a coupling condenser between valves coupled by the tuned-anode,

and these variations will thus cancel out.

We must therefore allow the system, at least when the H.T., L.T. and G.B. are derived from the lighting mains, the virtue of simplicity. Besides making coupling condensers and grid leaks unnecessary it also does away with the need for batteries, battery eliminators, and smoothing circuits.

## Better Results

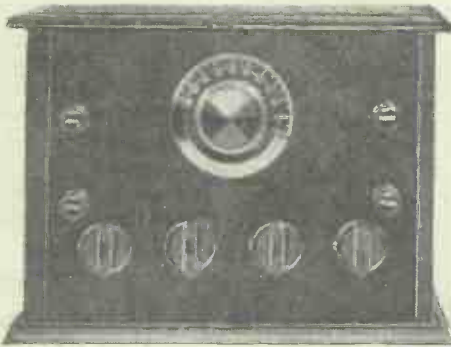
As regards actual results a set employing a detector and two L.F. stages has been critically tested and has been found to give reproduction definitely superior to that which could be obtained from a similar set employing resistance-capacity couplings. The fact that for theoretical reasons better results could be expected from the new system would not have been of much practical importance if the improvement had been so slight as to have been unnoticeable. However, even though very good results indeed can be obtained from an R.C. set, even an inexperienced ear can detect a noticeable improvement when the new system is used.

So that, viewing the new arrangement in the most critical light, we can confidently assert that it is a definite improvement on anything previously accomplished in that:

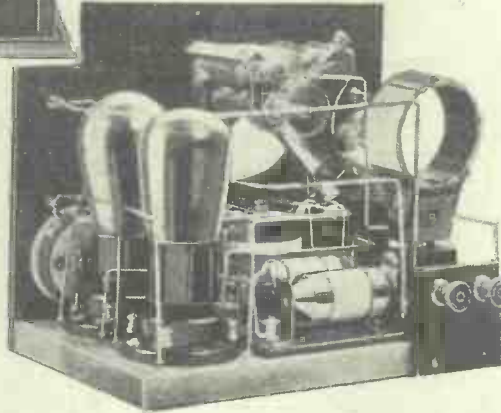
- (1) It simplifies wireless, especially as regards the derivation of H.T., L.T. and G.B. from the lighting mains, and
- (2) Gives better results than could otherwise be obtained, both as regards purity and volume.

The chief engineer of the Leeds-Bradford relay station, Mr. Lionel Harvey, has been elected president of the Leeds Radio Society, and Mr. G. P. Fox, the station director, a member of the committee.

The short-wave wireless beam stations, which have been built for the British Post Office, have begun to work now, and the Indian station is trying to compete with the Australian system for quickness and accuracy of dispatch. Although it is the same people who are working the wireless stations both here and in Australia, yet the Indian station feels that it should do better than can be achieved by Australia. They propose to broadcast the British programmes of the B.B.C. for their Indian subscribers and send out Indian programmes to England for similar broadcasting.



How simple and compact a three-valve receiver Constructed upon the new system can be is apparent from these photographs.



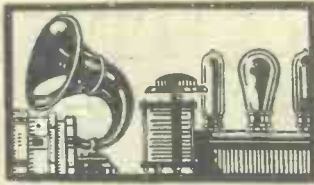
choke, or resistance methods).

If batteries were used with the new system a separate source of L.T. supply would be required for each valve, while a larger H.T. battery than usual would have to be used.

## Astonishing Advantages

When D.C. mains with a voltage of 200 to 250 are available, however, matters are greatly simplified and some astonishing advantages are apparent. The L.T. supply is obtained by connecting the filaments of the valves and a number of resistances in series with each other and directly across the mains. The resistances and filaments are connected up alternately so that the potential of each filament is considerably positive with respect to the filament of the valve in front and negative with respect to that of the following valve.

The whole arrangement forms a potential-divider and the free ends of the anode resistances have merely to be connected to suitable points on the resistances in series with the filaments. Moreover, if the resistance values are properly distributed, no hum will be heard in the telephones or loud-speaker, as any variations in the mains voltage will vary the potentials of all the electrodes of all the valves



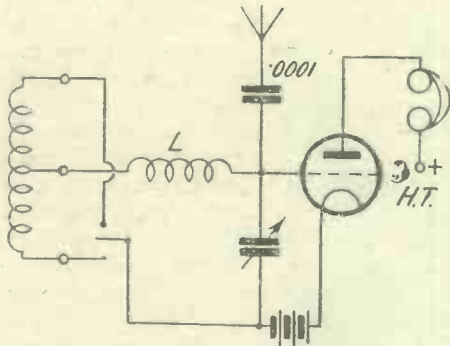
# PRACTICAL ODDS & ENDS



## Centre-tapped Coils

INSTRUCTIONS have often been given in AMATEUR WIRELESS, and elsewhere, for making centre-tapped coils. It is important, if the full efficiency is to be obtained, that the electrical centre, and not merely the middle turn, should be found. With basket coils especially the middle turn will be far from correct.

The diagram shows how the electrical centre can be found conveniently. A temporary tap is made by sticking a pin through the insulation, and the switch is thrown over suddenly. If the signal



Circuit for Finding Centre Tap

strengths do not coincide, a slight turn of the condenser dial will show which way the tap should be moved.

Coil L is about 35 turns when the centre-tapped coil is for the usual wavelengths. To sharpen the tuning, anode rectification and a series aerial condenser are used.

If a milliammeter is available it should be connected in place of the phones, and its deflection will give a still more accurate indication.—P. R. L.

## A Novel Frame Aerial

A NEAT and efficient frame aerial can be made from two old cycle wheels which may be obtained cheaply from almost any marine stores.

Each fourth spoke should be released at the hub and bent upright and should have a small egg insulator attached to the loose end. This done the wheels should be secured to a suitable pole as shown in sketch.

Now take a length of 7/22 copper wire, secure one end to an insulator suspended from the higher wheel to the next suspended from the lower until all the insulators have been connected. The spoke holding the

last insulator should be bent as in sketch to keep the lead clear of the wheel.

This type of aerial is extremely suitable for flat-dwellers, and is not nearly so



A Novel Frame Aerial

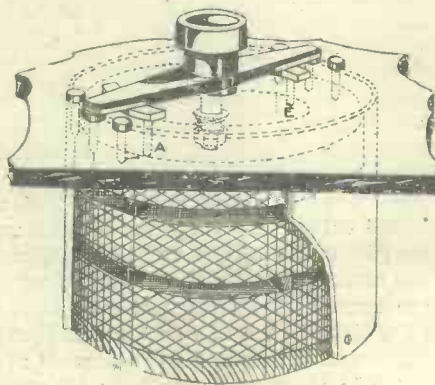
unsightly as the long single wire which stretches the length of the garden and is easily blown down.—N. W. C.

## Avoiding Dead-end Losses

THE accompanying sketch shows a method of making a switch suitable for any number of coils.

Each coil has its two contact studs, and there is no dead-end loss. The coils are placed inside a tube and are separated by means of ebonite strips.

On the underside of the ebonite arm are



A "No-loss" Tapped Coil

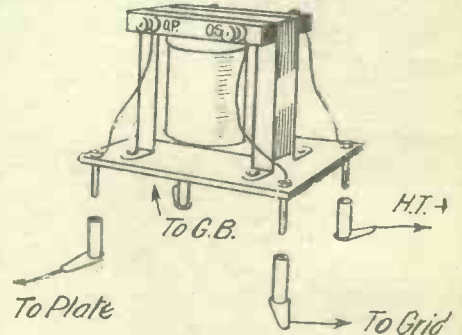
fixed two brass plates, which come in contact with the coils, two studs, and also two brass plates fixed on the panel which are connected to the aerial and earth.—C. E.

**"A.W." Solves All Wireless Troubles**

## Plug-in L.F. Transformer

FROM the accompanying sketch will be seen an arrangement for enabling L.F. transformers to be easily exchanged and their merits compared. The transformer is mounted on a piece of ebonite and the terminals connected to valve legs at each corner.

These legs fit into sockets mounted on the baseboard, the sockets being connected up to the set in the usual way. Transformers may be left permanently in the set or may be exchanged as frequently as may be desired for experimental purposes.



A Plug-in L.F. Transformer

Also, by having a spare platform the second transformer may be mounted ready and the first one pulled out and the second plugged in in a few seconds, the respective qualities of the transformers may then be easily ascertained.—J. A. E.

## Binding Multi-layer Coils

THE neat binding and finishing off of lattice and honeycomb coils seem to give a little trouble to amateurs who make their own.

Empire tape is often advocated for the binding. The drawback of Empire tape is its stiffness. It has been found that 1/2 inch superfine Egyptian tape, as used for lapping former-wound coils for dynamo armatures, is much more suitable.

It is thin and soft, and follows the contour of the coil without bulging out. After the tape has been put on, it should have a coat of shellac varnish.

For the band attaching the coil to the plug, press-pahn, which is used for lining the slots of armatures, is very suitable, being exceedingly tough and strong. 20-mil. press-pahn does admirably.—A. O. G.



# WITHOUT FEAR OR FAVOUR



## A Weekly Programme Criticism by Sydney A. Moseley

GATHER that the "My Programme" stunt is coming to a conclusion. As my readers know, I have never been enamoured of the idea, because the underlying principle was wrong. One doesn't want a programme that Mr. Smith or Mrs. Jones wants for himself or herself; far better would it have been for celebrities to have suggested an ideal programme that would have suited the majority of listeners.

I should have been prepared to have contributed to such a scheme myself. It would have been one thing for me to have set out a programme that I myself would have enjoyed. Yet to do this would have been too selfish. I should rather have composed a programme of which seven out of every ten listeners would have approved. That is my idea, and I make the B.B.C. a present of it.

P. F. Warner was clear and cultured in his description of the Surrey match at the Oval. He didn't even drop an aitch on the boundary line. But "Plum" was a bit mournful. Why? Surely it is fair and—Warner!

The gentleman whom I see is heralded as the radio vicar in place of Dick Sheppard will have to be a bit more logical if he is to succeed in the place of the most sensible vicar in London! This is what Mr. Pat McCormick says:

"If your wife slapped your face it shows you have done something to aggravate her. Therefore, you should say you are sorry," and more or less offer the other cheek. Which will bring smiles to the face of Mr. Henpeck (whose name is legion) who gets one in the jaw without rhyme or reason. Show some women the other cheek—and, by Heaven, they'll flop that one, too!

No, sir—the "Indian Love Lyrics" in French is as inspiring as the singing of "God Save the King" in Dutch. Bracony may be not without honour in his own country, but he has got a long way to go in order to make the ether oscillate with approving licence-holders. (Which is all wrong, I know. The ether doesn't oscillate. Thank heaven, I'm not on the technical side of the paper.)

Teddy Baldock gave points to a good many other speakers in speaking simply and from the heart. (Yes, Mr. Printer, put in the double aspirant.) He even said

"Good-night." And why not? Why shouldn't every speaker be privileged to say good-night to his listeners? It would be amusing to compare the tastes in such salutations. For instance, I always wait for Sir Walford Davies' "Good evening, listeners all," feeling sure that if he were near enough he would kiss us good-night as well. I call this pandering to announcers permitting them an intimacy with listeners from which we other occasional "wirelessers" (patent applied for) are debarred.

The augmented wireless military band sounds more musical than any Army band. And I believe I have heard all of them. It is less blatant and blaring, and now and then sounded as soft and as soothing as strings. In saying this, one can't pay a higher compliment.

Ethel Irving, in a short sketch, entitled *The Priest's Room*, by Herbert Swears, came over well enough to make me want to know the end of the story. It was realistic, if gruesome, but spoilt once more by the too persistent wind-realism. And again a very fine wireless play was spoilt by the *dénouement* being completely lost, either by the subtlety of the author or through the actress so lowering her voice as to make her inaudible.

I gave a welcome to Michael Cole when

he first appeared at the microphone. I hope success won't spoil him, as it has so many other artistes who having 'got there' through the medium of the wireless think that they ought to have the moon. But if Mike behaves at the "mike" he should be a permanent radio star.

They did well to broadcast the Royal Society of St. George speeches from Daventry only. That gave some of us an opportunity to switch over to London.

Victor Hely-Hutchinson gave variations on the piano on the theme of "Mary had a Little Lamb." "Parody in music is not very common," said the official announcement. Perhaps it is well. I can't see that the composer, a Mr. Ballantine, an American, has succeeded in doing anything more than imitating in the most obvious manner each of the ten original composer's idiosyncracies.

Arthur Wood, of the Daly's Theatre, conducted his own music; and very bright stuff it was, too.

The other night we had the Spanish talk at 8.40. You see, they were waiting for you all to come home from the City. It would never have done for any of you to have missed it!



### BROADCAST LESSONS

Lessons by wireless have now been instituted at several schools. The picture shows the pupils at Acland Central School receiving a lesson.

BY common consent, the "straight" three-valver is the most popular type of receiver with the average amateur. This has been proved in numerous AMATEUR WIRELESS competitions, and in all ordinary circumstances it is true that the simple H.F., det. and L.F., or det. and 2 L.F. receiver fulfils all ordinary requirements.

**Long Distance and Summer**

Yet with the advent of summer the "long-distance" listener, particularly if his set is of the det. 2 L.F. type and embodies no high-frequency stages, is likely to consider the addition of another valve to his existing three-stage receiver. Or, if one H.F. stage is already *in situ*, the fourth valve will be added as a stage of low-frequency amplification in order to bring signals up to their normal winter-time strength. In any case the final result is a four-valve receiver embodying 1 H.F., det. and 2 L.F.

There is a possibility that the single H.F. stage existing in many present three-valve sets may be of simple tuned-anode or H.F. transformer-coupled type, but with the addition of an extra valve more definite control over oscillation is necessary; such control as can be obtained for the sake of example, by neutralising the inter-electrode capacity of the valves.

Here, then, is the demand for a straightforward four-valve neutralised set such as is described and illustrated herewith. As the purpose of the set is chiefly DX reception under summer conditions, the title will be deemed apt.

The theoretical circuit Fig. 1 (p. 754) and the photograph showing the back-of-panel view of the set should first be studied. As in all neutralised receivers, the H.F. transformer is the main feature and should be made exactly according to the dimensions and description here given. In fact, the construction of the H.F. transformer and the aerial solenoid will be described first,

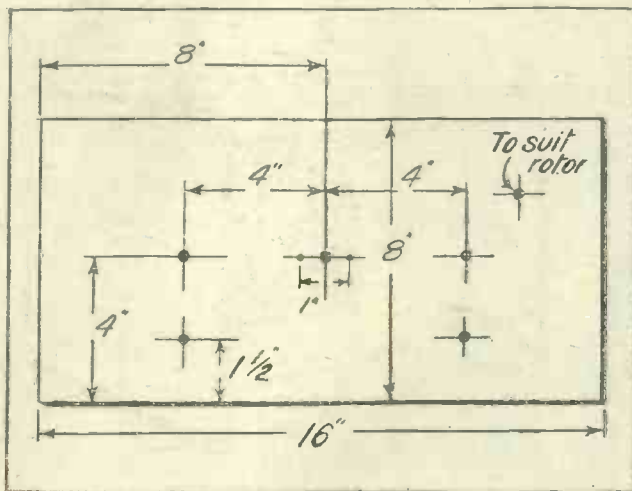


Fig. 2.—Diagram of Panel Layout

# THE "DX" FOUR for SUMMER

By KENNETH ULLY

*Here is a straightforward neutralised four-valver primarily designed for long-distance reception in the summer-time.*

so that if opportunity presents itself these two essential components may be given a preliminary test on a rough hook-up before the receiver proper is made.

