

SELECTING A SINGLE-VALVE CIRCUIT

Amateur Wireless

And Electrics

Vol. VI. No. 152.

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YOUR VALVES

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A CRYSTAL SET DE
LUXE

AT THE PARIS CON-
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Amateur Wireless

and Electrics

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SELECTING A SINGLE-VALVE CIRCUIT

Based upon Notes from an Experimenter's Diary.

AS the result of an extensive series of tests, the writer's opinion is that there does not appear to be anything to beat the single-valve reaction circuit for all-round work with suitable low-frequency amplification added if necessary.

It should here be mentioned that four-electrode valve circuits were not tested. It is common practice to recommend three-valve circuits of the H.F., detector, L.F. type for all-round long-distance work and reception. Now that short waves are coming into vogue, the author's opinion has been somewhat modified, and he would suggest as a desirable alternative a three-valve set of the Det. and two L.F. type. This remark the reader may consider to be substantiated by the subsequent notes on single-valve reaction receivers.

The Circuit Adopted

The Cockaday circuit was the one eventually adopted. Readers will probably remember this as a circuit in which regeneration is relied upon for amplification. With suitable low-frequency amplification (of the resistance-coupled type) good volume was available even on a small aerial, so that it was suitable for the reception of signals from the local broadcasting station. In addition, it was found that apparently the aerial tuning remained the same for any alteration in the length of the aerial within reasonable limits. The principal advantage of this circuit is its selectivity, for the tuning is remarkably sharp, and in consequence freedom from interference is most marked. One disadvantage, if such it may be called, is that the control of the current in the high- and low-tension circuits is very critical. Furthermore, the valve to be used should be carefully chosen.

Vernier Control

When first using the experimental set, temporarily but neatly laid out on a board, it was found when attempting to receive the transmission from the local broadcasting station, 2 L O, about ten miles away, that it was possible to pass the correct tuning position for the condensers. Vernier control was found absolutely essential, and experience indicated that with practice a station could easily be tuned in by rotating

the condensers simultaneously and subsequently using the verniers for final adjustments.

Much has been said from time to time in favour of the Armstrong super-regenerative single-valve receiver, as good volume is available when using a frame aerial,

WHEN designing a new valve receiver to cover wavelengths of 300 to 600 metres, the author experimented at some length with a number of single-valve receivers, and in almost every case the results obtained exceeded expectations. The conclusions arrived at are set forth in this article.

and it is possible, with one low-frequency stage added, to work a loud-speaker within moderate distances of a broadcasting station. The difficulty experienced with this set was that very careful handling was necessary with a good deal of perseverance before the set could be operated satisfactorily. It was, however, found possible to cut out interference from a near-by broadcasting station and to bring in other stations.

The Crowning Achievement

Perhaps the crowning achievement when experimenting with this set was that American broadcasting from K D K A and W G Y was heard when using a 2-ft. frame aerial. Distant amateur transmissions were also brought in. The control difficulty experienced in the handling of this set also existed in the Flewelling circuit, a well-known modification of the Armstrong super-regenerative circuit. The Flewelling circuit was found to be very sensitive, and capable of giving good amplification of the received signals over long ranges. With experience, it was found possible to bring in all the B.B.C. stations.

A friend of the author's had been able for some considerable time to work a loud-speaker, at ten miles distance from 2 L O, directly off a single-valve reaction receiver and a chance conversation with him influenced a modification in the author's programme of experiments, particularly as the super-receivers mentioned were

found to be too sensitive for general use, and that, figuratively speaking, the winking of an eye would upset the tuning when a critical balance had been obtained. As a matter of fact, the body-capacity effects of a person walking about a room would upset the tuning.

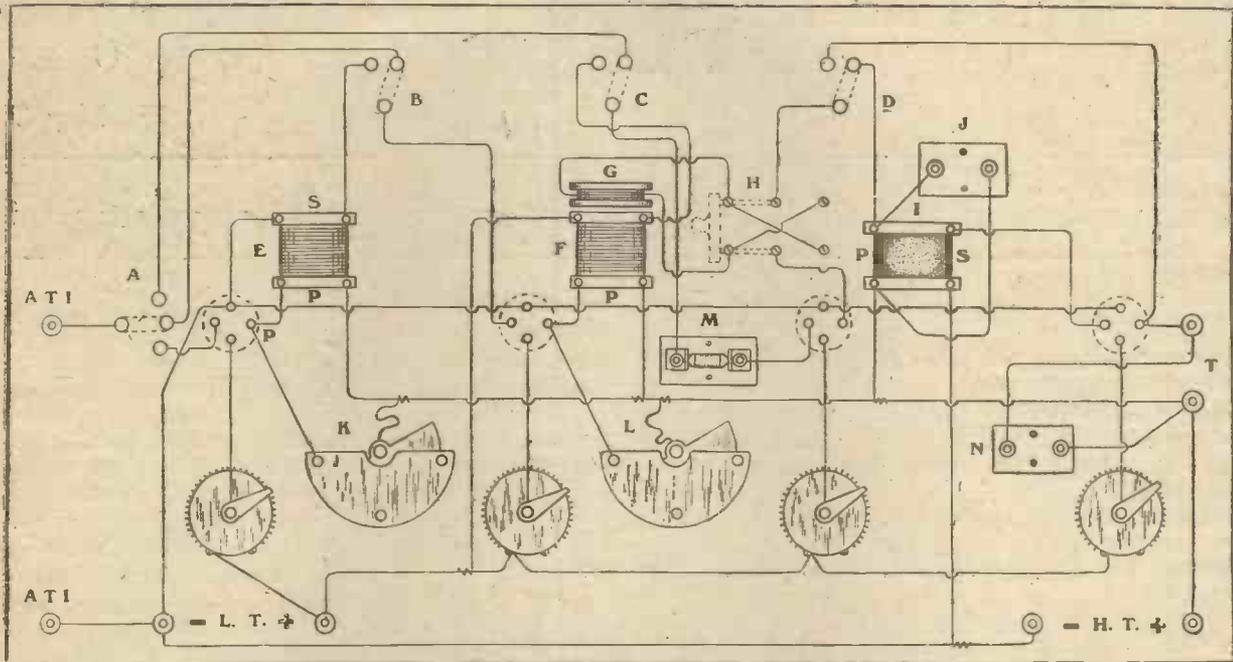
For some considerable time experiments were continued with straight circuits. Careful working in the wee sma' hours brought in American amateur stations, and subsequently W G Y. Since that time W B Z has often been brought in on two- and three-valve straight circuits, and when subsequently using a one-valve receiver when designing a receiver for short-wave work, the ease with which W B Z was brought in, due to the elimination of certain controls, was very marked. Furthermore, single-valve operation on a wavelength in the vicinity of from 300 to 400 metres was not found to be particularly critical, although it must be said that on these wavelengths high-frequency amplification was of advantage. The advantage, however, was not such that one could confidently recommend high-frequency amplification to anyone building a new set. It would be far better to use the extra components on the low-frequency side. It should be explained that the signals from the distant stations were faint, but nevertheless clear.

Short-wave Experiments

In preparing for short-wave experiments, one's attention was naturally called to the Reinartz receiver, which was designed primarily for short waves. Time was not available for extensive investigations of this circuit, but it is distinctly remembered that it was not difficult to handle. Certainly it was fairly selective, and gave good signal strength, but did not, as far as the author remembers, compare with the Cockaday circuit. Of course the latter circuit does not give signals of any greater strength than those obtained with the ordinary straight circuit under ordinary conditions. It scores, however, when using a short or small aerial, for then the volume is distinctly greater.

The May circuit received attention, and all the B.B.C. stations were heard on it,
(Concluded at bottom of next page)

SWITCHING OUT YOUR VALVES



FEW amateurs take full advantage of the opportunities offered by simple single- and double-pole switches for varying the circuits used.

The typical four-valve circuit (two H.F., detector and one L.F.) shown above is a concrete example of what may be accomplished by means of only four single-pole switches and one D.P.D.T. switch.

By means of switch A (in conjunction with B) it is possible to use either one or

two stages of transformer-coupled H.F. amplification by connecting the A.T.I. terminal to the grid of either the first or second valve.

When A is in the top position, and C is placed as shown by the dotted lines, the H.F. stages are cut out and it is possible to use the detector and one L.F. valve only. The D.P.D.T. switch H reverses the connections to the reaction coil, as is necessary when altering the

number of H.F. valves. The single-pole switch D when placed as shown allows the single stage of L.F. amplification to be employed, and when placed to the left cuts out the L.F. valve.

It is, of course, essential to use switches which make good electrical contact, while on the H.F. side (that is, for switches A, B, C and H) it is desirable to use switches of the anti-capacity type to prevent loss of signal strength.

R. O. J.

"SELECTING A SINGLE-VALVE CIRCUIT" (continued from preceding page)

but as it was found decidedly unsuitable, even with the experience gained from preliminary investigations, further experiments with this circuit were abandoned owing to the possibility of causing interference.

The Ultra-audion Circuit

Of late the ultra-audion circuit of de Forest has received attention, and is possibly becoming as popular here as it has been in America. The set is very selective, though filament control is rather critical. On the whole, it is quite a satisfactory circuit and fairly easy to manipulate. With care, the majority of the B.B.C. stations have been brought in, and the local station, ten miles away, was brought in at a fair loud-speaker strength, but nothing out of the ordinary. The circuit was modified in various ways, as has been suggested from time to time, and although an attempt was made to utilise a novel form of reaction and improved results were obtained, yet taking all things into consideration, in the author's opinion the old favourite, the single-valve reaction, cannot be surpassed.

With this in mind, it was only natural that one should augment the experiments on single-valve reaction circuits, possibly by reflexing, knowing the results to be obtained by reflexing on two- and three-valve receivers. Reflex working with and without a crystal in the circuit gave a loud-speaker strength at ten miles from a broadcasting station, when using a standard P.M.G. aerial and a decent earth connection. 2 L O was also faintly heard in the telephones without aerial and earth connections being attached to the set. What are considered to be good results were obtained about thirty miles from London, when 2 L O was heard faintly but clearly on an improvised aerial and earth. The usual run of B.B.C. stations have been heard, as well as some of the near-by French, Dutch and German broadcasting stations.

D.X. Work

The writer has not been successful with real long-distance work with the single-valve reflex receiver; for example, he has not been able to bring in American broadcasting. Judging from this experience, apparently reflex circuits are useful for

moderate-range work in fair to good volume. As far as can be ascertained, the low-frequency amplification predominates.

Certain observations suggested that it might be of advantage at some future time to investigate carefully what effect "damping" of a circuit (due to a crystal) has upon selectivity.

Reflex working was then abandoned, and other modifications were made to the single-valve reaction circuits. Circuits considered grotesque on paper each had their own distinct characteristics, and some were decidedly advantageous, generally in one direction only, and although an attempt was made to design a circuit incorporating the desirable features, this has not been entirely successful. The most satisfactory circuit closely approximated to the Cockaday circuit, and this similarity led to experimenting with the latter circuit, which, as indicated before, was finally decided upon to form a section of a new receiver.

If any reader should attempt to carry out experiments of the nature indicated above, the use of a wave-meter is indispensable.

H. J. H.

AN ATTACHÉ-CASE PORTABLE SET

GOOD headphone reception up to ten miles from a main broadcasting station is possible using the self-contained portable set illustrated by the photograph. The circuit used is of the Armstrong super-regenerative type, which allows the use of a frame aerial. The latter is enclosed in the lid of the case.

As will be seen from the photographs and the plan view of the set (Fig. 1), space is provided for two earpieces, but it was not found possible to accommodate the headband in so small a set; this, however, will not be found a disadvantage if small ebonite handles are fitted to each phone after the fashion of ladies' ear-phones.