**The Transformer and Tuner**

The aerial tuner is wound on an ebonite tube 3 in. in diameter and 2 3/4 in. in length, the usual thickness of such tubing being about 3/8 in. The solenoid consists of 66 turns of No. 24 s.c.c. wire, a loop tapping being made at the twelfth turn from the top to which the aerial terminal is connected. The ends of the wire are secured by twisting in and out of two small holes drilled at the ends of the former, a 7-in. length of flex being soldered to the aerial tapping.

The H.F. coil is slightly more complicated since the primary has to be wound on a separate former mounted inside the secondary. The secondary of the H.F. coil is exactly the same as the aerial coil, namely, 66 turns of No. 24 s.c.c. wire tapped at the twelfth turn. The primary is wound on a 2 3/4-in. length of tubing which is a fit inside the primary coil, allowing for the addition of the thickness of the wire to be wound on. The primary winding consists of 15 turns of the same gauge wire, no tapping being taken.

There is yet the reaction coil to be considered. This is wound on a barrel-shaped rotor, 2 1/8 in. outside diameter maximum and 1 3/4 in. outside diameter at the two smaller open ends. The barrel is drilled in the middle for the rotor shaft, and the turns of wire are wound on either side of the drill-holes. Fifteen turns of No. 24 d.c.c. wire should be wound on each



Close-up View of

side, the two sections of 15 turns each being connected together in series and magnetic continuation.

Two of the photographs clearly show that the transformer and aerial coil are each mounted on the end-plates of their respective condensers, thus saving a little space on the baseboard. For the mounting five L-shaped brackets will be required, each side and the base of the L being 1/2 in. long. Double Meccano brackets are of the right size to suit most variable

# R USE

YETT



Lamp Safety Fuse

This consists of the fifth  $\perp$  bracket inverted and held away from the lower piece by a brass collar  $\frac{1}{2}$  in. in length. A  $\frac{3}{4}$  in. bolt passed through the two brackets and collar holds the assembly in position. The top  $\perp$  bracket is thus inverted and the holes in the two sides form convenient supports for the shaft holding the reaction rotor. This, by the way, is a length of 2 B.A. screwed rod carrying a small knob at one end and holding the reaction former at the other, secured by two 2 B.A. nuts.

### Drilling the Panel

When the first and most difficult part of the construction has been done successfully (and the coil and transformer given a test on a rough hook-up, if at all possible) the usual panel drilling and wiring up may be proceeded with. A diagram of the panel layout is given by Fig. 2, which may be copied exactly if components are used similar to those shown by the photographs to be in the actual set described. On the panel are mounted aerial-tuning and H.F. variable condensers, the filament rheostat (common), the reaction control and the two loud-speaker combined plugs and filament switches. On the baseboard (in size 16 in. by 8 in.) are mounted four valve holders, two L.F. transformers, grid condenser and leak, neutralising condenser and terminal strip.

It should be said here that the terminal strip is 10 in. in length,  $1\frac{1}{4}$  in. wide and bears terminals in the following order, as viewed from the rear, left to right: G.B. + G.B. -, H.T. + (1), H.T. + (2), H.T. + (3), H.T. -, filament fuse (a small 2-volt lamp in a socket on

the strip, connected between L.T. - and H.T. -) L.T. -, L.T. + earth and aerial.

It would perhaps be advisable in a receiver of this type to wire up the panel and baseboard separately, making connections between the two when the set is assembled. A practical layout of the connections is given in Fig. 3, which diagram should be used in conjunction with the theoretical circuit shown by Fig. 1.

For simplicity in operation the two L.F. valves are given common H.T. and grid bias, separate H.T. tapplings being made to the detector and H.F. valves only. This is quite satisfactory for all practical purposes, but if it is desired to obtain the very best in the way of purity of results separate tapplings may be made to the plates and grids of both L.F. valves. If this is done, the first L.F. valve should be given an anode potential of about 15 to 20 volts less than that on the anode of the power valve, with a grid bias of about  $1\frac{1}{2}$  volts instead of the full bias.

No difficulty will be experienced in wiring up the combined loud-speaker jacks and filament cut-off switches if the two connection layouts are closely followed. The jacks give a choice of three valves, with one L.F. stage, or the full four valves.

### Components Needed

The following components were used in the set described:

Ebonite panel 16 in. by 8 in. (Peto Scott, Becol).

Baseboard to suit, 16 in. by 8 in.

Cabinet according to the dimensions given in Fig. 4 or materials to make same.

Ebonite for terminal strip, 10 in. by  $1\frac{3}{4}$  in. (Peto-Scott).

$5\frac{1}{2}$  in. length of 3 in. diameter ebonite former. (Peto-Scott).

$2\frac{3}{4}$  in. length of former to fit inside the H.F. coil (Peto Scott).

Quantity of No. 24 S.W.G. s.s.c. wire.

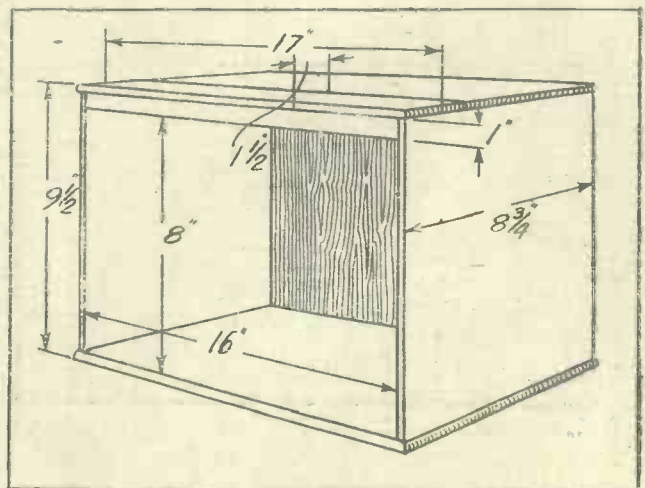
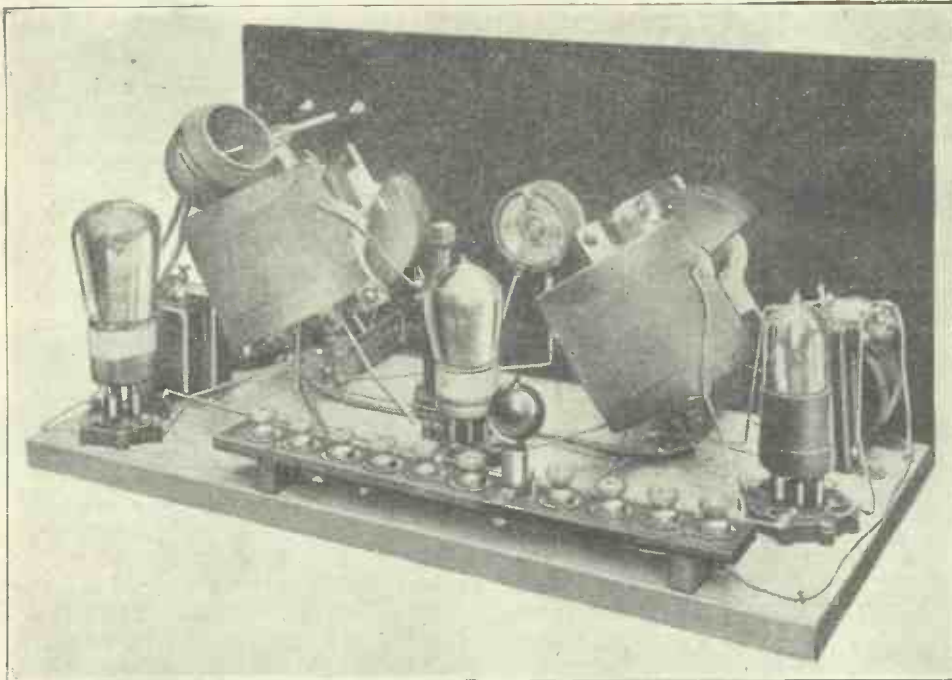


Fig. 4.—Details of Cabinet

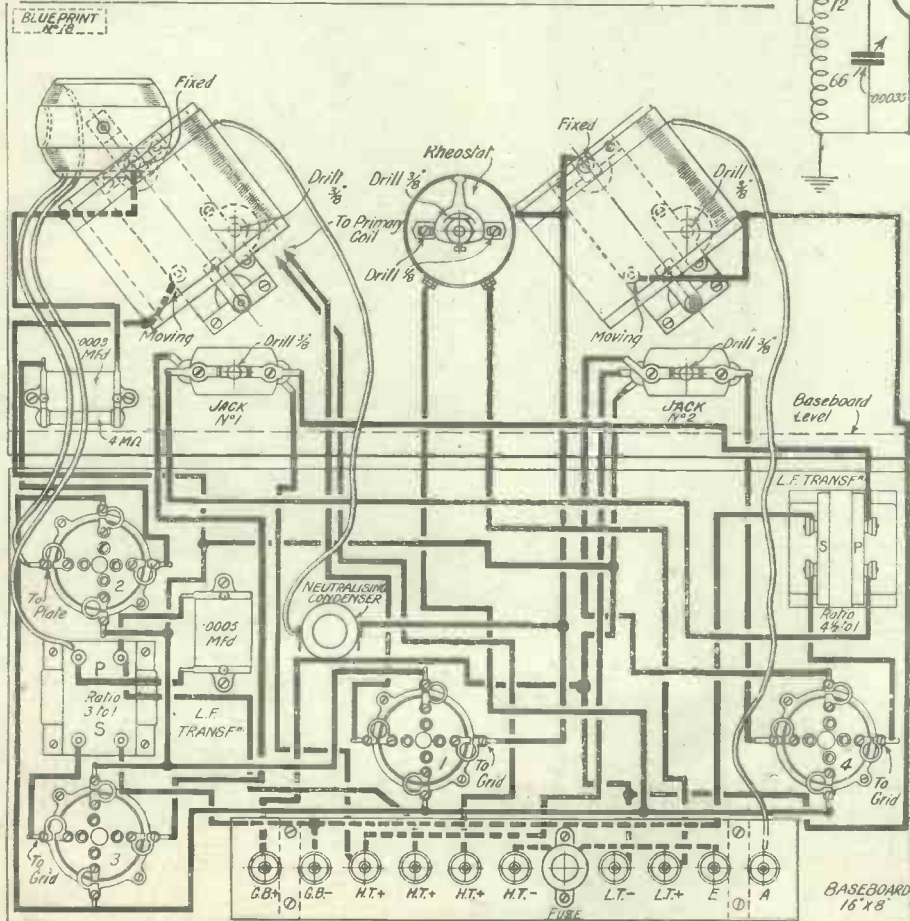
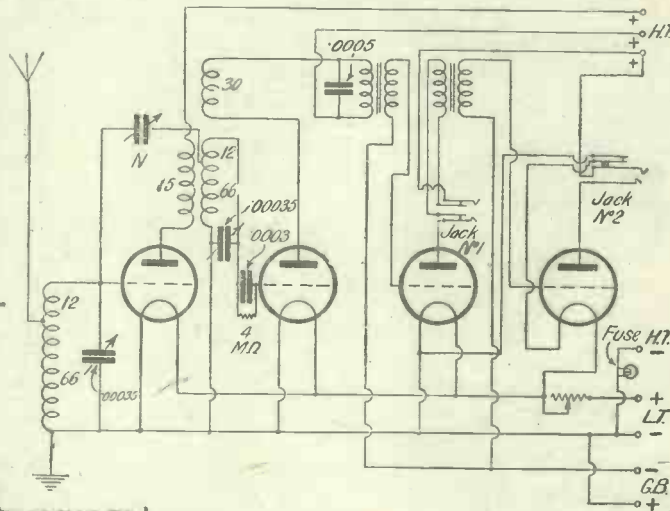
condensers. The aerial coil is mounted in the straightforward manner by fixing the former to the mounting pieces and the mounting pieces to the condenser end-plates by small nuts and bolts. The H.F. coil is mounted in a similar manner, but it must be remembered that the primary has to be fixed in position inside the 3-in. diameter former and hence the fixing bolts should be slightly longer. Above the top mounting piece of the H.F. coil is a further bracket for the reaction rotor mounting.



- Two .00035 microfarad condensers (Jackson Centroid, Formo).
- One rheostat to suit valves (Igranic).
- One two-point loud-speaker jack (Gar-net Whitley).
- One combined loud-speaker and filament switching jack.
- Four valve holders (Harlie).
- One L.F. transformer, 4½ to 1 ratio (Burndept).
- One ditto, 3 to 1 ratio (Brandes).
- .0003 fixed grid condenser (Edison Bell).
- .0005 microfarad fixed condenser (Edison Bell).
- Screws, glue, flex, etc.
- One 4-megohm grid leak (Dubilier).
- One neutralising condenser (Gambrell, Peto Scott).
- Ten terminals and Eastick terminal indicators.
- Materials for mounting H.F. coil and aerial tuner (Peto Scott).
- Materials and former for reaction coil (Peto Scott).
- H.T. lamp safety fuse (Bulgin).
- Wire for connections, etc.

## THE "DX FOUR" for SUMMER USE

Above: Rear View of Panel; Fig. 1. (right) Circuit Diagram; Fig. 3. (below) Developed Wiring Diagram.



The values of three of the components need to be noticed. The variable condensers are actually of .00035 microfarad capacity. The value gives a slightly greater tuning range than the ordinary .0003 microfarad capacity component, while avoiding the heavy damping of the .0005 microfarad maximum capacity. The grid leak has the rather unusual value of 4 megohms, this figure having been found the most effective for long-distance reception. The condenser shunting the primary winding of the first transformer is rather important and should have a value of between .0003 and .0005 microfarad if nice control of reaction is to be obtained.

### Operation

The ebonite knob of the neutralising condenser is slotted to permit "distant" control by means of a screwdriver. Full details of the correct procedure to adopt when making preliminary neutralisation were given in a recent issue of AMATEUR WIRELESS. The home-made coils in con-  
(Concluded at foot of next page.)

# SOME FURTHER NOTES ON THE M.C. THREE "STAR"

By J. H. REYNER, B.Sc. (Hons.)

THERE are one or two further matters concerning the "M.C. Three 'Star'" receiver described in No. 256 of AMATEUR WIRELESS and which have been raised by several readers. A further few notes on the subject are therefore desirable.

In the first place it is necessary to correct a small mistake which occurred in the wiring diagram. On the detector stage the earth end of the coil was connected to L.T. + this being done in order to provide the necessary small positive potential on the grid of the rectifying valve in the usual manner. The condenser portion of the detector circuit however, namely the bottom end of the .004 fixed condenser was connected to L.T.—. It will be clear that with this connection, the tuned circuit is completed through the battery.