To turn to the actual constructional details of the set, Fig. 2 shows the wooden inner case to which all components are fixed. This part should be constructed of well-seasoned hard wood $\frac{1}{8}$ in. in thickness. Mahogany will be found the most suitable wood to use, and if the constructor is not experienced enough to make proper joints, small countersink-head brass screws may be employed for fixing the sections together.

Before attaching the components, the wooden case should be fitted in the attaché case to make sure that it fits; if all is correct the inner case should slide into the attaché case without undue forcing.

The wood may at this stage be given a coat of shellac varnish, which will prevent the ingress of moisture, etc., when using the set on the ground or on board ship.

Figs. 3, 4 and 5 give the constructional details of the remaining wood fittings of the set, which are used to hold the batteries, vario-coupler and quenching coil in their respective positions.

The vario-coupler consists of 70 turns of No. 26 d.c.c. wire for the stator wound on a 3-in. diameter cardboard tube 3 in. long, and 100 turns of No. 36 d.s.c. wire wound on a hard-wood rotor ball $2\frac{1}{2}$ in. in diameter. A No. 2 B.A. spindle should, of course, be passed through the ball and stator tube in order to control reaction.

Unless the variable condenser is of the baseboard-mounting type this instrument may be conveniently fixed in position by means of a brass angle piece as shown in Fig. 6. The method of mounting the filament resistance, which is of the Microstat type, is illustrated in Fig. 7.

Phone and frame aerial terminals are mounted on an ebonite strip measuring $3\frac{3}{4}$ in. by $\frac{3}{4}$ in. by $\frac{1}{8}$ in. thick, as shown in Fig. 8, small-size condenser spacing washers being interposed between the mounting strip and the woodwork in order to allow of connection to the terminal legs.

No difficulty should be experienced in

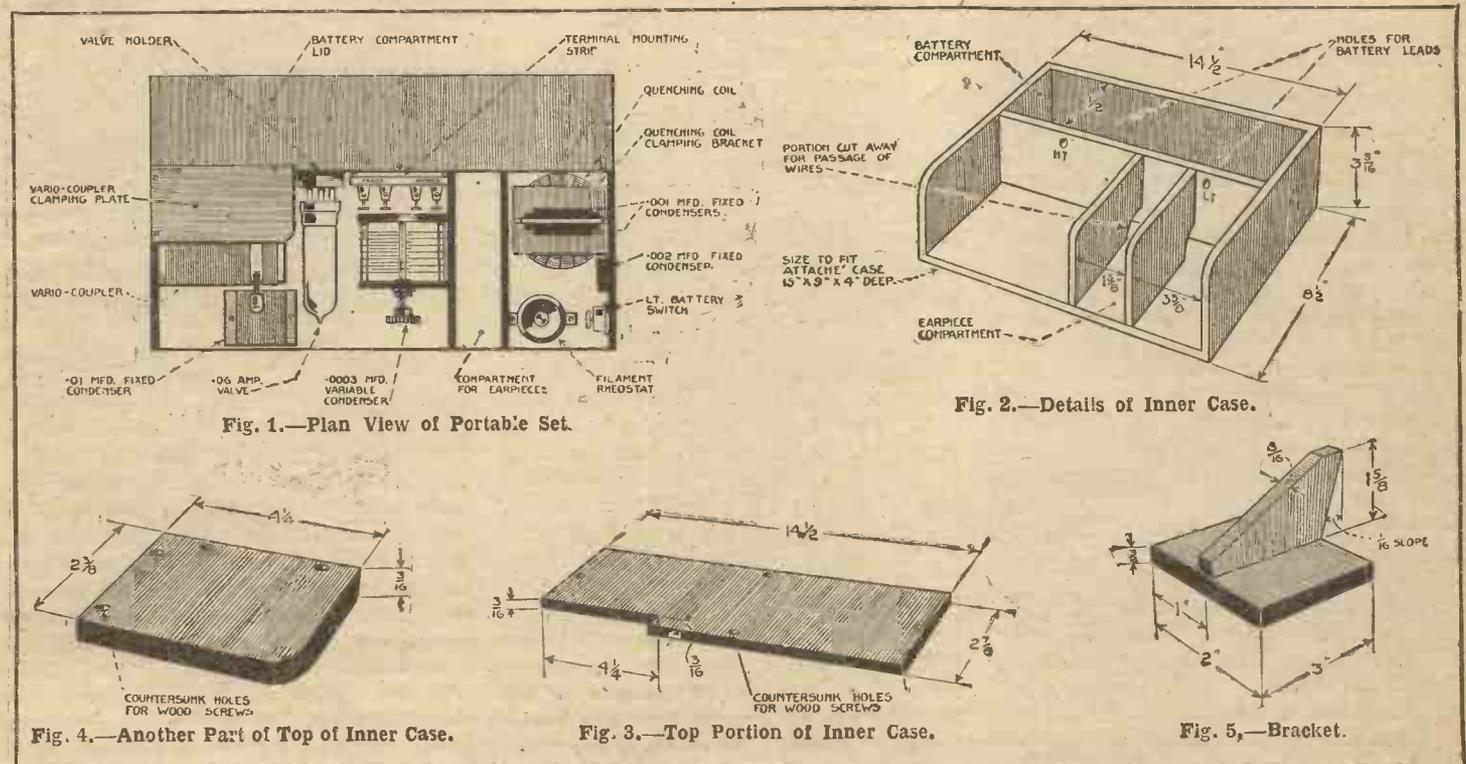


The Complete Receiver.

obtaining a valve holder, as there are several types on the market made specially for baseboard mounting; this component may, however, be constructed quite easily by fixing four valve-leg sockets into a strip of ebonite.

Probably the most important component—that is, the one on which success or failure of the set as an Armstrong super depends—is the quenching coil; details of this are given in Fig. 9. For the construction of this part, an unmounted honeycomb coil of 1,500 turns should be obtained and, after baring the wire on one side at a distance of approximately one-third the distance from the centre, a tapping of flexible wire should be carefully soldered on; it is advisable, in fact, to solder tappings of bare wire in several places around this point, as the successful working of the set depends to a large extent on the final placing of the tapping.

The coil is fixed to the base of the box by means of the bracket shown in Fig. 5.

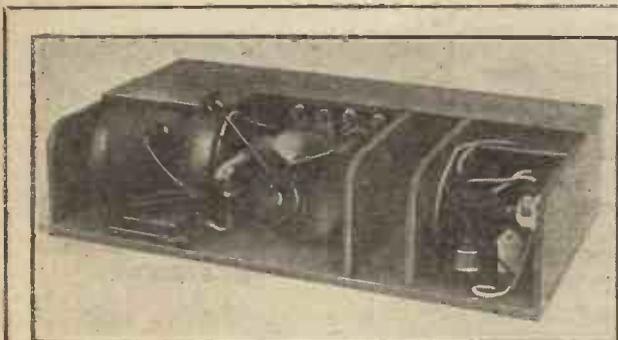


while the two .001-microfarad condensers are attached by means of wood screws to the sides of this bracket. The two remaining condensers (.01 and .002) are attached as shown in Fig. 1 to the base and side of the case respectively.

ment as indicated in Fig. 2—at the rear of the case; the H.T. battery consists of nine flashlamp batteries connected in series, while a single 4½-volt battery supplies the filament current for the .06 valve. If the extra expense is not objected to,

after putting on the winding, a coat of shellac varnish should be given in order to exclude moisture.

In conclusion, it should be pointed out that although no grid leak and condenser have been shown in the circuit diagram



The Interior Unit.



Fig. 9.—Quenching Coil.

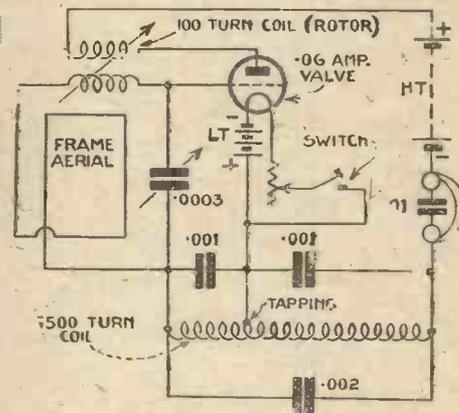


Fig. 10.—Circuit Diagram.

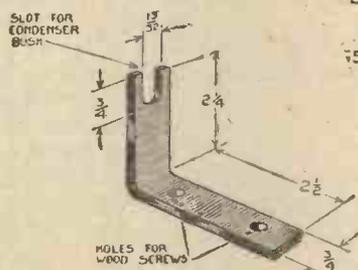


Fig. 6.—Condenser Bracket.

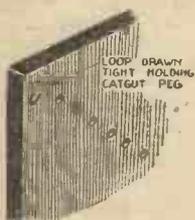


Fig. 12.—Details of Frame Aerial.

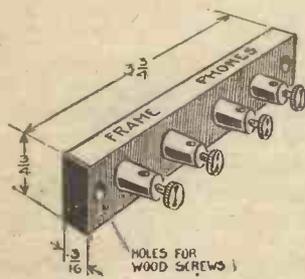
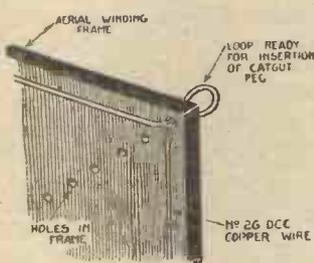


Fig. 8.—Terminal Block.

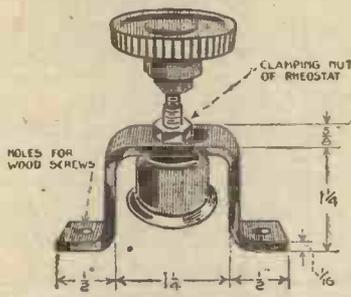


Fig. 7.—Method of Mounting Rheostat.

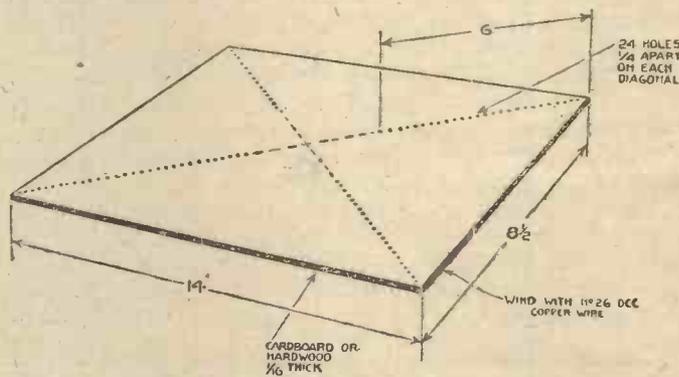


Fig. 11.—Frame-aerial Former.

Wiring up, using rubber-covered wire, is carried out as shown in Fig. 10. All joints should be well made, as in carrying the set about there is always a risk of a connection coming unfastened.

All batteries are placed in the compart-

ment as indicated in Fig. 2—at the rear of the case; the H.T. battery consists of nine flashlamp batteries connected in series, while a single 4½-volt battery supplies the filament current for the .06 valve.

Constructional details of the frame aerial are given in Figs. 11 and 12 and call for no special explanation except that,

(Fig. 10), their use with some types of valve is advisable for best results; experiments should therefore be made when first testing the set to find out whether the inclusion of these components improves signal strength.

R. N. W.

SECURING SPADE TAGS

WHEN affixing a spade-tag to the end of a length of flex it is a good plan to carry the wire up the groove between the small clips, underneath the tag, and then down the groove again. The first of the small clips should grip the wire at a point where the rubber covering has not been removed; this will provide protection for the flex where it joins the tag and add considerably to the life of the connection. A spot of solder should be dropped at the point where the wire crosses the metal on the under side of the tag. The stem of the tag and a further ½ in. of the flex should be bound with red or green cotton; this adds strength, and will also serve to indicate

whether the tag is to be connected to a positive or negative terminal on the set.

H. A. P.

The Eiffel Tower is now testing on 2,200 metres. The concerts on Wednesday and Sunday evenings from 8.30 p.m. to 9.55 p.m. are sent out from the second shorter aerial, and the 1,500-metres wave formerly used, which caused interference with Chelmsford and Radio-Paris, has been abandoned.

Experience in recent colliery disasters has shown that as a means of communication between entombed miners and rescue parties ordinary wireless apparatus is practically of no use. It will be necessary to design special sets for use in mines,

CRYSTAL SIMPLICITY

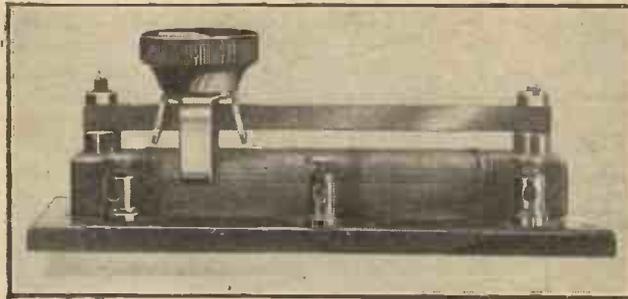
WITH crystal receivers simplicity throughout is a great point in their favour. Many arrangements involving complicated connections and possibly the use of two or more switches give inferior results. Switches are very often highly unsatisfactory and should be avoided in a crystal set. On the other hand, even in crystal work from an experimental point of view we have to employ these necessary evils for purposes of convenience. Those desirous of making up a receiver more or less to their own design will find plenty of scope for embodying their ideas into simple circuits. If they employ a variometer, detector and phones, they can make a space-wound variometer.

RADIO.

THE USES OF A POTENTIOMETER

AN APPRECIATION OF A USEFUL INSTRUMENT

A POTENTIOMETER consists merely of a coil of fine resistance wire wound into a suitable shape, with a connection at each extremity and a variable contact along the middle. There are a large number of different makes on the market, the more common type being wound single-layer fashion with a slider or in the form of a filament resistance. The actual design of the instrument is really immaterial providing good contact is established over the entire length of the coil. Some few years back a potentiometer would cost several pounds to buy, and for that reason was not used as much as it



The Original Type of Potentiometer.

usual resistance of a potentiometer is generally in the neighbourhood of 300 ohms. Thus, if a resistance is connected across a battery of 10 volts, it is easy to calculate from Ohm's law that the current flow will only be .033 ampere, or 33 milliamperes—not a very ruinous figure.

Fig. 3 shows a straightforward three-valve set, consisting of two high-frequency valves followed by a rectifier. The H.F. amplifiers are of the well-known tuned-anode type. As is known, this type of amplifier has a marked tendency to burst into self-oscillation when the anodes are in tune.

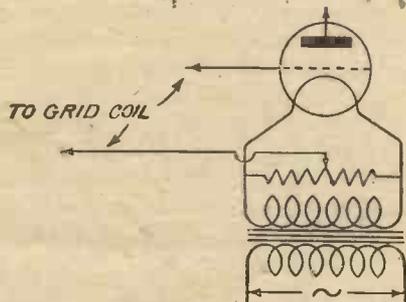


Fig. 1.—Filament Heated by Alternating Current.

legs, the grid potential will vary between minus and plus 2 (if the valve in use has a 4-volt filament).

Taking the frequency of the supply at 50 cycles per second, it is quite reasonable to expect a very bad hum in the telephones due to this 50-cycle alteration. To overcome this, the filament transformer is sometimes centre-tapped—that is, the electrical centre is found and the grid return made to this point, thus ensuring a steady grid potential of zero. However, owing to various difficulties, it is very hard to find the exact central point and consequently difficult to eliminate the hum.

By bridging the output of the transformer with a potentiometer as shown in the figure, and taking the grid return to the slider, it is possible to vary the slider until minimum hum is heard in the telephones.

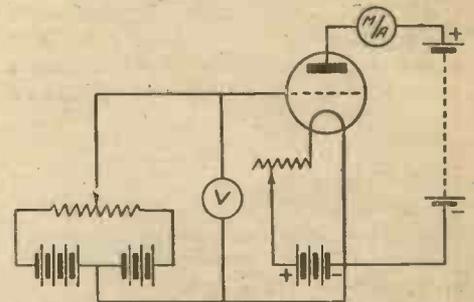


Fig. 2.—Circuit for Plotting Characteristic Curves.

might have been. Now, however, when it is possible to obtain a perfectly reliable instrument for less than 5s., there is no excuse for not making use of one. Until one has made use of such an instrument it is impossible to appreciate its great value.

Among its many uses may be classified the following:

- (1) Obtaining zero potential on the grid of a valve whose filament is heated by alternating current.
- (2) Obtaining grid bias for plotting characteristic curves of valves.
- (3) Controlling the self-oscillation of high-frequency valves.
- (4) Improving the sensitivity of a single-valve receiver.
- (5) Filament resistance for .06 valves.

It is proposed to deal with each of the above instances independently, giving a brief description of the application in each case.

Turning to Fig. 1, we have here a valve whose filament is being heated by alternating current. It is obvious, therefore, that if the grid return lead is connected to one of the filament

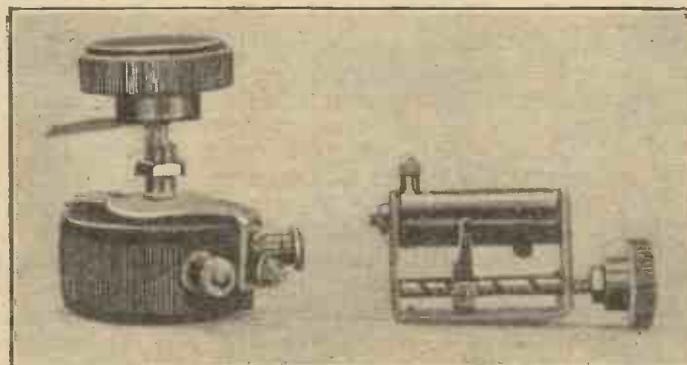
Characteristic Curves

Fig. 2 shows a typical circuit for plotting characteristic curves of valves, which, as is well known, consists of plotting the grid potential against plate current. To obtain a gradual increase or decrease in grid bias the potentiometer is connected up across a set of cells as shown. Then when the voltmeter reads zero, there is zero potential on the grid. At either side of this point the grid assumes either a positive or negative potential, depending upon the direction of flow of current. It might be mentioned at this point that the

Now a method of overcoming this drawback is to introduce heavy damping into the various circuits, generally by means of positive grid bias. Therefore, by connecting up a potentiometer as shown in the sketch, it is possible to control the grid bias on the three valves, even without the necessity of introducing extra batteries and at the total cost of 20 milliamperes from the 6-volt accumulator. Thus a much more stable arrangement is made and the set will work considerably more satisfactorily. Also, as will be seen from the following case, the rectifier will work with greater sensitivity by reason of its positive grid bias.

Fig. 4 shows an ordinary single-valve single-circuit set. This type of receiver can be made very sensitive by a few deft touches here and there. In the first place, a rectifier will work considerably better if operated on the upper bend of its characteristic curve (see Fig. 5), as rectification will take place equally well, but the plate current is greater and greater variations are produced accordingly.

To attain this objective, the grid of the valve should be



Two Newer Types of Potentiometer.

made positive. If this is carried too far, we go over on to the flat portion and the valve becomes more or less useless. If, on the other hand, we do not carry the matter far enough, we remain on the straight portion of the curve, a state of affairs very satisfactory from an amplification point of

view, but to be carefully avoided where rectification is desired. The only really satisfactory method of obtaining this exact grid potential is to use a potentiometer shunted across the filament battery as shown. Any tendency to overlap can be avoided by adjustment of the grid leak and consequent readjustment of the potentiometer. Yet another ruse in this connection

is in the control of so-called "soft" valves, which are very sensitive if carefully handled. The same circuit may be employed, but generally without the grid leak and condenser. Extra grid bias may be required also, but this is a matter for experiment.

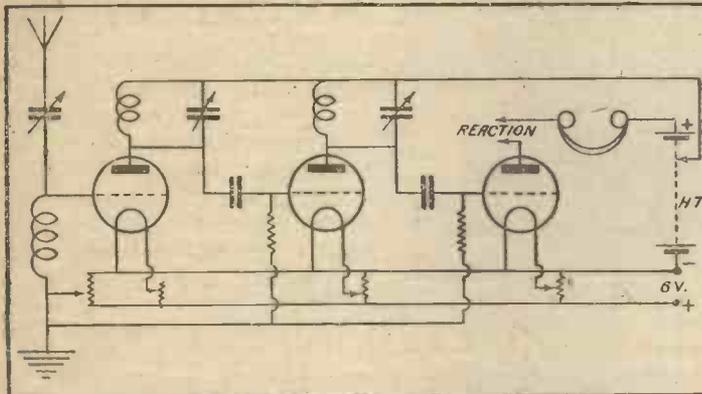


Fig. 3.—Use of Potentiometer in 3-valve Circuit.

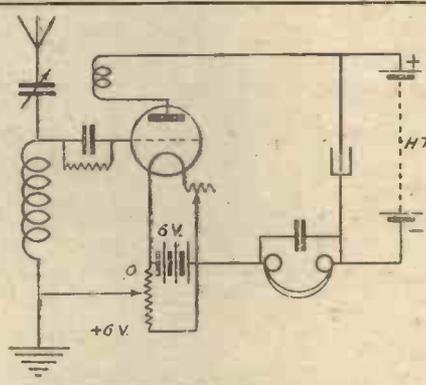


Fig. 4.—Use of Potentiometer in Single-valve Circuit.

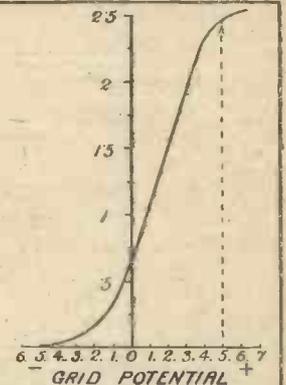


Fig. 5.—Characteristic Curve showing Rectifying Point.

view, but to be carefully avoided where rectification is desired. The only really satisfactory method of obtaining this exact grid potential is to use a potentiometer shunted across the filament battery as shown. Any tendency to overlap can be avoided by adjustment of the grid leak and consequent readjustment of the potentiometer. Yet another ruse in this connection

Finally we come back to earth and can use this instrument for a very domestic purpose as regards wireless—filament control of .06 valves. With a potentiometer of 300 ohms and a 6-volt accumulator it is possible to run one or more .06 valves without fear of burning-out either the valves or the resistance. It may not be possible to obtain fine control by this

the resistance of your potentiometer before carrying out this last method or the valve may be damaged.

In conclusion, take the writer's advice, obtain a potentiometer, and try out some of the above suggestions. You will be surprised at the satisfaction obtainable from such a small and quite unobtrusive instrument.
A. G. W.

A MAST TABERNACLE

It is surprising that more amateurs when erecting an aerial do not adopt the nautical method of using a "tabernacle" or housing instead of sinking the aerial mast in the earth.

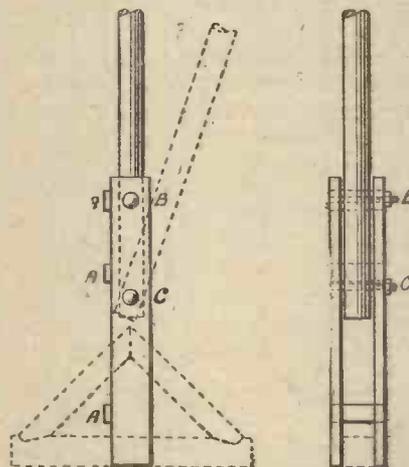
With a tabernacle the mast may easily be lowered for painting, etc., or in case of the wire breaking or becoming jammed. Again, the tendency is for a wooden mast to rot just below ground level, and this is, of course, avoided, any rotting taking place in the tabernacle, which lasts much longer than a pole owing to its greater bulk. Another point in favour of the tabernacle is that it enables the whole of the mast to be used effectively, thereby giving greater height.