## The L.T. Battery

Now although a good accumulator has a good low internal resistance, nevertheless there is an appreciable loss due to this cause and slightly improved results will be obtained by connecting the condenser to I.T. + instead of L.T.—. The wiring diagram shown by Fig. 2 of the previous article was lettered in accordance with the usual AMATEUR WIRELESS methods, and it is simply necessary to connect the terminal marked A on the .004 condenser direct to terminal No. 2 on the adjacent six-pin base. This point is already connected to L.T. + as will be seen.

In practice the extra damping introduced by the connections given originally is quite small, particularly as it occurs in the detector stage where there is already a

fair amount of unavoidable damping due to the method of rectification adopted. The small change just indicated however, will remove this additional source of loss, and will result in a material increase in efficiency.

The H.F. coil given in Fig. 4 of the previous article has caused a little confusion owing to the fact that it is wound from top to bottom instead of the other way up as is more usual. The first 25 turns shown are reaction winding, the next 75 being the tuned winding with a tapping at 50 turns. The final 10 turns, separate from the rest, is the primary winding. It is, of course, immaterial whether the winding is placed on in this manner or wound starting at the bottom so that the primary winding comes at the top of the coil.

## Coil Changes

One reader has raised the point of the difference between these coils and those of the original "M.C. Three." On the aerial circuit there is certainly an appreciable difference owing to the substitution of the tapped aerial coil for the constant-coupled arrangement. The number of turns on the tuned portion however, is the same as in the original "M.C. Three," namely 65 turns, and it is only necessary to omit the aerial winding on the original coil and to take tappings at 10 and 15 turns from the earth end to convert an "M.C. Three" coil to one suitable for the new circuit.

The H.F. coil is similar generally, except that the tuned winding has 75 turns and the reaction winding 25 turns, whereas the original "M.C. Three" had 65 turns for the tuned winding and 30 for the reaction coil.

This difference arises from the fact that the coils were designed for the "M.C. Four" and to obtain uniformity the same coils were used for the "M.C. Three 'Star.'" The difference, however, is very small and any reader who wishes to convert his original coils to the six-pin bases in the manner shown need not alter the windings on the H.F. coil beyond taking a tapping at 50 turns for the detector tapping.

Another point raised was the size of the former which was not specified, but which of course, is the standard 2 in. diameter. The wire for the long-wave coils should be No. 40-gauge enamelled copper wire.

Another reader raises the question concerning the potentiometer on the detector circuit which is utilised in the "M.C. Four." If, he says, this is an improvement on the "M.C. Four" would it not also be desirable on the "M.C. Three 'Star.'" There is certainly an advantage in obtaining smooth reaction by taking the grid leak on the L.T. terminals, and if any reader wishes to add this refinement it can easily be done. I did not want to alter the original layout of the "M.C. Three" more than was necessary so that this modification was not included in the "M.C. Three 'Star.'" "

As far as a test report on the receiver is concerned the stations will be received in approximately the same manner as in the original "M.C. Three." The dial readings on the H.F. condenser will be a few degrees lower owing to the slightly larger number of turns on the coil, but readers will rapidly find for themselves the positions in which local and distant stations can be received.

## "THE 'DX FOUR' FOR SUMMER USE"

(Concluded from preceding page)

junction with the .00035 microfarad maximum condensers have a tuning range of (approximately) from 205 to 479 metres, and within certain limits there will always be a relation between the dial readings of the aerial and H.F. condensers. Under ordinary circumstances the readings will be approximately the same, and this feature will be found an obvious advantage when tuning in DX stations.

With the actual set described, twenty standard broadcasting stations have been tuned in at fair loud-speaker strength during the early evening. Daylight existed over the whole path of the transmissions during the tests, and it was proved that it should not be outside the capabilities of the average amateur to tune in 2LO, 2BE, Y5IT, 5WA, 5NO, 2Z, Langenberg, Frankfurt, Hamburg, Muenster, Stuttgart and Rome.

## CHIEF EVENTS OF THE WEEK

### LONDON

- May 22. Instrumental and Vocal Programme relayed from Rudolf Steiner Hall.
- " 23. Programme relayed from Brighton.
- " 24. Empire Day Programme.
- " 25. Veterans of Variety.
- " 26. *The Magic Flute* (Mozart).
- " 27. *R.U.R.* (Karel Kapek).
- " 28. Oxford Summer Eights running commentary.

### BIRMINGHAM

- May 22. Light Orchestral Concert.
- " 23. *The Perfect Marriage*, a comedy by Leonard White.
- " 25. Requested Favourites.

### BOURNEMOUTH

- May 23. A Mixed Grill.
- " 28. Vocal and Instrumental Programme.

### CARDIFF

- May 23. Opening Night of the Parks Concert Season, relayed from Llandaff Fields Pavilion. Speech by Lord Mayor of Cardiff.
- " 24. Our Tudor Heritage (an English-Weish Programme for Empire Day).

### MANCHESTER

- May 24. Empire Day Concert. *Gentlemen, the King!* a play by Campbell Todd.
- " 25. *A Change of Spirit*, a new radio comedy by E. A. Bryan.
- " 28. The Prize Winners' Concert of the Buxton and North Derbyshire Musical Festival, relayed from the Pavilion, Buxton Gardens.

### NEWCASTLE

- May 22. Popular Wagner Programme.
- " 25. Northumberland and Cumberland Concert.

### GLASGOW

- May 22. Sacred Scottish Programme.
- " 27. Wagner and Tchaikovsky Programme.
- " 28. The Royal Quixotes Concert Party, relayed from Kelvingrove Park.

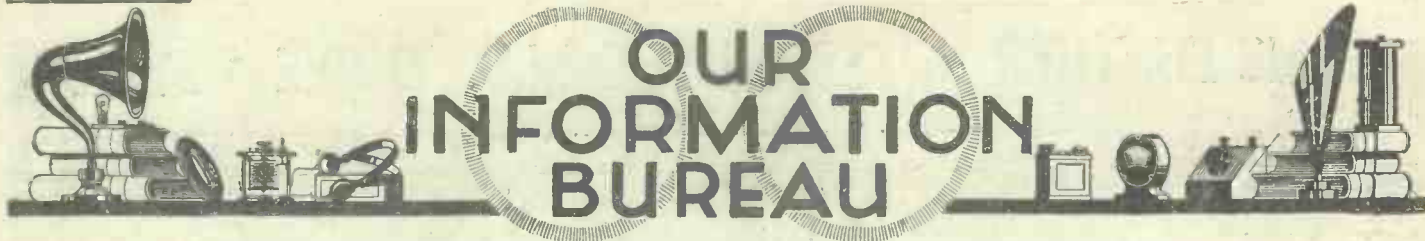
### ABERDEEN

- May 28. Solo, Vocal, and Instrumental Concert.

### BELFAST

- May 23. Speeches at the Opening of the Empire Exhibition, relayed from Ulster Hall, Belfast.
- " 24. Running Commentary on the Imperial Parade as it passes the City Hall.
- " 27. Running Commentary on the Parade of British Industry and Commerce as it passes the City Hall, Belfast.
- " 28. A Popular Programme with Colonial artistes.

In the report submitted to the Federal Radio Commission of America, Dr. Alfred N. Goldsmith, Chief Engineer to the Radio Corporation, states that the 733 broadcasting stations at present in operation in the U.S.A. should be reduced to 364. According to his scheme, there would be room for 64 national super-power transmitters and 300 smaller local stations.



**RULES.**—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. See special announcement below.

#### Aerial Mast and Lightning.

**Q.**—Would it be of advantage, as a protection from lightning, to fit a lightning-conductor to my wooden aerial mast, which is nearly 60 ft. high?—E. A. S. (Durham).

**A.**—It is quite unnecessary to do this if the aerial is connected directly to earth by a proper switch, whenever there is any lightning about. The aerial would then act as a very efficient lightning-conductor in protecting the mast. A separate lightning-conductor would, of course, be an extra safeguard should you forget to put over the earthing-switch or should a storm come on very suddenly.—B.

#### Gas-pipe Earth.

**Q.**—Why is it so often stated that it is bad practice to earth a wireless set to a gas pipe?—C. M. (Accrington).

**A.**—In the pipe system of the gas supply there are usually a number of screwed joints. In order to make the pipes gas-tight, these joints are usually packed with white lead or some other substance, which is rubbed into the threads before the joints are assembled. This packing material has very poor conducting properties, and as there may be a large number of such joints in series, a gas-pipe earth will have a very high resistance. Quite apart from all this, of course, is the danger of an explosion being caused should the aerial be struck by lightning.—B.

#### Crystal-set Wiring.

**Q.**—How should a crystal set containing a variometer, crystal detector, and four terminals be wired up?—C. P. (Northampton).

**A.**—First decide which shall be the aerial terminal, which the earth terminal, and which the two phone terminals. Now make the following connections: Aerial to one side of the variometer and one side of the crystal detector, the other side of the crystal detector to one of the phone terminals, and the other phone terminal to the other side of the variometer and to earth, and the wiring is complete.—J.

#### Grid-bias Values.

**Q.**—If separate grid-bias terminals are provided for each of the last two valves of a set, to which of these values should the more grid bias be applied?—W. R. T. (Bedford).

**A.**—This depends upon the characteristics of the valves and upon the H.T. voltage applied to each. If the two valves are identical and if the same H.T. voltage is used on each of the plates, it will be possible to apply a little more grid bias to the first valve than to the last, as the grid-swing of the first valve will be less. If, however, as is usually the case, the last valve is of the power type while the first is an ordinary valve, considerably more grid bias should be used on the last valve, especially if the H.T. voltage on this valve is high.—B.

#### Accumulator Discharge.

**Q.**—What is the maximum rate at which an accumulator may safely be discharged?—T. P. (Dover).

**A.**—If the makers' instructions are available, they should, of course, be followed implicitly. If not, the normal maximum safe discharge rate may be taken to be one-eighth the actual ampere-hour capacity of the battery.—J. F. J.

#### Choke Coupling v. Transformer Coupling.

**Q.**—Why is it possible to obtain purer results with choke-coupled amplifiers than with ordinary transformer-coupled amplifiers?—B. M. (Blackpool).

**A.**—Low-frequency transformers usually have a step-up ratio of between 1 to 3 and 1 to 6. A choke may be regarded as an auto-coupled transformer having a ratio of 1 to 1. The best results as regards purity of reproduction are obtained with transformers having low step-up ratios, because with such trans-

## When Asking Technical Queries

PLEASE write briefly and to the point

A fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped, addressed envelope and the coupon which will be found on the last page.

Rough sketches and circuit diagrams can be provided, but it will be necessary to charge a special fee (which will be quoted upon request) for detail layouts and designs.

formers the primary has a high impedance. For this reason the choke-coupled amplifier is usually capable of giving purer signals than the transformer-coupled amplifier. Control of grid current is more easily effected with choke than with transformers, but it is not possible to obtain such great amplification with choke coupling as it is with transformer coupling. Choke coupling is generally to be preferred on account of its greater simplicity of construction and consequent cheapness.—J. F. J.

#### Connecting Loud-speaker.

**Q.**—I have a loud-speaker, but neither the terminals nor the leads are marked in any way to show which is positive and which negative. Is there any simple method by which I could determine this?—H. P. (Southend).

**A.**—When fairly powerful signals are being received on the loud-speaker, adjust the magnets so that they just touch the diaphragm and cause this latter to "chatter." Now reverse the loud-speaker connections and, if this frees the diaphragm, the former method of connection was correct.—M.

#### Distant Reception.

**Q.**—I have a receiver consisting of a detector valve and one stage of low frequency. From nearby stations reception is everything that could be desired, but when trying to receive some of the more distant stations, I find that they can only be picked up when the set is oscillating. The moment the reaction coupling is loosened to stop oscillation the stations are lost. What is the matter?—P. D. L. (Birmingham).

**A.**—It seems to us probable that the only trouble is that you are attempting to receive stations which are just beyond the range of your set. You should understand that the type of set you are employing is by no means ideal for long-distance work and that, whatever the type of set used, there is bound to be

a limit to its range. In your case you might manage to bring in some of the distant stations better if you could improve your aerial system. If not, you should add a stage of H.F. amplification.—M.

#### Resistance of Wire.

**Q.**—Can you tell me the resistance, in ohms per yard, of No. 32 S.W.G. copper wire?—A. H. J. (Accrington).

**A.**—This wire has a resistance of .262 ohm per yard.—B.

#### Choice of Aerials.

**Q.**—I have been told that an indoor aerial is quite as good as one outside and, as I have just bought my first set, I do not wish to put up a wire outside if there is nothing to be gained by so doing. Can you confirm that an indoor aerial will be satisfactory?—H. P. R. (Worcester).

**A.**—It is impossible to advise you whether good results would be likely to be obtained with an indoor aerial without knowing the kind of set you are using and the kind of reception you require. As a general rule it may be stated that the best indoor aerial that can be put up will be inferior to even only a moderately good outdoor aerial, although, of course, there may be exceptions. Therefore we strongly advise you to put up a good outside aerial if this is at all possible.—B.

#### Inserting Potentiometer.

**Q.**—I have a four-valve set consisting of H.F. stage, detector, and two L.F. stages. The set is perfectly straight and does not employ neutralisation. How can I insert a potentiometer in order to control the grid potential of the first valve?—G. C. (Essex).

**A.**—At present one side of the filament circuit will be connected to earth. The connection between earth and the L.T. battery must be broken and the winding of a potentiometer connected across the filament leads. The earth is then joined up to the slider of the potentiometer. Preferably a large-capacity fixed condenser should be connected between the potentiometer slider and one end (either end) of the winding.—B.

#### Grid-leak Connections.

**Q.**—When should the grid leak be connected directly across the grid condenser, when between the grid and L.T. positive, and when between the grid and L.T. negative?—N. B. (Dartford).

**A.**—When the detector is the first valve of the receiver and when the bottom end of the first grid circuit is joined to L.T. positive, the grid leak may be placed directly across the grid condenser. If the detector valve follows a transformer-coupled stage of H.F., with one end of the transformer secondary joined to L.T. positive, the above connections will also be suitable. Should a stage of tuned-anode coupled H.F. precede the detector valve, however, the grid leak should be connected between the detector grid and L.T. positive. So much for the detector grid leak. If a second stage of H.F. amplification follows a tuned-anode stage the second valve must be provided with a grid leak. Thus the leak should be placed between the grid and L.T. negative. This is also the case when choke or resistance coupling is used, unless a separate G.B. battery is employed.—M.

## "A.W." TESTS OF APPARATUS

Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

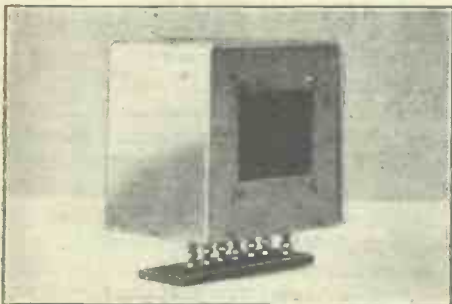
### Centroid Screened Coil

A CENTROID screened coil (Reinartz type) has been sent in for test by the Camden Engineering Co., Ltd., of Camden Town, N.W.1.