An easily made tabernacle is shown in Figs. 1 and 2. It consists of two timber uprights, either spaced by three wooden distance pieces as shown at A or by a solid piece the same length as the other two. The dotted portion is optional and it is unnecessary in the case of a light mast, but is strongly recommended in erecting a stout pole more than 25 ft. long.

Measurements are not given, as these will be governed by the size of the mast used,

but generally speaking the tabernacle should be one-fifth the length of the mast with a minimum length of 6 ft.

Fig. 1 shows the side elevation, B and C being bolts which keep the mast in position. It will be seen that C acts as a pivot



Figs. 1 and 2.—Details of Mast Tabernacle.

in erecting or lowering the mast after removing the bolt at B. Fig. 2 shows the front elevation.

Stay wires are advisable for the mast, as they enable the raising or lowering to be carried out more easily, in addition to preventing strain and movement in rough weather.

The whole of the tabernacle should be well creosoted or tarred.
A. W. X.

CRYSTAL HINTS

ALTHOUGH the crystal will often function under very adverse conditions, it invariably gives much better results when treated properly, and the following hints will be found to assist considerably in obtaining maximum efficiency.

The crystal must be clean, and whether enclosed or not should frequently be brushed vigorously with a stiff toothbrush.

Another important item is the catwhisker, which should be of fine wire with a very sharp point. An easy way of getting a sharp point is to cut the end of the catwhisker slantwise with a pair of scissors.

When searching for the best point of the crystal, always detune until signals are only very faint and then try for the loudest point, afterwards retuning. This is much more easily accomplished than when the set is properly tuned and strong signals are coming through. Let the contact be as light as possible.

In the case of reflex circuits, the writer has found that the best crystal point for the local station is not necessarily the best for other stations.
W. A.

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- (a) It must bear the name "DUBILIER."
- (b) It must be sold in a standard Dubilier box.
- (c) It must have the capacity clearly marked on the box (in the case of mica condensers).
- (d) It must be offered at the standard Dubilier prices as set forth in the Company's lists and leaflets.

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On Your Wavelength!

R 33

As luck would have it, I did not tune-in to 900 metres on the day that R33 broke adrift from her mooring mast at Pulham, and I knew nothing about the event until the evening papers arrived. Curiously enough, I had been working on this wavelength only the day before when testing out a new set. I always regard it as one of the most useful for this purpose, since there is telephony to be picked up at almost any time during the hours of daylight from Croydon, Lympne, Le Bourget, Rotterdam and other air stations, and one can be almost sure that one is causing no interference with anybody.

Those who were lucky enough to be searching for any of these stations on the fateful day must have had a most thrilling time listening to the story of the adventure as fresh developments were recorded by the various aerodromes. We may say pretty safely that but for wireless the R33 would probably have been wrecked. As it was, the weather experts were able to send her frequent reports of wind conditions, so that she was able to avoid the worst of the gale and managed eventually to return to port with her crew safe and sound.

The adventure of the R33 has indubitably proved how indispensable wireless is to this kind of craft. At the time of writing I am not aware of the nature and make of the general equipment, though I do know that the entire current supply is derived from Exide batteries—another proof of British excellence.

Wireless, in addition, is the airman's great stand-by when he is lost in a fog or in the dark. If you make use of the 900-metre wavelength you have probably before now heard a lost airman given his position by the ground stations. He is asked to keep on speaking for two minutes or so whilst two stations obtain a cross-bearing by means of direction-finders. With the help of these his position is plotted upon the map and reported to him. He is also told the course that he must steer to bring him where he wants to be.

Timely Warnings

One of the gravest risks that the airman would run if he had no kind of long-distance communication with the ground would be that of finding himself suddenly in the midst of an unexpected storm. As it is, he knows just what weather is ahead of him during the whole of his journey, and he can obtain reliable forecasts of the conditions likely to be met with an hour or even two hours ahead. The pilot who mistrusts the weather outlook whilst he is on his way calls up the nearest aerodrome and asks for a weather report.

The aerodrome telephones immediately to the Air Ministry, where a staff is constantly engaged in tabulating the weather news received from many different points. By means of the weather map upon which they are working they are able to reply almost at once over the land-line and their report is wirelessly to the pilot.

Programme Changes

I see that we are very shortly to have certain changes in the nature of the broadcast programmes. The first news bulletin has already come to an end, and I am not sure that this will be welcomed by a large number of listeners. Country folk who have to be afoot betimes in the morning generally go to bed pretty early, and it is a question whether they will be able to sit up for the one news bulletin now given at ten o'clock. If we are to have but one set of news items it would, I think, be better to broadcast them at a time intermediate between the original two, say at about 8.30. Except on special occasions, such as boxing matches and so on, I do not think that we should lose much in the way of news if the hour suggested were adopted. In any case, special announcements could be made at later times. The news bulletin is intended primarily for those who cannot see an evening paper, and the weather forecasts are especially useful to farmers, who must perforce go early to bed. I imagine that in the not very distant future we shall have a pretty constant service of news, probably from the high-power station. At present this is impossible owing to the agreement with the newspapers. It was, however, pointed out some time ago by Lord Burnham, who ought to know, that newspapers might expect increased rather than decreased circulations from the broadcasting by wireless of news items.

S.B. In America

Our own country was, I believe, the first to work simultaneous broadcasting—at all events, upon a large scale. The idea has now been taken up by some of the big American stations, linking up being done both by land-line and by wireless. Those who listen to the short-wave transmissions of KDKA know perhaps that these are sent out for S.B. work with other stations, and that they are not intended to be picked up direct by amateurs. Except amongst a certain few, short-wave work is not very much done in the States, and KDKA's lower transmission is heard probably by a greater number of people in this country and in the rest of Europe than in America. Land-line linkage has

been established between WBZ, WJZ and WJY, the last two stations being also connected directly to WGY and WRC. This makes it possible for programmes given in New York, Washington, Schenectady, Springfield or Boston to be broadcast over the whole of the eastern half of the United States. I have several times heard New York relayed by both WGY and WBZ, the results in spite of the long land-line being excellent. This is only one step, though it is a big one, in the development of S.B. over there. Before long the western stations are bound to be joined up so that the whole of America will be able to hear any really great programme or any important speech.

Talking of relaying, a remarkable feat of this kind was done not long ago when the music of the Savoy bands was sent over the land-line to 5XX, whence it was transmitted to Belfast. Thence the transmission went on 120 metres to a coastal receiving station on the far side of the Atlantic, which sent it over the land-line to WJZ. The last station broadcast it in the ordinary way. But this was not the end of it. One of our own amateurs picked up WJZ, called up the Savoy Hotel on the telephone, and let the manager hear the dance band music that had travelled between six and seven thousand miles through the ether and over the various land-lines.

Condensers

I did not realise what a difference poor condensers could make to reception even on the broadcast wavelengths until I brought into service an old set the other day, the more modern one having gone to the workshop for alterations. Both sets are of the same size, containing two high-frequency stages (tuned-anode, with the same special circuit in each case), rectifier and two note-magnifying stages, the first coupled by a transformer and the second by the choke and capacity method. The original L.F. transformer in the old set has been replaced by a modern one, so that the audio-frequency part of both sets is up to the same standard. Where the two differ is in the tuning condensers, those of the new set being of first-rate low-loss design, whilst the old ones, though of good quality, are of what I may call a "high-loss" pattern.

With the new set it was an easy business to get almost any British or foreign main station on the loud-speaker, whilst American stations could be picked up with fair certainty on any night that was not utterly unfavourable. With the old one, tuning is so flat that it is difficult to separate 2LO from Newcastle, and very few stations

On Your Wavelength! (continued)

come in at anything like their proper strength. America I have not heard since this set was brought back into commission. They were not cheap condensers, mark you, for the four of them cost nearly three pounds. Between two and three years ago, when they were purchased, they were thought to be, if not the last word in efficiency, at all events something like it. We have certainly advanced a long way since then in the design of variable condensers. Not everyone realises how great is the difference that good condensers make. If your set is rather "dead," if your range is not what it should be and if signal strength is poor, try the effect of substituting good condensers made upon an ebonite foundation or in other ways designed to have very small losses.

Long-distance Reception

Conditions for long-distance reception have not been particularly good of late. I doubt if anyone has been able to get at the higher-wave American stations with anything like success for some time. Even WGY, whose strength is usually phenomenal, has been getting very weak and badly blurred. Other stations have almost faded out completely. Whether this is due to the fact that the winter season is drawing to an end, or to purely temporary conditions, it is at the moment rather difficult to say, but no doubt a week or two will decide. I should imagine that most of the American stations specialising in long-distance transmission are prone to experiment, with the result that similar difficulty experienced by listeners in England may at times be due to alterations in the transmission constants. I am beginning to wonder when we shall be able to ascertain, with something like certainty, how much of the success of wireless work during the last twelve months is due to transmitting apparatus improvements and how much is due to improvements in receiving circuits.

Single-valve Sets

I have always blamed single-valve circuits for at least seventy-five per cent. of the interference we are subject to. But I must confess that now my ideas have been somewhat revolutionised.

Recently a friend brought to me a single-valve set of a perfectly straightforward type, incorporating reaction direct on to the aerial. The only peculiarity I could find in this set was the provision of a vernier across the aerial tuning condenser.

I placed this set on my aerial for test purposes, expecting to receive a number of distant stations, since I have never questioned the fact that the single-valver is sensitive. I also expected a certain amount of selectivity. As against this, I anticipated a considerable amount of

hand-capacity effect and considerable rustiness of musical tone.

I might as well confess that I expected the set to howl when anyone walked past it within a radius of ten yards. The actual results were somewhat startling.

In the first place, the number of distant stations which I received with ease was far in excess of anything I had heard before, and this selectivity of the receiver was so great that I was able to cut out 2LO (at a distance of seven miles) by moving the vernier a couple of degrees. I should think that in ten minutes I received a couple of dozen Continental stations, all of which I was able to pass through a note-magnifier to the loud-speaker, and all without interference.

I can quite guarantee that I caused no undue amount of interference while searching for distant stations. And this particular set was wired up with Systoflex tubing—Heaven knows what it would have done had it been constructed properly! So intrigued was I that I waited until the American stations opened in order to test it against my own standard receiver in the reception of U.S.A. broadcasting. And here, for the first time, I found its limitations.

To summarise the results, I should say that for the reception of British and Continental stations within a radius of 1,000 miles of the receiving aerial, a properly designed single-valve set is probably superior, even from the point of view of purity, to any other receiver I have met. But outside that radius it must give way to the receiver incorporating one or more stages of high-frequency, since a single-valve, even when worked on the edge of oscillation, has a definite limit to its sensitivity. I was entirely unable on this set to bring in anything from America. Conditions were certainly not good, but my own receiver brought in the usual American stations in reasonable volume.

One point has certainly arisen. Without a doubt, when I manage to find time, I shall put some of these single-valve circuits through intensive tests. From the point of view of the man who cannot afford an expensive set and yet wishes to tune in most of the Continental stations as well as the B.B.C. stations, it really does seem as though a straightforward circuit incorporating one valve and reaction direct to the aerial, followed by one or two stages of magnification, provides the best solution. The cost of upkeep is a minimum, the sensitivity more than reasonable, and the purity of reproduction obtainable really surprising.

Those Difficulties

The way of the experimenter is, as I have observed before, hard. The strange case of Smith, who built for himself a

super-heterodyne with which he received all and everything on a frame aerial for a steady fortnight is an instance. The signals which had come in so surprisingly easy suddenly ceased to exist, and it took Smith two week-ends and a spare Saturday morning to trace out the cause of the cessation—his neighbour had taken down his aerial for repair and his oscillating valves were quiet for a brief period. The exasperating part about it from Smith's point of view is that the super-heterodyne still refuses to work and is likely to be *hors de combat* until that aerial goes back. He now wishes that he had not mentioned it to his friends.

Meal-time Music

If anybody had told us last year we should have dined or tea'd to the music of *Pagliacci* or the *Ballet Egyptien*, I'm positive we should have called them—well, idealists, anyhow, and it is evident that the public taste for really musical music is increasing, judging by the high standard set by the restaurant bands at the Holborn, Metropole and Trocadero. They do say that some of the diners actually refrain from talking while the bands are playing, and if that isn't a triumph of mind over matter, what is? But personally I fail to see why we should be restricted to one hour. If the B.B.C. is too busy to provide music instead of talks, why not let the switch alone and allow these bands to continue giving us pleasure.

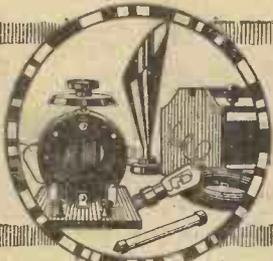
Press Programmes

Another excellent "outside" programme was that of last week. The artists were all household words in the way of fame. The outstanding item in my opinion was that of Miss Marie Hall, the famous violinist, but someone ought to have sat on the pianist who accompanied her; it would have needed a small army of violinists to stand up against the blast.

Labour Troubles

A certain amateur transmitter in the West of England recently purchased a hand-driven H.T. generator and is somewhat peeved because he cannot persuade more than eleven watts to pass through a 30-watt valve. To make matters worse, he hired his small brother "to do the mangling," and promised him half a crown per Yankee station worked. Up to the time of writing no Yankee stations have been worked, and the motive-power hand has gone on strike. The one-boy power maintains that it's too much like hard labour, and that small brothers should be paid per hour and not by results. He would welcome the names and addresses of small brother power-hands who would care to consider joining a trade union movement in order to uphold their rights.

THERMION.



PRACTICAL ODDS AND ENDS

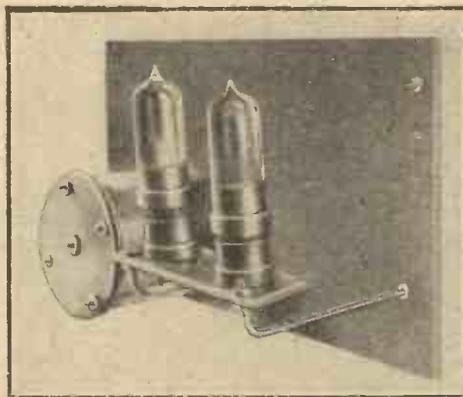
Multiple Connections

WHEN several connections are made to one terminal, and one happens to be a connection which it is desired to change fairly frequently (as, for example, reversing the leads to a coil or cutting out of circuit a certain piece of apparatus), annoyance is sometimes caused when doing so by the permanent connections coming adrift and being troublesome to recollect.

This can be prevented by threading on a nut underneath the milled terminal head and securing all permanent leads under this nut. The temporary connections can then be joined up in the usual way between the nut and the milled head.

W. G. T.

date the number and type of valve holders, it is desired to mount is drilled with two $\frac{1}{8}$ -in. holes, one at each end.



Back-of-panel Valve Mounting

The short-angled portions of the rods are now fixed into these holes and locked in position by means of two nuts, one above and one below the strip.

The photograph, which shows the holders mounted and unwired for clearness, is practically self-explanatory.

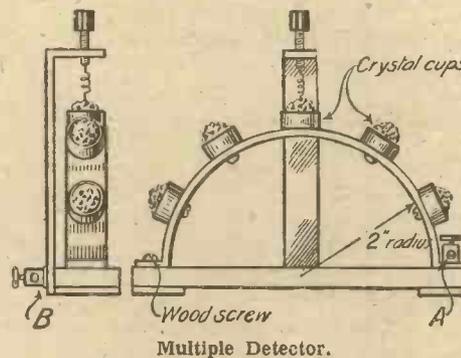
W. A. A.

A Multiple-crystal Detector

WHEN it is necessary for experimental purposes to have a selection of crystals, much trouble is caused if the crystals cannot be quickly changed.

A multiple-crystal detector, which can be easily made, is shown in the diagram.

The semicircular cup-holder and the cat-



Multiple Detector.

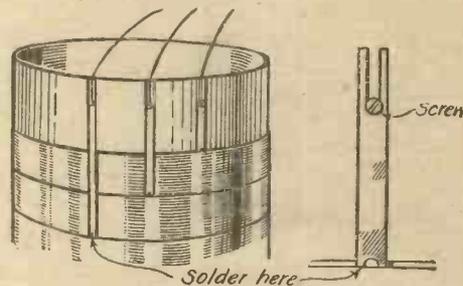
whisker arm are both made of brass strip, the former having a radius of about 2 in. and the latter being about 3 in. up to the bend. By using this, several different types of crystal can be tested without having separate stands. The only terminals used are those marked A and B in the diagrams.

F. C.

Neat Coil Tappings

A VERY neat method of tapping coils can be done in the following way. The coil is wound as usual, preferably with enamelled wire to ensure tightness after the tappings have been made. Then about a quarter of an inch of each of the selected turns for taps is scraped clean of insulation.

The leads for the taps are cut from brass ribbon (about $\frac{1}{4}$ in. wide). A semicircular bay with a depth equal to the diameter of the wire is cut in the end of each lead and slots are cut in the other ends of the leads as illustrated, this slot being wide enough to allow a small screw to pass through it. The strips, of course, vary in length according to the distance of the tapped turns from the end of the



Method of Taking Tappings.

coil. The semicircle at the end of the leads permits soldering.

Connecting wire is fitted to the screws by another nut on the end of the screw.

L. F.

An Aerial Tip

THE amateur, when putting up his aerial, is often at a loss to know how to fix his insulators in between his spreader-hooks and aerial wire.

Little pieces of wire, roughly tied, look unsightly, and may cause a downfall in a high wind.

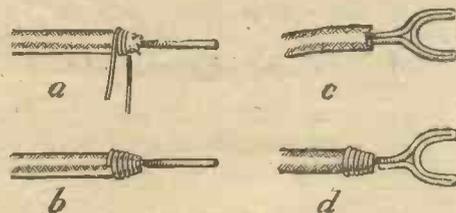
The amateur will find that if he obtains from his ironmonger a number of galvanised S hooks, such as are used to hang meat upon, he can hook these in between his insulators quite easily. The points should be carefully bent round the insulator to keep it from coming off the hook, and a neat and efficient joint will have been made.

This method was first used with egg-shaped insulators, but can, of course, be used for any type if the hook is obtained of the size that best fits the insulator.

C. A.

Neat Tips for Wires

IN order to have the wiring look as neat as possible on a set, all wires with outside connection to terminals should be



Neat Tips for Wires.

wound with small bare wire to prevent the insulation from unravelling. *a* and *b* show the insulation removed from the wire and the neat finished effect. *c* and *d* illustrate the method of making a spade tip for connecting to terminals. The latter is a connection that is especially useful when the wire is to be frequently connected and disconnected.

F. C. L.

Reaction Control

A SIMPLE vernier reaction control may easily be arranged by placing a .0005 or .001 microfarad variable condenser across the phones in place of the usual .001 fixed condenser. The H.F. currents are by-passed to earth according to the amount of condenser in circuit.

P.

Mounting Valves

A CONVENIENT method of mounting valves behind panels is illustrated in the accompanying photograph.

Two 6-in. lengths of 2 B.A. rod are cut and a right-angle bend made in each 1 in. from the end. A strip of ebonite, the length and width required to accommo-

EXPERIMENTAL TRANSMISSION.—XIII

MODULATION (continued)

A THREE-ELECTRODE valve may be used to amplify the microphone currents before absorption, as in Fig. 52, or a neon tube may be employed as previously described.

The chief advantage of grid control is its simplicity of modulation for all

The transformer in the plate circuit may be constructed with such a suitable value for the step-up ratio that the maximum voltage produced in one direction will be sufficient (provided that no lag effects are introduced) to set up oscillations.

diately become overloaded, and a breakdown might occur. Thus if the quiescent aerial system is used, a much larger valve will have to be employed than would normally be necessary, so that there is no chance of overloading occurring.

Fig. 54 shows a diagram of connections

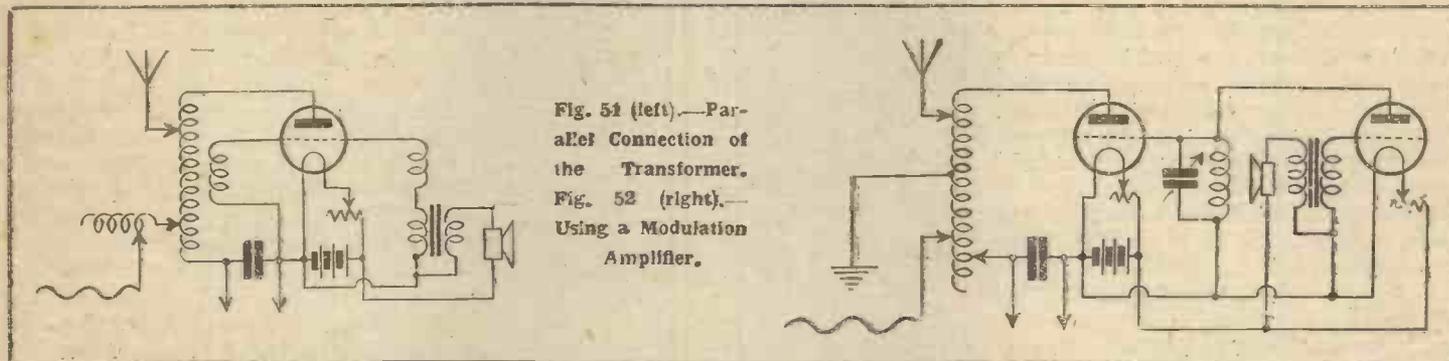


Fig. 51 (left).—Parallel Connection of the Transformer. Fig. 52 (right).—Using a Modulation Amplifier.

powers, but we also have to remember that grid modulation is rather unstable, is inefficient above about 1,000 metres, and cannot be very deep.

Constant current Control

The methods of controlling the current flowing in the plate circuit should be self-evident after reading the foregoing; the simplest method is shown in Fig. 53, but unfortunately this method has many dis-

advantages in practice, and unless special measures were taken distortion would result. It is, however, interesting to note that this circuit, besides being the simplest form of constant-current control, may, with suitable values for components, be the basis of a number of circuits employing the quiescent aerial system.

It will be seen that if the high-tension supply is suitably reduced, or even omitted, no oscillation will be set up and the circuit will be absolutely dead.

advantages in practice, and unless special measures were taken distortion would result. It is, however, interesting to note that this circuit, besides being the simplest form of constant-current control, may, with suitable values for components, be the basis of a number of circuits employing the quiescent aerial system.

This circuit has every advantage of simplicity and stability, but it is only necessary to point out that since two valves are employed, each helping to consume the power available, the running costs are not low. KENNETH ULLYETT.