Unlike the majority of screened coils, this component has an inductance wound in rectangular form surrounded by a rectangular screen, having dimensions  $3\frac{1}{2}$  in. by  $4\frac{1}{2}$  in. by  $4\frac{1}{2}$  in.

The winding of this coil is made of Litz wire. The primary and reaction windings are placed inside the tuned secondary winding, connections being taken to six pins arranged in line at the base of the screen.

A 6-socket base is supplied into which the complete screened coil fits. The sockets are numbered from 1 to 6, and there is an extra socket at the end, which



Centroid Screened Coil

is out of line with the others, so that no mistake can be made due to inserting the coil the wrong way round. This extra socket, which makes contact with the aluminium screen itself, should be connected to earth.

Full wiring directions are given by the makers, and a diagram of connections is included.

On test, in the aerial circuit of a valve receiver, quite satisfactory results were obtained. The tuning range with a .0005 mfd. condenser in parallel, extended from 240 to 620 metres: a standard aerial was employed.

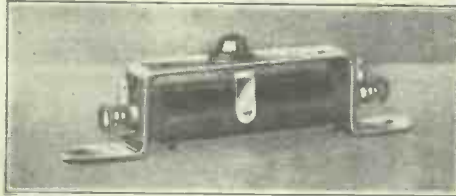
### Magnum Calibrated Rheostat

A MAGNUM filament resistance has been sent in for test by Burne Jones & Co., of 296 Borough High Street, S.E.1.

Now that the advantages of fixed filament resistances are realised, a vast number of designs have been placed on the market. Of these, the semi-fixed type which can be adjusted to suit any valve, has become deservedly popular: the Magnum resistor is a good example of this

type. In appearance, it is particularly neat, and the design is thoroughly sound.

The component consists essentially of a small ebonite former on which is wound the resistance wire. Fixed to the former is a metal guide bar on which a metal spring slides and simultaneously makes contact with the resistance coil. The movement is



Magnum Calibrated Rheostat

controlled by a miniature ebonite knob on the top of the guide bar.

A number of marks made on the guide serve as an approximate calibration. The maximum resistance is engraved on the component as 6 ohms. On test this figure proved to be 6.5 ohms. Terminals and soldering tags are mounted on either side of the resistance former. This component should certainly appeal to readers.

### Bretwood Grid Leaks

TWO types of Bretwood grid leak have been sent in for test by Messrs. Bretwood & Co., Ltd. of 12-18 London Mews, Maple Street, W.1.

This particular type of leak will be well-known to most readers. Improvements have occurred however, from time to time: the latest pattern is similar in its essential



Bretwood Grid Leaks

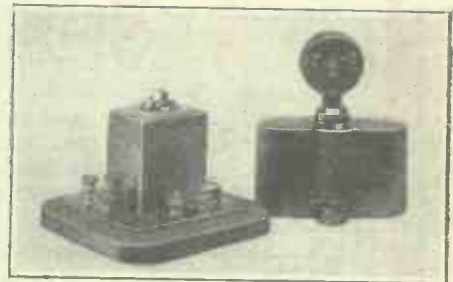
constituents to the original type. The resistance element consists of a glutinous substance into which a threaded brass spindle dips. By rotating the knob at the other end of the spindle it can be dipped

further into or pulled away from the bulk of this element.

A high resistance is obtained when the spindle is well withdrawn owing to the fact that the resistance element is drawn out in a fine string. On test we found that the minimum resistance was in the neighbourhood of 20,000 ohms. This could be varied gradually up to a value of about 2 megohms, and then more rapidly up to a value exceeding 20 megohms. It is thus possible to obtain any desired value of grid leak with the added advantage that the resistance will remain constant after being in continual use.

### Lotus Remote Control

A LOTUS remote-control house-wiring system has been sent in for test by Garnett, Whiteley & Co., Ltd. of Lotus Works, Broadgreen Road, Liverpool.



Lotus Remote-control Apparatus

The equipment consists of a very neat and totally-enclosed relay, two Lotus wall jacks complete with plugs and 21 yards of 4-strand wire for making connections to various rooms in the house. The outfit is thus complete and no additional expense is necessary.

The relay itself is actuated by the filament battery, which may vary from 2 to 6 volts.

When the loud-speaker, or a pair of telephones is inserted into one of the remote jacks, the relay points are constrained to make contact, and the filament circuit of the valve receiving set is automatically switched on.

On test, the relay functioned satisfactorily. A 2-volt filament battery gave ample power for operating the armature, and it was impossible to make the relay fail. The component was capable of handling currents up to 4 amps without any sign of sticking at the contacts. The complete equipment for wiring in two separate rooms, costs 30/-, which is a very reasonable figure for so reliable an instrument. This component should make a strong appeal to readers.

# RADIOGRAMS



It is obviously impossible to say when the nightingale will condescend to sing in Miss Beatrice Harrison's garden at Oxted, but attempts will be made between May 22, and June 1, and it is hoped that on one of these evenings an effective relay of the bird's performance can be broadcast to all stations.

For the broadcasting of a running commentary of the Derby on June 1, four microphones will be used; two in a hut on the roof of the grand stand in line with the winning-post, a third in front of the stand to pick up the noises from the course, and the fourth in the unsaddling enclosure.

Act 3 of Meyerbeer's Opera *The Huguenots* will be broadcast from Covent Garden Royal Opera House, on May 30.

It is now stated that Dame Clara Butt will take part in the Empire Day programme to be broadcast in Hyde Park.

Descriptive commentaries on the Royal Military Tournament are to be relayed from Olympia, on May 21. Apart from such popular features as the musical ride by the Royal Horse Guards, The Scottish Pageant, and others, band music may possibly be included.

The county of Wiltshire repeats this year its challenge to Essex by staging a trial for the Wiltshire Fitch, and the proceedings will be relayed from the Recreation Ground at Calne to 2LO and 5XX on May 25.

Belfast this year celebrates for the first time a British Empire Week, of which the inaugural speeches on May 23, will be taken by the Belfast station. Throughout the ensuing week there will be a broadcast of speeches made by Mr. Stanley Baldwin, M.P., the Duke of Abercorn, Mr. L. S. Amery, M.P., the Lord Mayor of Belfast, and others.

Owing to lack of financial support, the small private broadcasting stations of Caen, Angers (Radio Anjou) and Mont de Marsan, have been compelled to close down. According to reports received from Paris, the main reason is due to the fact that in North-west France, listening to telephony is by no means a pleasure; reception of even the higher power transmissions is completely spoilt by morse.

According to the monthly bulletin issued by the Union Internationale de Radiophonie at Geneva, Russia already possesses 56 broadcasting stations, of which nine are situated at Moscow and five at Leningrad. Many of these transmitters are working on the lower wavelengths.

A further relay station was added on April 24 to the Polish broadcasting system; in this case, the new 4-kilowatt transmitter at Posén. The station officially operates on a wavelength of 270.3 metres. The call is *Radio Posnan*, and it opens its transmissions with a relay of chimes from the

## DO YOU KNOW?

1. What fraction of a centimetre (capacity) is a micro-microfarad?
2. Which station announces "Ici le poste de Clichy"?
3. What is the calculated error of a good average moving-coil ammeter?
4. What is the calculated error of a good average moving-coil voltmeter?

Puzzle your friends with these queries; the answers will be given in the next issue of "A.W."

Last Week's Queries: 1. Copper pyrites, as used for crystal detection. 2. Oslo. 3. The volt. 4. That in which the positive charge equals the negative so the molecule is unaffected by electric forces.

Posen Rathaus (Guildhall). A further station is to be erected at Kattowitz; work on the site has already started and it is hoped to bring the transmitter into operation by September next.

The Forfarshire Mission to the Blind is seeking to supply free wireless sets to those

## CHANGE OF ADDRESS

Will readers please note that the address of "AMATEUR WIRELESS" is now 58-61 FETTER LANE, E.C.4.

so afflicted. The Earl of Strathmore commended the object at the annual meeting of the mission.

The Belfast Radio Players are visiting Scotland on Friday, May 20, in order to present the light entertainment "Between Ourselves," at the Glasgow studio. The production is by H. R. Hayward and Tyrone Guthrie.

A Channel Islands amateur, working on from 4 to 8 watts, has been in recent communication with Finland, United States, Yugo Slavia, and the Balcaric Islands.

At the Edinburgh Empire Exhibition, which is to be held in July and August, the B.B.C. has been allotted the largest block in the exhibition hall, and it is hoped to give the Scottish public an opportunity of realising the various stages through which a broadcast programme has to pass before reaching their ears. Mr. J. L. Baird, the television inventor, is sending an exhibit and hopes to be present to lecture and demonstrate.

In a letter to the Scottish press, leading members of the Scottish Area B.B.C. Educational Advisory Council claim that the experimental period with regard to broadcasts to schools is now at an end, and that many teachers, both in town and country, are finding the radio lessons a valuable help to their own efforts.

In the West of Scotland another agitation has begun against the local B.B.C. programmes. One of the chief complaints is that outstanding broadcasts from London and elsewhere are relayed through Glasgow to the other Scottish stations, while the Glasgow station itself broadcasts local programmes instead. The dropping of the local news bulletins is another source of grumbling among listeners.

In Elginshire the first prosecution for using a wireless receiving set without a licence has just taken place. Defendant, a salmon fishery manager, was convicted and the fine imposed was one of £3.

Over a hundred Sheffield schoolboys entered a competition in which they were invited to make a simple crystal set not costing more than 1s. 3d., and when the results were announced it was stated that quite a number of boys had constructed effective receivers produced for no more than 9d. The winners were presented with pairs of headphones.

The greatest simultaneous broadcast of radio stations in history is planned for the Dominion Jubilee, which is to take place in July, was recently announced at Ottawa. The carillon bells of Ottawa Peace Tower and the voice of King George, it is stated, will be relayed around the world in three-hundredths of a second.

Mr. Orestes H. Caldwell, Federal Radio Commissioner, representing New York, is optimistic about the progress of the work of himself and his colleagues; he declared he was beginning to see daylight and that the broadcasting tangle would be straightened out before the summer is over. He does not by any means think the commission is out of the woods, but he does believe it is part of the way through the forest. He believes it will be possible for the commission to take care of every station now in operation. But the extent to which the commission will provide for each station will depend "precisely on the service rendered by the station and the necessity for its existence."

The American Telephone and Telegraph Company announces that pictures in which three or more colours are used can now be transmitted by wireless across the Continent and reproduced with the most delicate shadings. Engineers have been experimenting for a year on coloured telephotos on the same principle as black and white photographs. Separate transmission is necessary for each colour.

The Moscow Great Comintern broadcasting station has increased its power to 40 kilowatts; it transmits daily on 1,250 metres.





## GREAT BRITISH RADIO AMALGAMATION To help every Wireless Amateur

The amalgamation of R.I. Ltd. and the wireless section of the Varley Magnet Company marks a tremendous advance in radio in this country. Here we have two firms, both with extensive experience in the design and manufacture of radio products joining forces to supplement and improve existing design, to afford each other unlimited use of their Patents and Rights, and to utilise to the best advantage either collectively or individually, manufacturing processes of both firms.

Those who have used the famous Varley Bi-duplex wire-wound Anode Resistances and H.F. Chokes will realise the tremendous advantages to be gained by the extension of this wonderful winding to wireless products made by the combined firms.

Again, R.I. Ltd. have specialised in L.F. Transformer Coupled circuits—Varley in Resistance Capacity Coupling—so that wireless amateurs will get the very best in L.F. amplifiers, whether they be transformer or resistance capacity coupled.

Extensive research in L.F. amplification has resulted in a wonderful new product which will undoubtedly revolutionise radio.

Then consider for a moment the existing R.I. and Varley H.F. Chokes—the unique advantages of both designs will now be incorporated in the new R.I. and Varley H.F. Choke, which is far and away superior to any on the market to-day.

The close co-operation in every detail between two firms with such wide experience will immensely improve radio reception and be a real help to wireless amateurs.

The growing popularity of modern valves with their exacting drain on the H.T. Battery has made an H.T. Eliminator almost essential. Here again previous experience enables us to market the cheapest and most efficient unit available to-day.

The super-excellence of R.I. and Varley products will bear the stamp of the combined resources of the technical and manufacturing specialists of two firms, a large number of whose staff can claim over twenty years' experience in electrical and radio engineering.

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### The "M.C. Three"

SIR,—May I first of all congratulate you on the "M.C. Three." It is a set! I built the original "M.C. Three" and am now altering it to the "Star."

One of your remarks regarding the difference, which I would point out, is that you state "all that is necessary are two six-pin bases." Well, I have got these and fitted them, but now notice you show different windings on the coils.

I was naturally under the impression that it would do to fix the old coils on to six-pin bases so as to plug in, but with the windings being so very different, I am at a loss how to make the connections to the pins of the base.

Doubtless you have overlooked this point. Further, if a potentiometer is of use on the "M.C. Four," would it not be beneficial on the "M.C. Three 'Star' "?

N. R. F. (Leeds)

(The points raised in this letter are dealt with in an article in this issue.—EDITOR.)

### Corrosion from the Accumulator

SIR,—I have just had an experience which might benefit some of your readers. I built a set on the totally-enclosed principle about three months ago.

Everything was A1 for about a month, when it started making crackling noises; a fresh H.T. battery made no difference; in fact, every component was removed and fresh ones tried, but all to no purpose. On taking out the panel and baseboard, I noticed that every soldered connection was green.

I suddenly remembered that the accumulator would give off fumes of a corrosive nature, and the cabinet being practically air-tight there was no escape; consequently all the soldered connections became corroded. A hole cut in the back of the cabinet cured the trouble. R. C. (Accrington.)

### "Simpler Wireless"

SIR,—With reference to an article in your paper "Simpler Wireless" by J. F. Johnston, I have been experimenting on a similar system for some time.

One point which I think you should consider is to find out how much interference such a circuit may be causing other users of the mains for no provision has been made in the circuits described to prevent the low-frequency impulse from the plate of the last valve entering the mains.

However, the results justify your claims,

for it is certainly the finest method of low frequency for medium power yet produced.

[R. H. M. D. (London, N.W.)]

### "Where L.F. Circuits Fail"

SIR,—In your issue No. 249 a correspondent (I. H. S. F.), commenting on an article "Where L.F. Circuits Fail," states that with his apparatus, which includes a stage of transformer coupling, he obtained very good loud-speaker reproduction of a note of 32 cycles. He then proceeds to criticise the author's statement that transformer coupling "cuts off" round about 300 cycles and takes him to task for making sweeping statements without qualification.

I am going to make an even more sweeping statement. I am going to tell I. H. S. F. that with his present equipment he never has, and never will, hear any *real* note much below middle C on the piano scale. What he hears are "ghost" notes built up from the higher harmonics. These "ghost" notes are lacking in volume, and to an acute musical ear appear to be slightly raised in pitch. In fact, they give the effect of musical distortion in the bass.

If I. H. S. F. has the best possible combination of valves, R.C. coupling and transformer, he has a receiver which really will give him a substantially even amplification between 25 and 10,000 cycles. If he wants to hear the true notes below 250 cycles he must either provide his loud-speaker with a horn about 50 ft. long or buy a good cone-type instrument. 5YM (Pirbright).

### 2XAD

SIR,—I wish to report the reception of the G.E.C. Experimental Station 2XAD, at Schenectady N.Y. on Tuesday, May 3, between 9.45 and 10.45 p.m. B.S.T. on a wavelength of 22 metres. The transmission was mainly organ music from a theatre at Schenectady, and was received at good phone strength on a o.v.1 receiver, the circuit of which appeared in "AMATEUR WIRELESS," a few weeks ago under the title of "The Aeranode Short Waver." This receiver is by far the best I have used and anyone wishing to pick up anything from 5 to 100 metres cannot do better than build it. The announcer repeated several times during the transmission last night, that they hoped to be picked up and relayed by the British Broadcasting Corporation "Limited," but evidently our engineers were not listening, because nothing happened.

I have regularly received the G.E.C.'s 32.77-metres transmission 2XAF for the last eighteen months or so; summer or winter does not seem to make much difference, except of course for the usual fading.

I am wondering if any of your numerous readers picked up the above special transmission.

P. V. (Walthamstow).

### Psychic Wireless

SIR,—It is refreshing to read THERMION'S much-needed remarks anent "Psychic Wireless." May I point out that through (accepted) post-hypnotic suggestion, hypnosis, (i.e. an artificially produced "brown study") may readily be induced by wireless, just as by telephone! I and others so induced hypnosis over a quarter of a century ago. Further, credulity may at any time lead to foolish conduct by persons who believe they cannot withstand an influence which may nevertheless be purely imaginary on their part.

There is one point on which I beg to disagree with THERMION'S remarks. Though hypnosis cannot be induced without the subject doing his part, his eagerness may defeat the hypnotist's endeavours; consequently, I, for instance, often have to lead the "subject" to *involuntarily* comply with the essential preliminary condition.

J. Louis Orton, (Denham).

### AN INTERESTING AMALGAMATION

Our readers will be interested to hear that the well-known firms Radio Instruments Ltd. and the wireless section of the Varley Magnet Company have joined forces and will be known from now on as R.I. and Varley Ltd.

There is no doubt that this amalgamation with its resultant advantages can do much to improve and develop the existing design and construction of radio components, and we shall watch the progress of R.I. and Varley Ltd. with much interest.

Radio Carthagenia has raised its wavelength from 279 to 335 metres.

"Amateur Wireless and Electrics." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. Contributions are always welcome, will be promptly considered, and if used will be paid for. Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed.

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58/61, Fetter Lane, London, E.C.4.

# Blueprints!

FULL SIZE working Blueprints, showing the method of wiring and the disposition of components, are now available of the following sets.

No.	Description	Price Post Free
AW 1	M.C. 3, with copy of AMATEUR WIRELESS giving full instructions .. .. .	4d.
AW 2	1-Valve All-wave Reinartz .. .. .	1s. 0d.
AW 3	Safeguard Two .. .. .	1s. 0d.
AW 4	A.W. Ballot 3, with copy of AMATEUR WIRELESS giving full instructions .. .. .	4d.
AW 5	2-Valver embodying K.L. 1 valves .. .. .	1s. 0d.
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AW 9	Victory Three .. .. .	1s. 0d.
AW 10	The "Distance Getter" (4 Valver) .. .. .	1s. 6d.
AW 11	Wide World Short-wave Two .. .. .	1s. 0d.
AW 12	The Regulator Three .. .. .	1s. 0d.
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Evolved on the logarithmic principle avoiding inherent defects of Square Law and Straight Line Frequency. Spreads all stations evenly over whole dial. All dial readings identical in multi-tuned circuits. Tuning extremely simple. All condensers will soon be designed on the "Log" principle, but CYLDON is the only make yet on the English market. They have stolen a march on time.

**PRICES:**

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.0003.....16/6	.00025.....16/-
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With 4 in. Knob Dial. If dial is not required deduct 2/-

If the Logarithmic Units are used in gang condensers individual tuning is not necessary, because they compensate for slight inductance variations. Extensive experiments were necessary to accomplish this exclusive feature to be found only in the CYLDON Log Mid-Line. Therefore stick to One Dial Tuning and use the only correct method.

**THE CYLDON LOG MID-LINE WAY.**

Prices of CYLDON Log Mid-Line Gang Condensers:—  
 2 Gang £2-10-0 3 Gang £3-10-0 4 Gang £4-10-0

CYLDON Temprytes, the best means of valve control, are guaranteed to function perfectly with any type of valve. Comprehensive valve chart, showing correct Tempryte for every valve, free on application.  
 CYLDON TEMPRYTES 2/6 each.  
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**SYDNEY S. BIRD & SONS**  
 CYLDON WORKS, SARNESFIELD ROAD,  
 ENFIELD TOWN, MIDDLESEX.

Advertisers Like to Know That "You Saw it in 'A.W.'"

# BROADCAST TELEPHONY



NOTE.—In the following list of transmissions these abbreviations are observed: con. for concert; lec. for lecture; orch. for orchestral concert; irr. for irregular; m. for metres; and sig. for signal. Unless otherwise stated all times are p.m. (B.S.T.).

## GREAT BRITAIN

**London** (2LO), 361.4 m. 1-2 p.m., con.; 3.15-4 p.m., transmission to schools; 3.30-5.45, con. (Sun.); 4.15 p.m., con.; 5.15-5.55, children; 6 p.m., dance music; 6.30 p.m., time sig., news, music, talk; 8.10 p.m., music; 9.0, time sig., news, talk, special feature. Dance music daily (exc. Sundays) from 10.30 until midnight.

**Aberdeen** (2BD), 500 m. **Belfast** (2BE), 306.1 m. **Birmingham** (5IT) 326.1 m. **Bournemouth** (6BM), 491.8 m. **Cardiff** (5WA), 353 m. **Glasgow** (5SC), 405.4 m. **Manchester** (2ZY), 384.6 m. **Newcastle** (5NO), 312.5 m. Much the same as London times.

**Bradford** (2LS), 252.1 m. **Dundee** (2DE), 294.1 m. **Edinburgh** (2EH), 288.5 m. **Hull** (6KH), 294.1 m. **Leeds** (2LS), 277.8 m. **Liverpool** (6LV), 297 m. **Nottingham** (5NG), 275.2 m. **Plymouth** (5PY) 400 m. **Sheffield** (6FL) 272.7 m. **Stoke-on-Trent** (6ST), 294 m. **Swansea** (5SX), 294 m. **Daventry** (25 kw.), high-power station, 1,600 m. Special weather report, 10.30 a.m. and 10.25 p.m. (weekdays), 9.10 p.m. (Sun.); 11.0 a.m., light music (exc. Sat. and Sun.); relays 2LO from 1 p.m. onwards. Time sig.: 10.30 a.m., 4.0 and 10.0 p.m.

## IRISH FREE STATE

**Dublin** (2RN), 319.1 m. Daily, 7.25 p.m. Sundays, 8.30 p.m. until 10.30 p.m.  
**Cork** (6CK), 400 m. (1 kw.). Relays Dublin.

## CONTINENT

### AUSTRIA

**Vienna** (Radio Wien), 517.2 m. (5 kw.) and 577 m. 8, con.; 10.30 dance. (Wed., Sat.).  
Relays: **Graz**, 358 m. (750 w.); **Klagenfurt**, 272.7 m.; **Innsbruck**, 294.1 m.

### BELGIUM

**Brussels**, 508.5 m. (1.5 kw.). 5.0, orch. news; 7.30, con., news.

### CZECHO-SLOVAKIA

**Prague**, 348.9 m. (5 kw.). Con., 8.0 (daily). **Brunn**, 441.2 m. (3 kw.). 7.0, con. (daily).  
\***Bratislava**, 300 m. (500 w.).  
\*Relays Prague.

### DENMARK

\***Copenhagen**, 337 m. (700 w.). Sundays, 10.0 a.m. sacred service; 4.0, con.; 8.0, con. Weekdays: 8. lec., con., news; dance to midnight (Thurs., Sat.).  
\*Relayed by Soro (1,153.8 m.).

### ESTHONIA

**Reval**, 404 m. (2.2 kw.). 6.0, con. (daily).

### FINLAND

**Helsingfors**, 375 m. (1.2 kw.). 7.10 con.

### GRAND DUCHY OF LUXEMBERG

**Radio Luxemburg**, 217.4 (250 w.). Con. 2.0 (Sun.), 9.0 (Tues.).

### FRANCE

**Eiffel Tower**, 2,650 m. (8 kw.). 6.30 a.m., 8.35; m. 20; weather (exc. Sun.); 11.0 a.m., markets (exc. Sun. and Mon.); 10.15 a.m., time sig., weather; 6.0, talk; 7.0, weather; con. 8.15, lec. Relay PTT, Paris, Sat., 9.10-11.0, and weekday afternoons. Testing on 50 kw.

**Radio-Paris** (CFR), 1,757 m. (about 3 kw.). Sundays: 12.0, sacred service; 12.45, con.; news; 4.30, Stock Ex., con.; 8.15, news, con. or dance. Weekdays: 10.30 a.m., news, con., 12.30, con., markets, weather, news; 4.30, markets, con.; 8.0, time sig., news, con. or dance. Testing on 30 kw.

**L'Ecole Sup. des Postes et Telegraphes** (PTT), Paris, 464 m. (5 kw.). 3.0, lectures (relay of Sorbonne University); 8.30, lec. (Almost daily); 9.0, con. (daily).

**Le Petit Parisien**, 340.9 m. (500 w.). 9.15, con. (Tues., Thurs., Sat., Sun.).

**Radio L.L.** (Paris), 370 m. (250 w.). Con. (Mon., Wed., Fri.), 9.30.

**Biarritz** (Cote d'Argent), 200 m. 6.0, con. (Mon., Wed., Fri.).

**Radio Vitus** (Paris), 308 m. 9.0, con. (daily).

**Radio-Toulouse**, 390 m. (3 kw.). 5.30, news (exc. Sun.); 8.45, con.; 9.25, dance (daily).

**Radio-Lyon**, 291 m. (1.5 kw.). 8.20, con. (daily); 4.0 (Sun.).

**Strassburg** (8 G.F.), 268 m. (1½ kw.). Con., 9.0 (Tues., & Fri.). 9.20 to 12.0, dance (Sat.).

**Radio Agen**, 297 m. (250 w.). 8.30 con. (Tues., Fri.).

\***Lyon-la-Doua**, 478 m. (1 kw.). Own con., 8.0 (Mon., Wed., Sat.).

\***Lille**, 287 m. (500 w.).

\***Marseilles**, 300 m. (500 w.). Own con. (daily).

\***Grenoble**, 350 m. (500 w.).

\***Toulouse**, 253 m. (500 w.).

\*Relays of PTT, Paris.  
**Montpellier**, 252.1 m. (1 kw.). 8.45 (Wed., Fri.). For news, relays Marseilles.

**Beziers**, 178 m. (500 w., 9.0 (weekdays only)).

**Juan-les-Pins** (Radio L.L.), 220 m. (300 w.). 9.0, con., news.

**Bordeaux** (Radio Sud-ouest), 238 m. (1 kw.). 7.25, con. (Thurs.), also on 25 m. (Sun.).

**Bordeaux** (Lafayette), 419.5 m. (1½ kw.). Con., 5.0, 9.0 (weekday), 2.30 (Sun.). Relays PTT, Paris, 8.30 (Sat.). Testing on 238 and 275 m.

**Forez Ste.-Etienne** (Loire) 220 m. (0.3 kw.). 8.45 con. (Wed.).

**Algiers** (N. Afr.) (PTT), 310 m. (50 w.). 7.0-10.0, daily.

\***Carthage** (Tunis), 1,850 m. (5 kw.). 6.30, con., dance.

\***Casablanca** (Morocco), 250 m. (300 w.). 8.30, con. (daily); 10.0, dance (irr.).

## GERMANY

**Berlin**, on 483.9 and 566 m. 9.0 a.m., sacred con. (Sun.); 6.30 orch.; 8.30, con., weather, news, time sig., dance music until midnight (daily, exc. Tues.). Relayed on 1,250 m. by Königswusterhausen and Stettin (252.1 m.).

**Königswusterhausen** (LP), 1,250 m. (18 kw.). 11.30-12.50 a.m., con. (Sun.); 3.0, lec. (daily), 8.30, relay of Berlin (Vox haus) con. (daily). 2,525 m. (5 kw.), Wolff's Bureau Press Service. 6.45 a.m. to 8.10. 2,900 m., Telegraphen Union: 8.30 a.m. to 8.45, news. 4,000 m., 7.0 a.m. to 8.0, news.

**Breslau**, 315.8 m. (4 kw.). 12.0, con. (daily), Divine service (Sun.); 5.0, con.; 7.0, lec.; 8.30, con. Relay, Gleiwitz, 250 m.

**Frankfort-on-Main**, 428.6 m. (4 kw.). 6.0 to 6.15 a.m. (exc. Sun.), physical exercises; 8.30 a.m., sacred con. (Sun.); 4.0, con. (Sun.); 4.30, con.; 8.0, lec., con., weather. Dance; relays Berlin. Relay: Cassel, 272.7 m.

**Hamburg**, 394.7 m. (4 kw.). Relayed by Bremen (400 m.), Hanover (297 m.), Kiel (254.2 m. Sundays: 8.25 a.m., time sig., weather, news; 9.15 a.m., sacred con.; 1.15, con.; 6.0, con.; 7.0 con. Weekdays: 5.45 a.m., time sig., weather, news; 9.0, con., dance.

\***Königsberg**, 329.7 m. (4 kw.). 9.0 a.m., sacred con. (Sun.); 8.0, con. or opera, weather, news, dance (irr.). Relay: Danzig, 272.7 m.

**Langenberg** (Rhineland), 468.8 m. (25 kw.). Relays Elberfeld, Muenster, Dortmund, Cologne (Studio).

**Leipzig**, 365.8 m. (4 kw.). Relayed by Dresden (294.1 m.) 8.0 a.m., sacred con.

(Sun.); 8.15, con. or opera; weather, news, dance music.

**Munich**, 535.7 m. (4 kw.). Relayed by Nuernberg (303 m.). 11.30 a.m., lec., con. (Sun.); 6.30, con. (weekdays).

**Muenster**, 241.9 m. (1.5 kw.). Relayed by Dortmund (283 m.). 9.0 a.m., Divine service; 12.0 news (Sun.); 7.40, news, weather, time sig., lec., con.

**Norddeich** (KAV), 1,800 m. 11.15 a.m., 10.30, weather.

**Stuttgart**, 379.7 m. (4 kw.). 11.30 a.m., con. (Sun.); 6.30, time sig., news, lec., con. (daily). time sig., late con. or cabaret. Relay: Freiburg, 577 m. (1½ kw.).

## HOLLAND

**Hilversum** (HDO), 1,060 m. (5 kw.). Sundays: 9.40 a.m., sacred service; 2.10, con.; 4.40, church service; 7.20, weather, news, con. Weekdays: 5.10, con.; 7.25, news, con.