(To be continued)

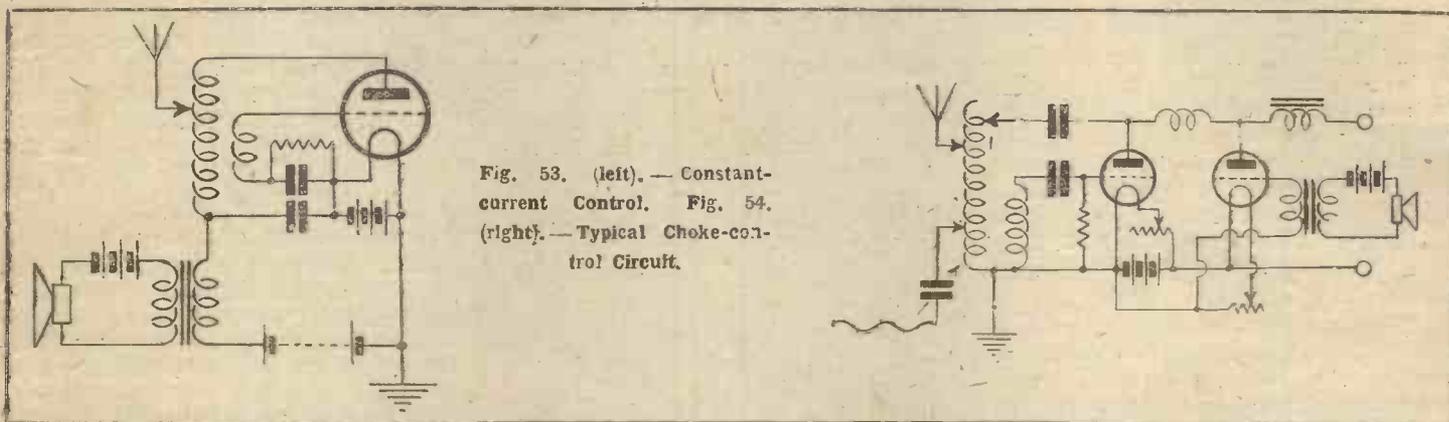


Fig. 53. (left).—Constant-current Control. Fig. 54. (right).—Typical Choke-control Circuit.

advantages in practice, and unless special measures were taken distortion would result. It is, however, interesting to note that this circuit, besides being the simplest form of constant-current control, may, with suitable values for components, be the basis of a number of circuits employing the quiescent aerial system.

It will be seen that if the high-tension supply is suitably reduced, or even omitted, no oscillation will be set up and the circuit will be absolutely dead.

exceedingly difficult to obtain even intelligent speech with it, and is thus not really worthy of consideration. The system, too, is limited to low powers.

It should be remembered also that a valve, when oscillating, will of course absorb much more energy than it would in the normal state, and it is thus usual practice to push up the input power to a much greater value than the valve could normally stand. If for any reason the valve should stop oscillating, it would imme-

A new group of lightships is to be fitted with wireless telephones and wireless bells, and these will be in communication with a new Trinity House station to be erected on the seashore near Cromer.

In Germany a receiving licence costs £5 a year, and it is collected weekly by a Government official, who has power to confiscate the set of any licence-holder who is in arrear with his payments and hold it until he has made payment.

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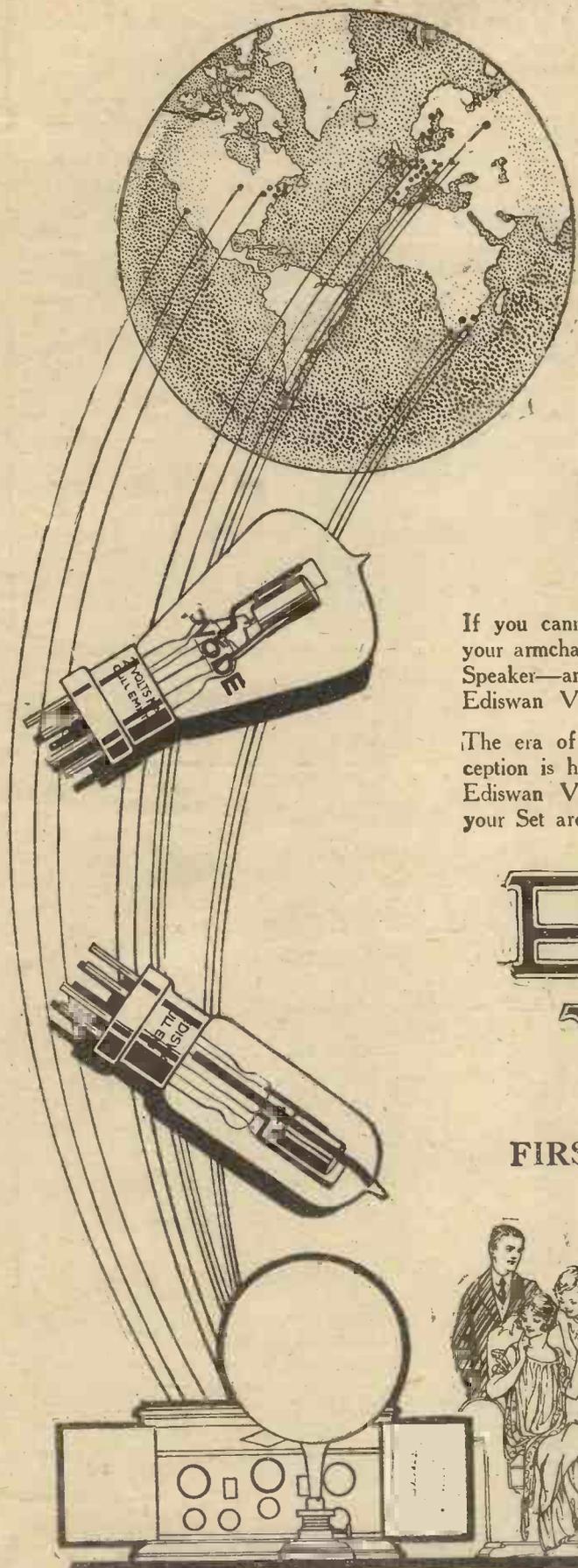
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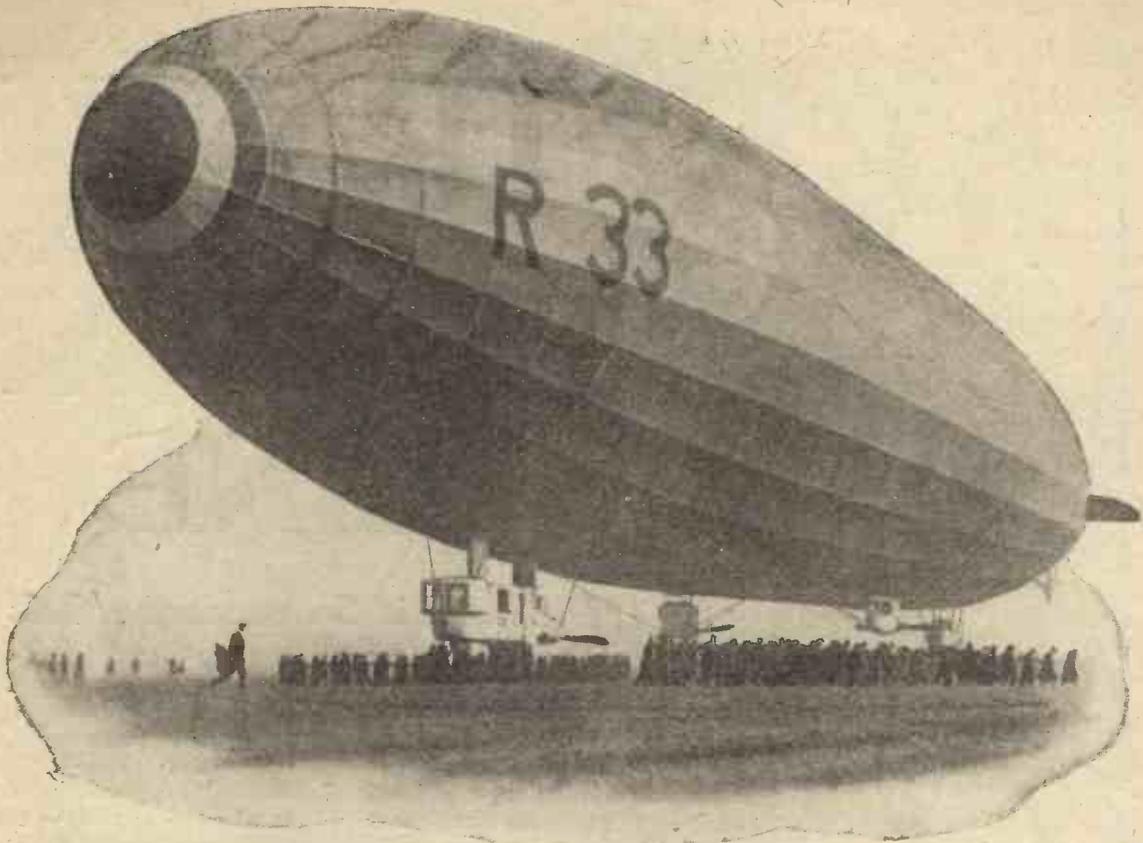
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The above photograph shews the
R 33
prior to making her first flight.

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The LARGEST BATTERY WORKS in the BRITISH EMPIRE

A CRYSTAL SET DE LUXE

THERE must be many listeners whose interest is limited to crystal reception who would like to possess what might be termed a "de luxe" outfit of this type. It has often surprised the writer to observe how many of his acquaintances who use crystal sets are content with the very cheapest or, in the case of home-constructed apparatus, the crudest article which will serve.

Good Appearance

Why this should be it is difficult to say. The valve user generally takes a pride in the appearance of his set. Why not the crystal user? Perhaps it is that a crystal set can be so easily thrown together out of almost any odd material that many amateurs hardly consider its construction a serious proposition. At all events, it appears to the writer that a crystal set is such a wonderful instrument, so frequently in use and consequently before our eyes, and giving so much pleasure, that it justifies as much care in construction and as handsome a cabinet as any of the more expensive and elaborate valve receivers.

The set shown by the photograph was built by the writer with these ideas in mind, and in addition to providing accommodation for two pairs of phones, it forms a handsome piece of furniture when out of use.

Components

Regarding the actual electrical components, little need be said except that the best obtainable were used. An open-type detector was chosen for convenience and ease of manipulation, and the screws in the crystal cup were replaced by knurled-head screws to avoid the necessity of a screwdriver when setting the crystal.



The Complete Set.

Tuning is done by means of a double spherical variometer with internal stator winding; separate terminals are provided for each pair of phones.

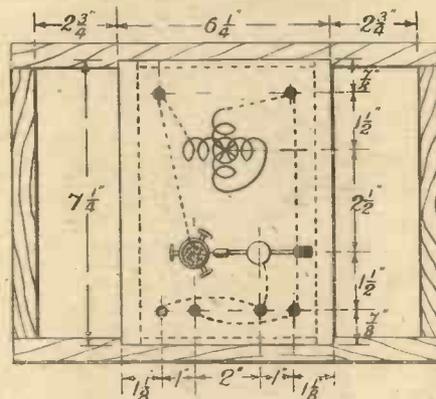


Diagram showing Connections.

Flat copper strip $\frac{3}{8}$ in. wide by about .001 in. thick was used for all connections behind the panel (see the diagram). No

labelling of the terminals was considered necessary, as it is obvious which are the phone connections, and the aerial and earth are interchangeable.

The Complete Set

The cabinet was made of old seasoned mahogany $\frac{3}{8}$ in. thick, dovetailed at all corners; the joints can, of course, be simplified if necessary to suit the constructor's skill in woodworking. The base projects $\frac{3}{8}$ in. all round and has a $\frac{3}{8}$ -in. bevel, and the top of the lid, which was a piece of choice grained wood, also projects $\frac{1}{4}$ in. all round but has square edges. The overall outside dimensions of the box are 14 in. long by 9 in. wide by $7\frac{1}{2}$ in. deep, closed. The ebonite panel is $7\frac{1}{4}$ in. by $6\frac{1}{4}$ in. by $\frac{1}{4}$ in. thick.

Grooves were cut to receive the vertical divisions which form the phone compartments and also carry the ebonite panel. The panel was let into the back and front of the box to cover the ends of the grooves.