**Scheveningen-Haven**, 1,950 m. (2½ kw.). Throughout day. Markets, Stock Ex.

## HUNGARY

**Budapest** (Csepe), 555.6 m. (3 kw.). 8.0 con. or opera; dance nightly.

## ICELAND

**Reykjavik** 333.3 m. (700 w.). Con., 8.30

## ITALY

**Rome** (IRO), 450 m. (3 kw.). 8.30, news weather, con.; 10.15, late news. Testing on 1,200 m. (5 kw.).

**Milan**, 322.6 m. (1 kw.). 8.15-11.0, con.

**Naples**, 333.3 m. (1½ kw.). 8.30-11.0, con.

## JUGO-SLAVIA

**Zagreb** (Agram), 310 m. (500 w.). 8.15, con.

## LATVIA

**Riga**, 526.3 m. (5 kw.). Con. daily, 8.0.

## LITHUANIA

**Kovno**, 2,000 m. (15 kw.). 7 p.m. (daily).

## NORWAY

**Oslo**, 461.5 m. (1.5 kw.). 7.15, news, time, lec., con.; 10.0, time, weather, news, dance

**Bergen**, 370.4 m. (1 kw.). 7.30, news, con.

\***Fredriksstad**, 434.8 m.

\***Porsgrund**, 504 m. (1½ kw.).

\***Tromsø**, 500 m.

\***Hamar**, 566 m.

\***Rjukan**, 413 m. (1 kw.).

\*Relays Oslo.

## PORTUGAL

**Lisbon** (PLAA), 303 m. (500 w.). 10.0, con.

## POLAND

**Warsaw** (High-Power), 1,111.1 m. (10 kw.). 8.30, con. Relays:—

**Posen**, 270.3 m. (4 kw.).

**Cracow**, 422 m. (2 kw.).

## RUSSIA

**Moscow** (RDW), 1,450 m. (15 kw.). 5.55, news and con.; 11.0, chimes from Kremlin.

**Moscow** (New Central), 1,250 m. (40 kw.).

**Leningrad**, 1,000 m. (10 kw.). 6.0.

## SPAIN

**Madrid** (EAJ7), 375 m. (1.5 kw.). Con., daily. 8 or 10, con.

**Madrid** (Radio-Madrilena) (EAJ12), 306 m. (2½ kw.).

**Madrid** (Radio Espana) 391 m. (2 kw.). irr.

**Barcelona** (EAJ1), 344.8 m. (1½ kw.). 6.0-11.0 (daily).

**Barcelona** (Radio-Catalana) (EAJ13), 462 m. (1 kw.). 7.0-11.0, con., weather, news.

**Bilbao** (EAJ9), 438 m. (500 w.). 7.0, con.

**Bilbao** (Radio-Vizcaya) (EAJ11), 420 m. (500 w.). 8.0-12.0, con. (daily).

**Cadiz** (EAJ3), 344.8 m. (550 w.). 7.0-9.0, con., news. Tests daily (exc. Sun.), midnight.

**Cartagena** (EAJ15), 335 m. (500 w.). 8.30-10.0, con. (daily).

**Seville** (EAJ5), 344.8 m. (500 w.). 9.0, con., news, weather. Close down 11.0.

**Seville** (EAJ17), 343.9 m. (500 w.). 7.0-10.0, con. (daily).

(Concluded at foot of page 764)

# HOW MUCH DO YOU PAY FOR EXPERIENCE ?

You will pay much less if you take advantage of the accumulated knowledge and experience gained by a firm that has been manufacturing **BATTERIES** for **FIFTY YEARS.**

BUY

## SIEMENS



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**The Radio Battery Which Gives STEADY PERSISTENT SERVICE**

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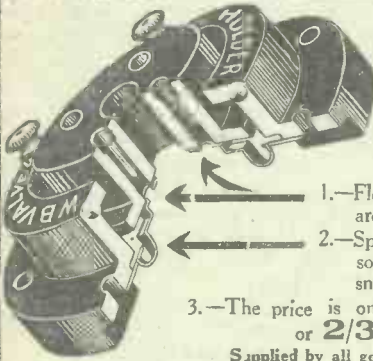
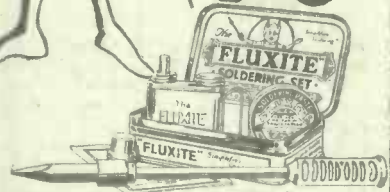
# WEAK JOINTS



FLUXITE SOLDERING SET complete

7/6

All Hardware and Ironmongery Stores sell FLUXITE in Tins, price 8d., 1/4 and 2/8. Another use for Fluxite—Hardening Tools and Case Hardening. Ask for leaflet on improved methods. **FLUXITE Ltd.** (Dept. 326), Rotherhithe, S.E.16.



## W.B. ANTI-PHONIC LOW-LOSS VALVE HOLDER

Cut open for your inspection

Notice that—

- 1.—Floating springs and valve sockets are riveted and soldered.
- 2.—Springs are at right angles to valve sockets, avoiding side strain and snapping.
- 3.—The price is only 2/- each without terminals, or 2/3 each with terminals.

Supplied by all good class dealers from stock.

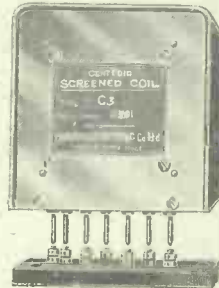
In case of difficulty write to the makers:

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# CENTROID

Wireless Components

## Screened Coils



Model	Frequency Range	Type	Price Each
C5BA	250-550	Split Primary Aerial Coil	8/6
C5DA	1000-2500	" "	8/6
C5BT	250-550	" " Transformer	10/-
C5DT	1000-2500	" " "	12/-
C6B	250-550	" Secondary	10/-
C6D	1000-2500	" "	12/-
C3B	250-550	Reinartz Coils	10/-
C3D	1000-2500	" "	12/-

Prices include complete screened coil and base.

An entirely new and original method of using screened coils.

- CENTROID lead-in and earthing switch - 4/- each
- CENTROID slow-motion dial - 3/-

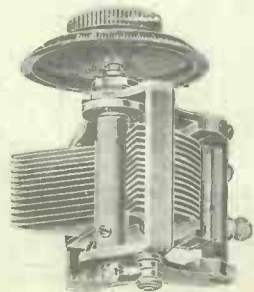
## CONDENSERS

Die Cast	Low Loss	Square Law	Price
SINGLE	-	-	10/- each
DUAL	-	-	21/-
TWO GANG	-	-	22/-
THREE	-	-	33/-

Two and three gang are fitted with additional balancing condensers.

Obtainable through Dealers or direct from manufacturers

**The Camden Engineering Co., Ltd.,**  
Bayham Place, Camden Town, N.W.1



From Radio Dealers Everywhere

**"almost the same as an added stage of L.F!"**

THE LONDON ELECTRIC WIRE CO. and SMITHS, LTD.

**LEWCOS Inductance Coils**

JUDD

Advertisers Appreciate Mention of "A.W." with Your Order

## "Is Constant Coupling the Right Term?"

(Continued from page 741)



### IT TAKES TWO! TO MAKE A QUARREL!

VIBRATION is always seeking a quarrel with the valves, but if they are installed in Benjamin Clearer-Tone Anti-microphonic Valve Holders the valves feel not the faintest jar of vibration—and they'll not make the second party to the quarrel.



BENJAMIN  
VALVE  
HOLDER

2/9

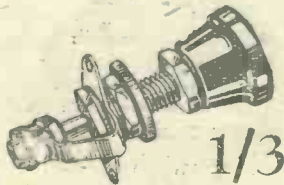
EACH

The Benjamin Holder has averted over 700,000 quarrels and here are the reasons for such phenomenal sales:—

1. Valve sockets and springs are made in one piece, with no joints or rivets to work loose and cause faulty connections.
2. Valves are free to float in every direction.
3. Valves can be inserted and removed easily and safely.
4. Valve legs cannot possibly foul the baseboard.
5. Both terminals and soldering tags are provided.

**BENJAMIN**  
Clearer-Tone Anti-micro-  
phonic Valve-Holder  
Patent No. 250,451. Regd. Design No. 71487.

### Battery Switches



1/3

This Benjamin off and on Battery Switch is the simplest you can buy. No parts to get out of order. Nickel-plated metal components. Soldering tags. Overall measurements 1 1/2 in. It's off when it's in.

**BENJAMIN**

Makers of things more useful.  
THE BENJAMIN ELECTRIC LTD.  
Barnwood Works, Tariff Road,  
Tottenham, N. 17.

receiver produced for the amateur in this country, the possibility of various types of lay-out was considered for the gang condenser. The experiments on this portion of the apparatus were carried out in co-operation with the Bowyer-Lowe Company, of Letchworth, and the possibility of using a clover-leaf arrangement of the three condensers was considered; but it was never proceeded with, because it appeared to me that the abnormally large coupling which would exist between the detector stage and the first high-frequency stage would absolutely preclude satisfactory working being obtained. After some research, the actual axial-spindle gang was developed.

### Ordinary Methods Useless

Certainly, with a very large capacity coupling between stages such as this, the ordinary methods of stabilisation would be useless. Individual feed-backs in the several valves could be neutralised by the ordinary methods, but, as is well known, difficulty arises if the neutralising condenser is increased beyond a certain point. Although this tends to introduce damping into the circuit, it unfortunately also tends to make the circuit oscillate in another mode, with the result that before very long oscillation does set in. Most readers will have experienced cases of which neutralised circuits gave all the symptoms of correct neutralising, and yet would not

remain stable when they were brought into operation.

In other words, the ordinary methods of stabilisation are irreversible, as it were. It is possible to overcome the effect of valve-capacity feed-back, but it is not possible, to any appreciable extent, to do more than this and to cause the valves to have a definite reverse feed-back. A reverse reaction effect can be obtained by applying a negative reaction; but the disadvantage of this is that it does not hold over the whole of the tuning range, and would require to be continually adjusted, as the frequency of the signals being received, varied.

### Flexibility

The beauty of the Loftin-White system is that the extent and direction of the feed-back may be varied over a very wide range. The valves can, if desired, be permitted to oscillate. The oscillation can be checked absolutely by making the feed-back neutral, the direct current being 90 degrees out of phase with those of the grid circuit. Finally, if necessary, the feed-back can be reversed a phase and caused to produce definite damping. In cases, therefore, where reaction effects are obtained due to stray couplings, the introduction of damping by negative feed-back through the valves in this manner is one which offers considerable possibilities. Certainly, no ordinary methods would enable such flexible results to be obtained, so that there can be little argument when Mr. Loftin contends that this control of the anode-circuit reaction is a most important feature of the system.

Incidentally, Mr. Loftin has raised several points of considerable interest which I hope to discuss in these columns shortly. Without question, this circuit is one of the most outstanding developments of the times. I have been keenly interested in the results I have obtained, and I can recommend any reader who has not yet done so, to build either the "M.C. Four" or the "M.C. Three 'Star,'" so that he can find for himself the various effects. I shall also, from time to time, give details of minor alterations and improvements which can be carried out with very little trouble on the various receivers. Everyone who tries the system is surprised at the excellent results which are obtainable, and the only traces of trouble which have come to my notice arose where the readers were not using the specified coils. Constructors, therefore, should be careful only to use the coils specified.

The Berne broadcasting station, as an interval signal between programme items has adopted the ticking of a metronome.

### "BROADCAST TELEPHONY"

(Continued from page 762)

San Sebastian (EAJ8), 346 m. (1.5 kw.). Temporarily closed down.

Salamanca (EAJ22), 402 m. (1 kw.). 5.0 and 9.0 con. (daily). Closes down 11.0.

Malaga (EAJ23), 325 m. 8.0 con.

### SWEDEN

Stockholm (SASA), 454.5 m. (1 1/2 kw.). 11.0 a.m., sacred service (Sun.); 6.0, sacred service; 7.0, lec.; 9.15, news, con., weather. Dance (Sat., Sun.), 9.45.

Relays.—Boden (SASE), 1,200 m.; Eskilstuna, 250 m.; Falun (SMZK), 400 m.; Gothenburg (SASB), 416.7 m.; Gefle, 204.1 m.; Joenköping (SMZD), 201.3 m.; Kalmar (SMSN), 254.2 m.; Karlscrona (SMSM), 196 m.; Kristinehamn (SMTY), 202.7 m.; Karlstadt (SMNG), 220 m.; Linköping, 500 m.; Malmo (SASC), 260.9 m.; Norrköping (SMVV), 278.2 m.; Orebro, 218 m.; Ostersund, 720 m.; Saefle (SMTS), 252.1 m.; Sundsvall (SASD), 545.9 m. (1 kw.); Uppsala, 497.5 m.; Motala (high power station), 1,304.5 m.

### SWITZERLAND

Lausanne, (HB2), 850 m. (1 1/2 kw.). 8.0. Zurich, 496 m. (500 w.). 11.0 a.m., con. (Sun); 6.15, lec., con., dance (Fri.).

Geneva (HBr), 760 m. (2 kw.). 8.15, con. Berne, (411 m. (1.5 kw.). 10.30 a.m., organ music (exc. Sat.); 4.0, 8.30, con.

Basle, 1,100 m. (1 1/2 kw.). Con. daily 8.30.

### TURKEY

Constantinople (Radio Stamboul), 1,200 m. (10 kw.). Testing

**MORE RADIOGRAMS**

OWING to the serious loss of life in connection with shipping on the Australian coasts, the Minister for Trade and Customs recently wrote to the state Governments, which control inter-state shipping, urging that all coastal vessels should be equipped with wireless, but the replies received were lacking in unanimity. The Minister is, however, pursuing his endeavours to have the matter put on a more satisfactory footing, but in the absence of agreement by the States of the Commonwealth he is powerless to compel the States to move on the lines indicated.

Radio will replace the orchestras on board the night boats of the Hudson River Navigation Company this season. Four boats are in service plying up and down the Hudson, and it has cost hitherto about £5,000 a season for orchestras to furnish music for dancing and in the dining-hall. The initial expense of the radio installation is estimated at £600, and the music will be available at all times.

Signor Majorana, Professor of Physics at the University of Bologna, has written to the Reale Accademia dei Lincei claiming to have discovered a system of wireless telephony in which invisible ultra-violet rays with a very long wavelength are employed. In experiments made between Bologna and a place 16 kilometres distant, conversations were, it is said, carried on with great clearness and in perfect secrecy.

Wireless enthusiasts will be hearing more of John Henry again. John Henry had a dispute with the B.B.C. on the question of fees, but has now come to a satisfactory agreement with them. "I am perfectly satisfied with the terms they are now to give me," said John Henry in an interview. "I shall be appearing more regularly this summer than I have ever done before, both in B.B.C. revues and in my own numbers."

Two wireless amateurs will transmit special signals on short wavelengths in connection with the important tests of the effect of the total eclipse of the sun on June 29 on wireless waves, which are being organised by the Radio Research Board.

The recent radio telepathy tests carried out by Dr. V. J. Woolley, hon. secretary of the Society of Psychical Research, with the

help of Sir Oliver Lodge, brought into the B.B.C. 25,320 replies from all over the British Isles, the Continent and America, and at least one from Australia.

A successful attempt has been made to broadcast music from the island of Syllt, one of the Friesian Islands, to Otto Kemmerich, the German long-distance swimmer, while making a record swim round the island. A special wireless receiving set was fixed to the swimmer's head, and Kemmerich heard the musical programme plainly.

Close after Congress' passage of the White-Dill Radio Bill which will stabilise broadcasting in the U.S.A., an agreement has been reached between Radio Corporation of America (largest in its field) and Zenith Radio Corporation (one of the largest independents). Zenith Corp. admitted that the Radio Corp. of America with Westinghouse and General Electric, owned practically all basic patents in radio and agreed to pay royalties, under a licensing system, for Radio Corporation devices.

Replying to recent questions in the Australian Senate, Senator G. F. Pearce said all the terms of the agreement entered into by the Amalgamated Wireless (Australia) Limited with the Australian Commonwealth Government had been fulfilled with the exception of the erection of the feeder stations for communication between the capital cities and the main station; and of the completion of the beam station for communication with Canada. Testing of the beam station for communication with Canada was awaiting the completion of the corresponding station in Canada. Replying to another question on March 22, Senator Pearce said the beam stations for the English and Canadian services were not yet available for commercial traffic. The feeder stations to provide accommodation between the capital cities and the beam station were not yet in operation. They would not be needed until beam service was opened for commercial traffic.

Bordeaux-Lafayette, which up to the present has been broadcasting on 419 metres, is carrying out tests on both 238 and 275 metres, with a view to abandoning its original wavelength, on which it has suffered considerable interference from French coastal stations and steamers.

**A FURTHER UNSOLICITED APPRECIATION OF CÔPEX COILS**

Mr. J. H. REYNER, writing in the May 7th issue of "Amateur Wireless" says, Messrs. Peto-Scott have developed a new form of long wave coil which gives somewhat better results than the simple single-layer winding.

You must ask for Cōpex Coils—by general opinion they are the best.

Copex Coil and Transformer, for M.C.3* or M.C. Four - Per pair	250 550 Metres 11/6	1000 2000 Metres 14/6
--	------------------------	--------------------------

Obtainable from all good dealers—in cases of difficulty apply to us direct.

**FREE PANELS FOR M.C.3\***

To all purchasers of a complete kit of components a drilled ebonite panel will be supplied free.

KIT COMPRISES: Ormond Slow Motion Condensers, Re-action Condenser, H.F. Choke, L.F. Transformer, Terminals, Cōpex Coil and Transformer, Coil Basis, Fixed Condensers, Grid Leak, Connecting Wire, etc. **£5 15 0**

Send to-day for the "PILOT MANUAL" containing details of a wide range of modern sets for home construction. 24 pages beautifully illustrated. Post free, 3d.

**PETO-SCOTT Co., Ltd.**

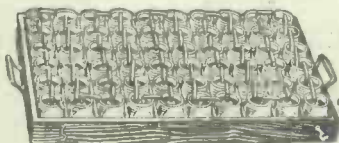
77 CITY ROAD, E.C.1 and 62 HIGH HOLBORN, W.C.1

Also at: 4 MANCHESTER STREET, LIVERPOOL, and 4 BANK OF ENGLAND PLACE, PLYMOUTH

**STANDARD WET H.T. BATTERIES**

Separate Parts	
Jars (waxed)	1/3 doz.
Zincs	1/- "
Sac No. 1	1/6 "
Do. with terminals	2/3 "
Sac No. 2	3/0 "
Do. with terminal	3/0 "
Electrolyte for 20 cells	9d.
Box - Rubber Bands for 12 Sacs No. 1	6d.
Rubberbands for No 2 Sacs	6d.

(Leclanche Type) 1½ volts each cell



50 cell, 90 volt battery (size 11" x 17 1/2") Price of complete set £1 1/3. Varnished Mahogany Tray, 9/6 extra. Each Cell comprises Jar (Waxed), Zinc, Sac Element with rubber insulating band and electrolyte.



**WATES Universal Test Meter.** For testing H.T. and L.T. Battery & CURRENT taken by H.T. Battery in milliamps. Price with full instructions. **7/6**

**NO CHARGING — ECONOMICAL — PERMANENT — SILENT**

Send 11d. stamp for illustrated list giving full particulars, maintenance hints and working instructions. We shall be pleased to advise the best battery to suit your set on receipt of full details.

**WET H.T. BATTERY Co.** 12, B ROWNLAW STREET, HIGH HOLBORN, W.C.2

By First Avenue Hotel

**BRIGHT**

If you sometimes change from bright to dull emitters, or use one type now and contemplate using the other soon, you should certainly use a "Peerless" Dual Rheostat. With this rheostat the dual purpose does not hinder the efficiency of either purpose in the least. You get the advantages of 2 separate rheostats without extra cost.

**PEERLESS**

PRICE **3/9**

**DUAL RHEOSTAT**

The "bright" winding has a resistance of 6 ohms. This continues on to a 30 ohms winding, bringing the total resistance up to 35 ohms. The wire is wound on hard, impregnated fibre material under great tension. Contact arm has smooth, silky action. Terminals are conveniently placed. Handsome combined knob and dial fitted. All parts are nickel-plated. One hole only needed to fix to panel.

**BEDFORD ELECTRICAL & RADIO CO., LTD.**  
22, Campbell Road, Bedford.

**OR DULL**



**SIXTY VOLTS**  
Tapped every 3

**NOW ONLY 6/11**

FROM ALL DEALERS or if any difficulty **POST FREE** from  
**ERIC J. LEVER**  
33 Clerkenwell Green, London, E.C.1.  
Phone: Clerk. 3014, 5.

This is our original TRIX 8/6 sixty-volt battery which we are now able to reduce in price owing to greatly increased production. Satisfaction guaranteed.

### THE "TRIX PORTABLE FOUR"

WE have recently had an opportunity of testing the four-valve portable receiver produced by Eric J. Lever of 33 Clerkenwell Green, E.C.1.

Of moderate weight for this type of portable, the "Trix Four" is 18 in. square by 9 in. wide. The container is an oak cabinet, well finished in dark oak. As our photograph shows, there is an ornamental grille cut out on one side of the cabinet, and behind this is mounted an Edison-Bell cone loud-speaker.

The control panel, which is about 5 in. square, is sunk into one end of the cabinet and is protected by a hinged flap. The actual controls are few in number and simple in operation. A slow-motion dial controls the tuning condenser, and a small extension handle controls the one-plate reaction condenser. A push-pull switch is arranged so that when the flap is closed the receiver is switched off. There is one more attachment and that is a phone jack, so that distant or weak signals can be picked up on phones if desired.

The frame-aerial arrangement is novel, in that three plugs and sockets serve the dual purpose of hinges and frame connections. This system allows of interchangeable frames, so that both long and short-wavelength bands can be covered. As there are many localities where only Daventry can be received, it is certainly desirable to

have a separate frame to receive this station.

The valve-holders and other components are mounted on a narrow shelf behind the cone loud-speaker. The two Trix 60-volt H.T. batteries, grid-bias battery and Oldham 2-volt accumulator are securely strapped in convenient positions below the component shelf.

As regards the circuit incorporated in



The "Trix Portable Four"

this portable, this is a straight 4-valve circuit which is capable of giving exceedingly good results. A detector valve with a form of capacity-controlled magnetic reaction, is followed by three stages of resistance-capacity L.F. coupling. In the model tested the first three valves were Cossor 2-volt R.C.'s, and a Cossor power valve was used in the last stage. Thus the total L.T. current consumption is .45 amp., which is not excessive in view of the fact that a reliable accumulator is used to supply the "juice." The R.C. valves require very little H.T. current so that the capacity of the H.T. batteries used should be sufficient to supply the needs of all four valves for a considerable period.

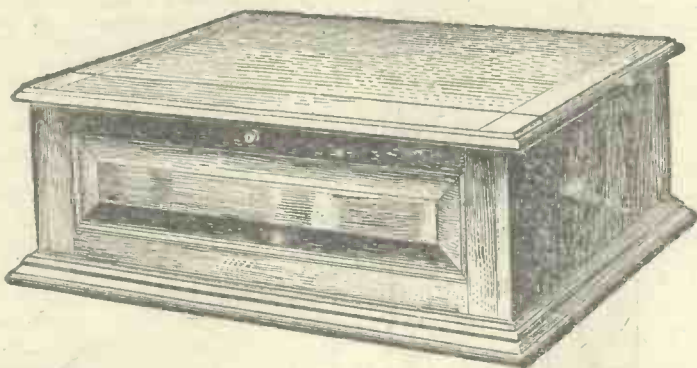
The receiver was tested in a badly-screened building where reception is usually

## CAXTON WIRELESS CABINETS

THOUSANDS OF SATISFIED CUSTOMERS.

All Polished with new enamel that gives a glass hard surface that cannot be spoiled or scratched. Ebonite or Radion Panels Supplied and Perfectly Fitted at low extra cost. **SENT FREE**—Catalogue of Standard Wireless Cabinets in various sizes and woods.

Elstree "Solodyne"



Specially designed for this famous Radio Press Circuit. All details and dimensions conform to their specification, enabling constructors to follow the layout without difficulty.

PRICES:

Light Fumed Oak **61/-** Dark or Jacobean Oak **65/-** Real Mahogany **68/-**

Prices include either "full front" with handsome solid raised panel, as illustrated, or beaded doors, allowing ample space for tuning controls, etc. Glass panelled doors can also be supplied at 3/- extra.

**CASH WITH ORDER. CARRIAGE PAID U.K. PROMPT DELIVERY.**

Packing Case 5/- extra repaid if Case returned within 14 days Carriage paid to Works.

**CAXTON WOOD TURNERY CO., MARKET HARBOROUGH.**

**TO CLEAR AT**

**OPPORTUNITY CALLING**

**"SPARTA" SPEAKERS**

**HALF PRICE**

**25/-**  
EACH  
(List Price) £2-15-0

**BRAND NEW "JUNIOR" LOUD-SPEAKERS**  
In Maker's Original Packing Cases.

**"BLOCK" TYPE**

**FULLER-SPARTA 6volt BATTERIES**

45-amp. ...	18/9
60-amp. ...	25/-
110-amp. ...	37/6

**BOTH THESE BARGAINS ARE BRAND NEW AND GUARANTEED FOR 12 MONTHS. SENT ON 7 DAYS' APPROVAL AGAINST CASH.**

**MAUDE RUBBER Co. Ltd. 58, PRAED ST., W.**





indifferent. In spite of the poor conditions, however, full loud-speaker results were obtained from 2LO, the local station. The quality of reproduction, as would be expected from a resistance-coupled set and a cone speaker, was distinctly above the average. The volume increased considerably as the reaction was increased, but the quality began to deteriorate. Providing that reaction is not "pushed," however, the quality is all that could be desired. Owing to the smoothness of the reaction control, it was possible to increase the sensitivity of the receiver to such an extent that Bournemouth was picked up faintly on the loud-speaker. Due to the directional properties of the frame aerial, the selectivity is very good, and there would be no difficulty in separating stations if more than one were received at good strength. Our tests of this receiver showed that it is simple to handle and distinctly pleasing in operation. The moderate price asked for the Trix Portable Four, namely 17 guineas, should do much to popularise portable receivers in general and the Trix in particular.

**WORTH WRITING FOR**

CAMCO cabinets for wireless sets are fully dealt with in a booklet issued by The Carrington Manufacturing Co., Ltd., of 18-20 Naman's Buildings, Central Street, E.C.1.

The Atalanta screw driver is the subject of an informative leaflet issued by E. E. Co., of 6 Cambridge Road, Great Crosby, near Liverpool.

Typical components of all well-known American radio manufacturers are fully illustrated and described in a handsomely-produced catalogue issued by the Rothemel Radio Corp. of Great Britain Ltd., of 24 and 26 Maddox Street, Regent Street, W.1. Supplied to dealers free of charge, this booklet is available to amateurs for the nominal charge of 9d.

Edison Swan Electric Co., Ltd., of 123-5 Queen Victoria Street, E.C.4, have sent us a booklet describing their new range of precision components (variable condensers, coil holders etc.). A test report of these will appear in a future issue of this journal.

*Internal Heat Kills Batteries Why?*

**ELECTROLYTE HEATED BEYOND THE LOW TEMPERATURE POINT OF 75° FAHRENHEIT.**

which it quickly reaches, creates Chemical Heat. Everytime—short or long—that this low degree point is exceeded it then becomes a dangerous destroying Heat which permanently reduces the amperage capacity of each Plate, and eventually kills every Battery.

This is why present day Batteries require constant re-charges. Once damaged by Heat can never again hold a full rated re-charge. The modern Car Battery is ideal for Generating and Retaining excessive Heat. Internal Heat is also excellently assisted by the inseparable block of Wood and Plates. Celluloid Ebonite and other compound containers are all Heat retaining materials cemented into a solid block, and thereby the heat, fire and explosion risks are considerably increased and intensified. In another advertisement we give some facts on

Gas in Batteries—the bye-product of excessive Heat.

*Tungstone guarantees negligible internal-resistance How?*

**Tungstone is Entirely ALL Metal—WITHOUT WOOD and CELLULOID—which holds the heat.**

**METAL is the Ideal disseminator of Heat.**

**HEAT is dissipated as rapidly as made through the Tungstone patented Glass Valve Vent Plug.**

**BECAUSE Independent and Airy Plate Separation gives free and unfettered diffusion of the Electrolyte always at very low temperature rate and minimum rise.**

**FREE AIR is always freely circulating round the FOUR OUT-SIDES of each 2-Volt metal container.**

**CONTINUOUS OVERCHARGING cannot create excessive heat.**

TUNGSTONE High Tension 60 Volt Battery 3 a.h. is sold in the United Kingdom on monthly payments over extended period. Apply for particulars. Further interesting information on points of this advertisement are to be found on pages 58, 59, and 67 to 73 of the Illustrated Booklet "Photography tells the Story" which will be sent free on application to the— T.A.45  
TUNGSTONE ACCUMULATOR CO., LTD., St. Bride's House, Salisbury Square, London, E.C.4

**WEARITE COMPONENTS**  
**WRIGHT & WEAIRE, Ltd.,**  
740, HIGH ROAD, TOTTENHAM, N.17.  
**The Wide World Short-Wave Two**

Coils No. 1, 2 & 3, 35/180 metres - 10/3 Coils No. 4, 5, 6, to 520 metres - 19/3  
3-Way Coil Holder - 6/6

**M.C.3, M.C.3 "STAR" & M.C.4 COILS**

B.B.C. Wavelength M.C. 3	4/- pair
B.B.C. Wavelength M.C. 3 "Star" and M.C. 4	10/6 pair
5XX Wavelength M.C. 3 "Star" and M.C. 4	12/6 pair
H.F. Choke	6/6
Screen and Base (Copper)	10/6
Standard 6-pin BASE	2/9
Push-Pull BATTERY SWITCH	1/-

See Page 315, February 26th issue.

**ATTENTION!**

Use only the ORIGINAL world-famous  
**BECOL LOW LOSS FORMER**



Sizes : 3in. diam. to outside of wings. Prices in 6in. lengths, 3/- (postage 9d.); 4in. lengths, 2/- (postage 6d.); 3in. lengths, 1/6 (postage 6d.)  
Up to 36in. lengths.