A novel method of fixing the panel down was employed which conceals the fixing screws. Each corner terminal passes through a small separate piece of ebonite under the panel, and these small pieces are in turn screwed to the vertical partitions within the box, making a secure and invisible fixing. The wood bottom of the box is also screwed on and can be removed if necessary to get at the back of the panel.

R. L.

Ryvang (Denmark) recently broadcast a concert in which wind instruments taken from the Copenhagen Museum were used. Some of these had been found in the course of excavations and are stated to have been 3,000 years old. It is thought that they belonged to the original vikings.

DATES ON VALVES

ADDITIONAL interest is given to the amateur's experiments if he keeps some sort of record of the apparatus that he uses and the progress that he makes month by month.

This keeping of records has a particular merit in the case of valves. Every amateur should know exactly when each of his valves was put into service, so that some estimate can be made of its useful life.

The most obvious method of recording such particulars is to write them in a book, but this has a number of disadvantages, of which the greatest is that a book is so easily mislaid.

A method adopted by the writer that has

proved to be quite satisfactory in practice is to stick to the valve a small label bearing the date when it was first used.

For this purpose an ordinary small gummed label is suitable, but if it should tend to become unstuck when the valve is handled a thin coating of shellac varnish will put things right.

Every experimenter will recognise the value of keeping records of valve life in this way. It may be of interest to note that the writer still has in use a bright-emitter R valve dated June, 1921. It has not, of course, been used continuously, but nevertheless it has done a fair share of work.

G. W.

PANEL TRANSFERS

IN spite of claims made by the makers to the effect that their transfers will not crack or curl, it is sometimes found that after a time the transfers chip off and completely spoil the appearance of the panel. To overcome this difficulty, paint over the transfers (after applying them to the panel) with quick-drying shellac varnish, using a small camel-hair brush for the purpose.

A useful tip in applying the transfers to the panel is to use an old teaspoon instead of a hot pad of rag or blotting-paper, as usually recommended. The spoon can be made hotter and retains its heat longer, besides being much more convenient to manipulate.

E. B. R.

Ask "A.W." for List of Technical Books



Photograph of General Ferrié transmitted over 200 miles of wire by the Belin system

THE Paris Conference to inaugurate an International Amateur Radio Union was attended by over two hundred delegates, representing wireless clubs and association from twenty-one different countries in all parts of the world.

The primary object of the congress, as advertised, was to organise the wireless workers of various nationalities into a coherent body having sufficient driving force behind it to safeguard the interests of the amateur against any adverse influences, commercial, political or otherwise.

Purpose of the Association

Although it is obvious that any association claiming the status of an International Union of Radio Amateurs should be broad enough to include in its ranks those interested in reception, particularly broadcast reception, as well as those carrying out experimental work in private transmission, it was made clear at an early stage of the proceedings that the Paris delegates were mainly interested in the private transmitter.

To a large extent this is bound to alienate the active sympathies of the ordinary amateur, who confines himself to experimenting with receiving circuits, more or less specially adapted for broadcast reception. If the union as constituted is unwilling to safeguard and protect the interests of this class of worker, who by the way represents at least 95 per cent. of the wireless public, it will certainly become necessary to organise another international association upon a broader basis.

Apart from the task of drafting the constitution of the new union, the conference discussed ways and means for co-ordinating the experimental work now being carried out by the amateurs of different countries on short wavelengths,

AT THE PARIS CONFERENCE

A Special Report by our Own Representative

particularly in two-way transmission and reception. A schedule of wavelengths to be used for this purpose in Europe, the U.S.A., Canada and Newfoundland and other countries was agreed upon.

After some discussion, in which the Scandinavian delegates advocated the use of English as an international language for world-wide work, it was finally decided to adopt Esperanto.

Legal Points

A special section of the conference was devoted to a consideration of various legal points of interest in connection with the use of the ether by private individuals. As is well known, the law in this respect varies considerably in different countries. In America, for instance, there is no strict State monopoly such as we have in England. Permission is not necessary in order to listen-in, and no tax is payable.

It is, however, necessary to secure a licence before one is allowed to transmit, but permission to use a low-power transmitting set is far more easily obtained both in France and America than here. In America alone there are at present nearly 18,000 licensed amateur transmitters.

Another point of interest arises in connection with copyright in broadcasting. As most people are aware, the right to perform an original work in public for profit is an important part of the property rights of an author. For instance, a playwright is legally entitled to draw a royalty for every public performance of his play, just as a composer is entitled to draw a fee every time his musical score is played in any theatre or other place to which a charge is made for admission.

The position in this respect as regards broadcasting is by no means well defined. The courts of certain countries, for example, the United States and Germany have decided that an original work may not be broadcast without the author's permission and the payment of an agreed royalty.

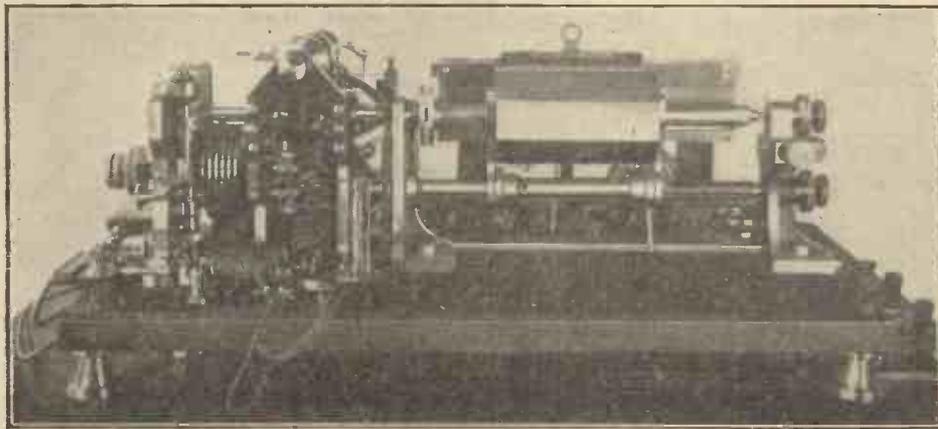
On the other hand, it has been argued that broadcasting is not a public performance for profit in the strict legal sense of the term any more than playing a pianola, or reproducing a gramophone record, for the amusement of a party of friends assembled in one's own house.

Meanwhile there are signs of the development of a new technique, both in dramatic and musical art, specially directed to the peculiar needs of wireless transmission. Unless the private property rights of the author in such radiated work is clearly defined and established, the artistic development of broadcast along these new lines is bound to suffer.

The conference held its meetings in the buildings of the Faculty of Science at the Paris University. At the opening session, on April 14, formal speeches of welcome to the delegates were delivered by various distinguished personalities in the wireless world.

General Ferrié

General Ferrié, the head of the French Military Wireless Service, thanked the delegates and those whom they represented, in the name of science, for the many valuable contributions they had made to the progress of wireless. There was still much to be discovered and many problems to be solved, particularly in the



The Belin Photo-telegraphic Apparatus.

elimination of atmospheric disturbances, and a more complete knowledge of the way in which ether waves were propagated over the surface of the earth. In both these and other directions the amateur and private experimenter could still do useful research work, and thus help to perfect the technique of radio communication.

Mr. Hiram P. Maxim, president of the A.R.R.L., expressed the deep admiration felt by himself and other American enthusiasts at the remarkable results achieved by British and French amateurs in the region of short-wave transmission and reception. Two-way communications between England and Australia had now become almost commonplace, although the power used by amateurs was infinitesimal when compared with that employed by the large commercial stations.

For the first time in history a private citizen in one part of the world was able to communicate, practically as and when he liked, with another private citizen at the other side of the earth. This was an astounding feat of human intercourse and one which, in the course of time, must develop into a factor of tremendous importance in world politics. Communication with the Antipodes represented the maximum distance possible over the earth, and this could now be covered by the new short waves either by day or night.

European amateurs, he added, might be interested to learn that a representative of the American Relay League is at present with the U.S. Pacific fleet experimenting on short-wave reception. This worker,

using the call-sign, NRRL, would be glad to co-operate with any European amateur able to get in touch with him on a wavelength of 23 metres.

At the close of the conference, on the 18th, it was announced that the following officers of the newly-constituted union had been elected: Mr. Hiram P. Maxim (America), international president; Mr. Gerald Marcuse (England), international vice-president; Mr. Warner (America) secretary and treasurer; M. J. G. Mezger (France) and Mr. F. Bell (New Zealand), international counsellors. The headquarters of the union are fixed, for the time being, at Hartland, Conn., U.S.A., where the existing organisation of the A.R.R.L. is available.

During the four days of the congress special facilities were given to the delegates to visit various places of wireless interest in and around Paris. On the 14th and 16th the transmitting equipment at the Eiffel Tower was inspected, whilst on the 17th a large contingent paid a visit to the famous high-power station at Sainte Assize, situated some twenty-five miles outside the city.

The aerial system at this station is supported by sixteen huge pylons or masts, each 800 ft. high. The receiving aerial is located at Villecresnes, a considerable distance away. Both transmission (keying) and reception (recording) take place, however, at the head office of the Cie Radio-France in the centre of Paris, the necessary control being automatically effected by relaying over land-lines.



M. Eduard Belin. A photograph specially autographed for "Amateur Wireless."

Perhaps the most interesting trip was that made to the establishment of M. Belin, at Malmaison, where the distinguished inventor personally conducted the delegates over the laboratories and explained his famous system of transmitting photographs by telegraphy. The perfection attained by M. Belin's apparatus is well illustrated by the accompanying copy of a photograph of General Ferrié transmitted over two hundred miles.

WATCH YOUR ACCUMULATORS

THERE are certain rules which should be carefully observed if accumulators are to remain efficient for their allotted span of life. Give the battery the attention it requires and it will remain in service for a long time. The writer has had the same accumulator steadily at work since the early summer of 1922 and as yet it has shown no signs of old age.

Discharge

In the first place, the most important matter to watch is that of discharge. Even though the battery continues to light the filaments of your valves in an apparently satisfactory way, a hydrometer reading should be taken at frequent intervals to arrive at the exact position of affairs. If the hydrometer test shows one of the cells to be appreciably lower than any of the others in specific gravity, there can be no doubt that the particular cell is out of order. This may be due to a short circuit somewhere, but, whatever the cause, it should have immediate attention from an expert. It is perhaps as well to mention at this stage that when a syringe hydro-

meter reading is taken the acid which is withdrawn, though really always a very small quantity, should be returned to the cell when the test is completed.

The necessity for this is that the acid must be maintained at a certain level in the accumulator. The tops of the plates ought to be covered with, say, $\frac{1}{4}$ in. of acid. If this condition is not adhered to there is likely to occur uneven action on the plate surface, with the certainty of evil results.

Another rule is to prevent as far as possible the fall of any foreign body, how-

ever small, into the cells. A particle of metal or any conducting substance dropping in when the plugs have been removed has often been the cause of short circuits or other damage necessitating expensive repair. The moral, of course, is that the vent plugs should never be taken out except when absolutely necessary, as at the time of testing or filling.

Another point is to ensure that the terminal connections are secure and that good contact is being obtained. The terminals should be coated with vaseline.

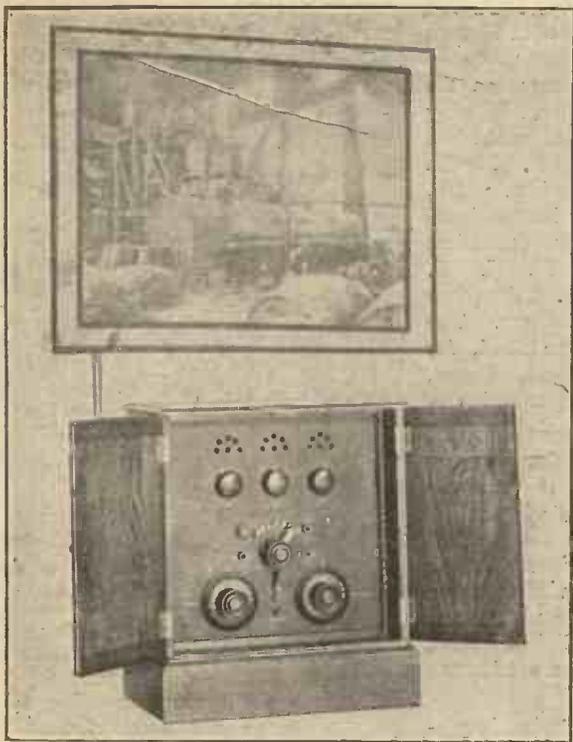
W. G. F.