**NOTICE.**

Do not be put off with an imitation. Ask for BECOL, and use the Former with a reputation.



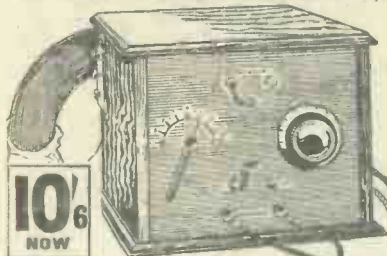
Ebonite Rods, Tubes and Sheets. Panels guaranteed free from surface leakage.

Write for List "O" to the MAKERS

**The BRITISH EBONITE Co. Ltd.**  
**HANWELL : LONDON, W.7**

# GRAVES

## 2-VALVE LOUD SPEAKER BARGAIN.



**10/6**  
NOW

This highly efficient 2-Valve Loud-Speaker Set is the finest wireless value ever offered.

It gives a volume and quality of tone unattained by any instrument of a similar price and is the essence of simplicity. Fitted with coils covering all the British wave-lengths, including Daventry.

THE CABINET is of beautifully polished Oak, & all components are of the highest quality. Dull Emitter Valves with patent valve holders, 40.; H.T. Battery, 2-volt accumulator and complete Aerial outfit. **LOUD SPEAKER** of exclusive design with unique magnetic system and improved mica diaphragm. Price **£7:17:6**

TERMS: Our Bargain Price is for deferred payments. Send 10/6 now, & complete purchase in 14 monthly payments of 10/6. If you wish to pay cash, 6 per cent discount is allowed.

Catalogue Post Free. Up-to-date Crystal & Valve sets at keenest prices.

J. & Graves Ltd. Sheffield.

Fullest Approval



Of proved efficiency



## THE RECOGNISED DETECTOR FOR ALL SETS & CIRCUITS.



RD 40 ..... 2/-

Shield for same 6d.

By Insured Post 2/3 or 2/9 with shield. Can be mounted on brackets or through panel. Each one is tested on broadcast before despatch, and is perfect.

Of all high class Radio Dealers or Sole Makers:-

**JEWEL PEN CO., LTD.,**  
Radio Dept. 45, 21-22, Gt. Sutton St., E.C.1



At the request of users of **GAMBRELL** Centre Tapped Coils we have been pleased to put this new Coil Holder on the market. It is designed to facilitate the changing of coils and to do away entirely with the use of flexible leads.

**COIL HOLDER** Price 1/3.  
For Gambrell Centre Tapped Coils

An interesting Booklet on "Efficiency" Coils (Ref. G.F.11) sent post free to all requesting a copy

**GAMBRELL**  
76, Victoria Street, LONDON, S.W.1

Inscribe your Panels with

**R.N.B. PANEL TRANSFERS**

SILVER, WHITE OR GOLD

Sixpence per set Obtainable everywhere

RADIO NEWS BUREAU LTD., 50 HIGH HOLBORN, W.C.

### WORTH WRITING FOR

WIRELESS cabinets combining quality with economy are described in a booklet issued by the Eunice Wireless Cabinet Works, Ltd., of 52 Myrtle Street, N.1.

The Radio News Bureau Ltd., of 50-51, High Holborn, W.C.1, have sent us one of their Constructors Envelopes. This collection of photographs, blueprints, wiring diagrams, etc., should make the task of constructing the Polar Three extremely simple.

J. Dyson & Co., Ltd., of St. Stephen's House, 2 Coleman Street, E.C.2, have forwarded several interesting pamphlets detailing H.T. eliminators and tuning coils and condensers.

"A Petrol Engine Pickaxe" is the title of an interesting leading article describing a new portable road-breaking tool worked by means of a petrol engine in *English and Amateur Mechanics* for May 20, 1927, on sale at all newsagents and bookstalls (3d.). Other interesting articles include "MORE SPEED AND GREATER HEIGHT," relating to aerial progress; "THE LATEST IN GRAMOPHONE INVENTIONS"; "HOW TO REPAIR YOUR GARDEN TOOLS"; "MAKING ONE CAMERA ANSWER ALL PURPOSES"; "A HIGHLY EFFICIENT 5-VALVE NEUTRODYNE RECEIVER"; "HOW TO DO YOUR OWN ENGRAVING"; "PRACTICAL MECHANICAL IDEAS FROM READERS"; MICROSCOPY; ASTRONOMY; LETTERS, QUERIES, REPLIES; TECHNICAL ADVICE BUREAU, Etc.

### REMARKABLE OFFER

## 5/- ENGLISH DULL EMITTER VALVES

2 Volt '06 H.F., 2 Volt '06 L.F., 2 Volt power '34.

All one price 5/-. all guaranteed.

"Uncle Tom," PAYNE & HORNSBY, LTD.,

Roker Avenue, Sunderland. Camden St., North Shields.

10, Queen Victoria St., LEEDS.

Gallowgate, NEWCASTLE-ON-TYNE.

All postal orders to Newcastle (Dept. 4) 3d. extra per valve for postage must be included.



### FOOD FOR REFLECTION

A Ruby Reflector, a Bracket Fitting and a Low Consumption Bulb (as illustrated) gives visual proof that your valves are switched on and prevents waste of L.T.

We are the first to place on the market a Bulb consuming only .06 of an Amp. This means that you use only one-sixth of the current consumed by the old type Pocket Lamp Bulb.

Ruby Reflector - 9d.  
Bracket Fitting - 6d.  
Low Consumption Bulbs - 9d.

LIST No. 151 (Complete at 2/-)  
FREE. Obtained from Dealers, of



A. F. BULGIN & CO.  
9-10-11, CURSITOR STREET, CHANCERY LANE, E.C.4.

**21/-** H.T. ELIMINATORS with Tappings, Flex and Adapter, with full instructions for use, for D.C. current. Fully guaranteed, 7 days trial against cash. Postage 1s. State mains voltage when ordering. **RADIOMAINS CO., 107, The Grove, Stratford, E.15.**

### PREPAID ADVERTISEMENTS.

Advertisements under this head are charged **FOURPENCE PER WORD**, minimum charge **FOUR SHILLINGS**.

#### DEPOSIT SYSTEM.

As the Publishers cannot accept responsibility for the bona fides of advertisers in this publication they have introduced a system of deposit which it is recommended should be adopted by readers when dealing with persons with whom they are unacquainted. It is here explained.

Intending purchasers should forward to the Publishers the amount of the purchase money of the article advertised. This will be acknowledged to both the Depositor and the Vendor, whose names and addresses must necessarily be given. The Deposit is retained until advice is received of the completion of the purchase, or of the article having been returned to and accepted by the Vendor. In addition to the amount of the Deposit, a Fee of 6d. for sums of £1 and under, and 1s. for amounts in excess of £1, to cover postage, etc., must be remitted at the same time. In cases of persons not resident within the United Kingdom, double fees are charged.

The amount of the Deposit and Fee must be remitted by Postal Order or Registered Letter (Cheques cannot be accepted), addressed to

"AMATEUR WIRELESS,"

ADVERTISEMENT DEPARTMENT,

58/61, FETTER LANE, LONDON, E.C.4.

**PATENTS AND TRADE MARKS.**—British and Foreign: **GEE & CO. (H. T. P. Gee, Member R.G.B. and A.M.I.R.E.)**—51-52, Chancery Lane, London, W.C.2. Phone: Holborn 1525.

**PATENTS**—Trade Marks. Advice Handbook free.—**B. T. King, Regd. Patent Agent, 146a, Queen Victoria Street, London.**

**WOOD HORNS** to fit any loud-speaker unit. Send for list: Maddison, 2a Ronalds Road, Highbury, N.5. If you have an Amplion AR 30 mention same.

**BUSINESS FOR SALE (WIRELESS AND ELECTRICAL).** East coast, near London; turnover £2,000 p.a.; net profits £400; accounts audited. Low expenses; central position. Plenty of scope for smart man or partners. Good stock and fittings. Price £250 inclusive or near offer.—Box 56, "Amateur Wireless," 58/61, Fetter Lane, London, E.C.4.

### THE PERFECT WET H.T.

ASSURED WITH OUR NEW INSULATING LINER

Jars 1/3 doz., plain 1/6 doz., waxed; special zincs, 1-doz.; high capacity sacs, 1/6 doz.; perforated liners, 4d. doz. Post free on 3 doz. and over including special divided cartons suitable as a container. Send 6d. for sample complete unit, particulars and instructions. We stock seamless moulded cone parts. Also the wonderful Rolls Portable Set. Demonstrations given.

**SPENCER'S STORES, LTD.**

4-5 Messon's Avenue, Coleman Street, London, E.C.2

Phone: London Wall 2292 (Nr. Bank)

### EVERYTHING RADIO

ON

**£1 EASY TERMS £10**

DOWN SECURES WORTH OF PARTS

Woolridge Radio Co., Ltd. 26 & 30 Lisle Street, W.C.2

### WET H.T. POROUS POTS

Genuine miniature porous Pots for Wet H.T. to fit 2 1/2 x 1 1/2 Jar, registering 1-4 volts, 3/- per doz., Non-conductive Glass Jars 1/- doz., Waxed 1/3 per doz., Sacs 1/6 doz., Zincs 1/- doz. Send 1/6 stamp for Price List and Instructions. Carriage and Packing extra. Trade inquiries: **THE ETON GLASS BATTERY CO.**

Dept. A, 46, St. Mary's Road, E.10.

"PRIMARY BATTERIES." An excellent work on Wet Batteries published by Messrs. Cassell & Co., 1/6. Post free 1/6.

### EXPERT REPAIRS

To all kinds of Radio Instruments by experienced workmen.

Phones and Transformers, 5/- Speakers, 4/6

Prompt service. All work guaranteed as new.

**KNIGHT (Dept. A), 6, Chapel St., E.C.2.**

Clerkenwell 4715

### TRANSFORMERS REWOUND

Transformers, Phones, Loud-speakers repaired to maximum efficiency. All one price 4s. post free. A 12 months guarantee accompanies each repair. Your transformer can also be rewound to Multi-Ratio type. Write giving particulars. Trade invited. Service, 115 Links Road, Tooting, London, S.W.17.

### AMPLIFIERS: 1-VALVE 19/-, 2-VALVE 30/-

**2-VALVE ALL-STATION SET 64.** APPROVAL WILLINGLY Wet H.T. Batteries, Jars, zincs and sacs complete, 3/6 per doz. (18 volts), post 9d. extra. Sample 6d. 3 doz. upwards post free, in divided cartons. **Bargain List Free**

**A. TAYLOR, 57, Studley Road, Stockwell, London**

Amateur Wireless

### COUPON

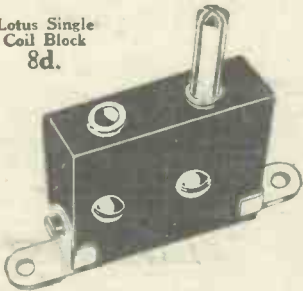
Available until Saturday,  
May 28th, 1927.

# LOTUS COMPONENTS PREFERRED

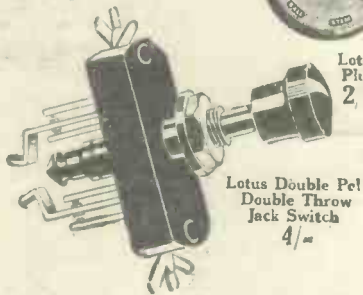


Lotus Terminal  
Valve Holder  
2/6

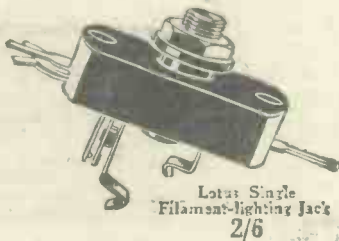
Lotus Single  
Coil Block  
8d.



Lotus  
Plug  
2/-



Lotus Double Pin  
Double Throw  
Jack Switch  
4/-



Lotus Single  
Filament-lighting Jack  
2/6

“Radio for the Million”  
Circuits are prepared by  
technical experts and show  
great skill and care.

Only the best components  
are good enough, and that  
is why “Lotus” Valve  
Holders, Jacks, Switches  
and Plugs are used.

By using substitutes the  
same good results are not  
guaranteed.

*Specify*

## LOTUS COMPONENTS

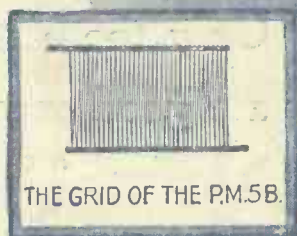
*and you get the best*

GARNETT, WHITELEY & CO., LTD.  
LOTUS WORKS, BROADGREEN ROAD, LIVERPOOL

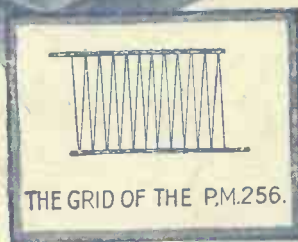
# THE DIFFERENCE!

In this photograph the matched electrode construction of the P.M. 6 is disclosed with the anode displaced. Note the great length of the wonderful P.M. Filament.

The grids illustrated give a striking example of the matched electrode system in the case of only two of the series of Mullard P.M. Valves.



THE GRID OF THE P.M. 5B.



THE GRID OF THE P.M. 256.

## MATCHED ELECTRODES

combined with the wonderful P.M. FILAMENT

MORE than a supreme filament in Mullard P.M. Valves . . . more than a master filament that has set a new standard for long life, toughness, economy and power . . . the wonderful P.M. Filament . . .

A system of matched electrodes, designed by Mullard Engineers to produce unequalled performance in every type of valve operation by completely utilising the vast energy of this master P.M. Filament to the best advantage in each case.

The result of this special P.M. construction and design is that a series of P.M. Valves has been produced from which, no matter what type of circuit you employ, positively pure and powerful amplification is assured from the first to the last stage, culminating in a final reproduction that is a delight and a revelation.

Consult your radio dealer to-day about the correct Mullard P.M. Valves for your receiver.

# Mullard

THE MASTER VALVE

*For 2-volt accumulator*

P.M. 1 H.F. 0.1 amp. 14/-  
 P.M. 1 L.F. 0.1 amp. 14/-  
 P.M. 1A  
 (Resist. Capacity) 0.1 amp. 14/-  
 P.M. 2 (Power) 0.15 amp. 18/6

*For 4-volt accumulator or 3 dry cells*

P.M. 3 (General Purpose) 0.1 amp. 14/-  
 P.M. 3A (Resist. Capacity) 0.1 amp. 14/-  
 P.M. 4 (Power) 0.1 amp. 18/6

*For 6-volt accumulator or 4 dry cells*

P.M. 5X (General Purpose) 0.1 amp. 14/-  
 P.M. 5B (Resist. Capacity) 0.1 amp. 14/-  
 P.M. 6 (Power) 0.1 amp. 18/6

*Super power valves for last L.F. Stage*

P.M. 254  
 (4 volts, 0.25 amp.) 22/6  
 P.M. 256  
 (6 volts, 0.25 amp.) 22/6

ADVT. THE MULLARD WIRELESS SERVICE CO. LTD., MULLARD HOUSE, DENMARK STREET, W. C. 2