Our Special Super-hot Number of last week met with general approval. We propose therefore to make a special feature of this type of set in our Next Issue, when constructional details of the **TROPADYNE SUPER-SONIC RECEIVER** will be given. Order your copy now.

The French Government have agreed to continue until May 1 the informal arrangements hitherto in force, by which the French Wireless Decree has not been applied to British ships, on the understanding that the British Government hope that legislation will have been enacted by then enabling them to make a permanent arrangement for the exemption of British shipping from this Decree on a reciprocal basis.

A REINARTZ SET FRAME

*Appearance and efficiency are particularly
been designed for a*



The Receiver and "Picture" Aerial.

THERE is little doubt that, although most ladies thoroughly enjoy "listening-in," they openly or secretly deplore the sight of batteries, sundry connecting wires, and exposed coils and valves, etc., all of which get dusty yet must not be touched except by the proud owner himself! The good housewife likes everything neat and tidy, and it was to meet this demand for neatness that the three-valve set shown by the photographs was designed.

Reinartz Circuit

The set is a perfectly straightforward Reinartz receiver, the circuit being shown by Fig. 1. It is made entirely of standard British parts. While intended primarily to be used on a conventional aerial and earth system, it can also be successfully worked on a special frame aerial. In one photograph it is seen arranged to receive on a loop wound at the back of a picture frame. Furthermore, the set is suitable for receiving on all wavelengths from 100 metres upwards, and is decidedly efficient. Many main broadcasting stations can be received at proper loud-speaker strength, and loud-speaking from London is quite easily obtained at Bromley, Kent, using the loop behind the picture frame. By the plug-and-jack arrangement, so popular in America, one, two or three valves may be used as desired.

The cabinet is oak, with neat doors fitted to close in front of the vertical panel of the set. It cost a little over 30s. In addition to the set proper, the cabinet holds the high-tension battery. There are

no terminals whatever on the front of the panel, all these being on the valve platform behind. The aerial and earth leads reach their respective terminals through two neat holes cut one on each side of the cabinet.

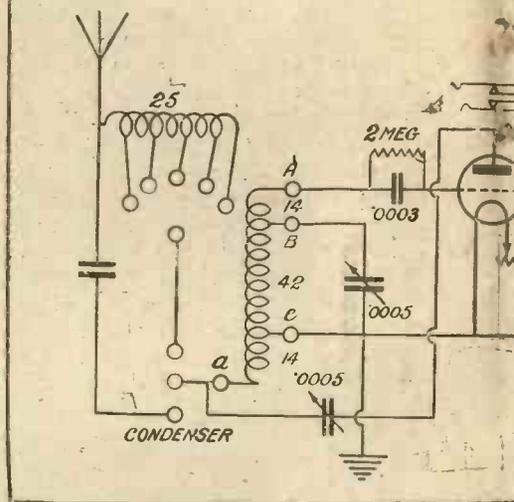
The following is a complete list of the parts required, from which it will be seen that the receiver is quite an economical one to make.

Oak cabinet; main panel, 12 in. by 12 in.; sub-panel, 11 3/4 in. by 5 in.; variable .0005 condenser (reaction); variable .0005 condenser with vernier (tuning); three Igranic rheostats; push-pull switch; three plugs and jacks; two low-frequency transformers; fixed .0003 condenser with 2 megohm leak; switch arm, five contact points and two stops; single-pole double-throw switch; eleven terminals; twelve valve sockets (Clix); sundry wire screws, etc.

Arrangement

Intending constructors are advised to follow strictly the arrangement shown by the drawings Figs. 2 and 3, as considerable time was taken in planning the most suitable places for the components so that the transformers are well spaced, grid leads as short as possible, etc. Even if some other components are incorporated it will be best to keep to Igranic rheostats, as these have convenient holes drilled in their frames for the purpose of supporting the valve panel at its front edge. The transformers were deliberately arranged so that they "take the weight" when valves are pushed into their sockets on the panel. Another detail well worth the trouble it incurs is to have the panel properly engraved. This will only cost about 3s., but the panel must be sent to the engraver after it has been drilled with a scale drawing, full size for preference, showing the exact locations for the wording.

The tuning coil for the aerial consists merely of 70 turns of No. 18 double-cotton-covered wire wound jumble fashion on a 2 1/2-in. bathroom tumbler, with loops, 4 in. long, taken so as to form taps at the 14th



and 56th turns. The whole coil was afterwards tied up in three places with short lengths of knitting silk. The four points of the coil (being the two ends and the two taps) are connected to four adjoining terminals on the back edge of the valve platform. These four terminals make contact with (see Fig. 1) (A) grid condenser, (B) high-potential side of the tuning condenser, (C) earth and L.T. +, (D) aerial through S.P.D.T. switch. This simply made tuning coil is surprisingly efficient, and the numbers of turns given are suitable for the broadcast band with an ordinary aerial and earth.

The system of putting the tuning condenser across only part of the inductance shows to best advantage on the very short

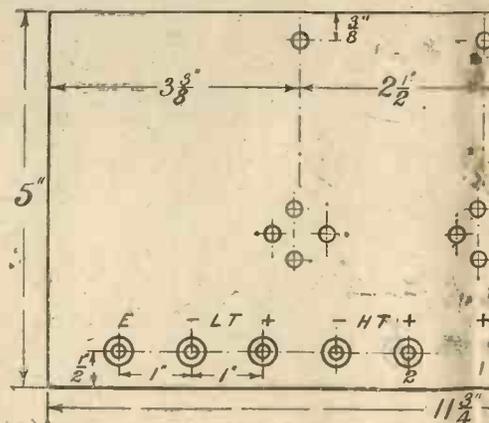


Fig. 2.—Layout of

WITH SPECIAL AERIAL

features of this receiver, which has drawing-room use.

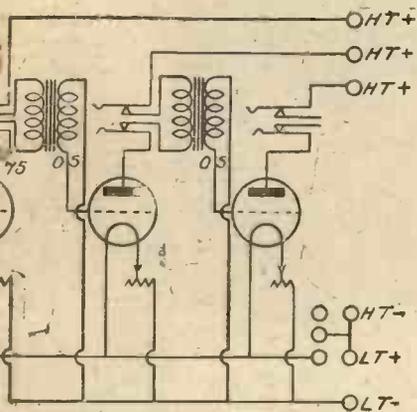
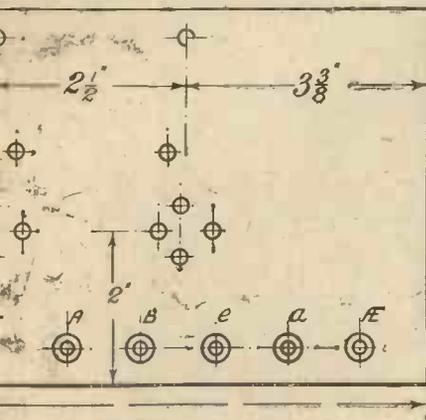


Fig. 1.—Circuit Diagram.

wavelengths when it reduces the effective dielectric losses of the condenser and gives a slightly flattening effect to the tuning but very little damping. On the B.B.C. band of wavelengths the advantages are hardly noticeable. A suitable coil for use round about 100 metres consists of 3 turns, tap, 9 turns, tap, 3 turns. That is 15 turns in all. For Chelmsford 30 turns, tap, 170 turns, tap, 30 turns, being 230 in all, of No. 24 d.c.c. wire.

The Frame Aerial

The special frame or loop aerial is in reality a very large tuning coil, but with only one tap instead of two. Wound on the back of a picture frame, 24 in. by 20 in., it consists of one short coil of 3 turns



Valve Panel.

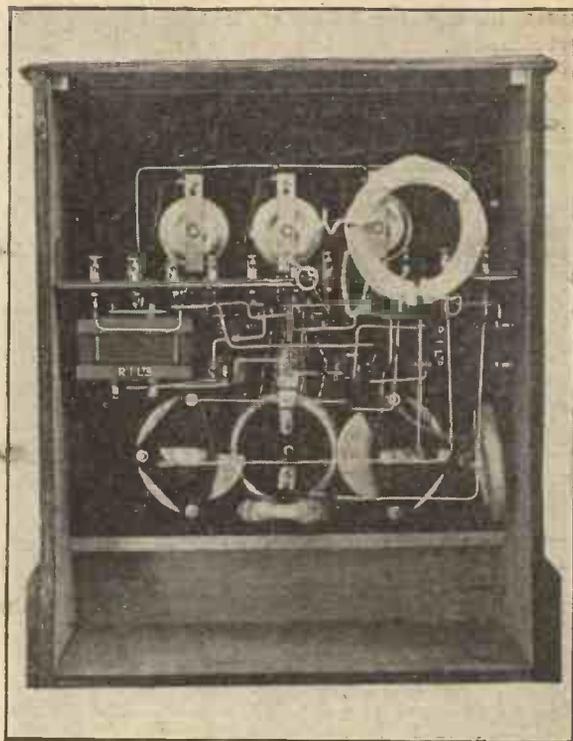
and another of 11 turns, the short coil and the first three turns of the longer one being wound together. Four special pieces of fibre tubing are used to support the coil behind the frame, being attached by brass-headed nails. It was not possible to drive the nails far into the frame, so they were strutted with short pieces of ribbon aerial. Fig. 4 clearly shows this arrangement. The fibre tubes are 1½ in. long with 1-in. "waists." The wire used is No. 22 gauge, double-cotton-covered.

The inside end of the short coil is connected to the terminal referred to above as *a*. The outer end of the same coil and the inner end of the longer one are both connected to the terminal *e*. The outer end of the longer coil is connected to either A or B, these two terminals being connected together by a suitable strap when the frame aerial is used. The frame should be arranged so as to be sideways to the transmitting station.

Switching

The single-pole double-throw switch, which is only in circuit when using the outside aerial with its lead-in connected to the aerial terminal of the set, throws into circuit either a tapped coil or a fixed condenser of small capacity. The coil consists of 25 turns, with a tap every fifth turn. It was wound on the same tumbler as the tuning coil, and afterwards bound up with empire tape. It is introduced to control the fundamental wavelength of the aerial circuit, and its use is most apparent when desiring to receive on wavelengths closely approaching the natural wavelength of the aerial. The upper contact of the S.P.D.T. switch and the arm of the selector switch are connected by an aluminium strip cut from a condenser vane, and this forms a convenient clip for holding down one side of the tapped coil.

The small fixed condenser which comes into the aerial circuit when the S.P.D.T. switch is thrown down consists merely of 40 in. of twin electric-light flex, one end of each piece of the twin wire being connected respectively to aerial and to the



Rear View of Receiver.

S.P.D.T. switch. The other two ends are left absolutely disconnected. The whole is rolled into a coil and bound up with empire tape. It is then lashed to a slip of ebonite, one end being fastened to a clip clamped beneath the lower contact of the switch. This clip also holds in place the other side of the tapped coil and is the electrical connection between the switch contact and one end of the flex wire, this wire being soldered to it.

General

When the small fixed condenser is in series with the aerial it adds very considerably to the selectivity of the set at a slight loss of signal strength.

The choke between the plate of the first valve and the first transformer consists of 75 turns or so of No. 24 d.c.c. copper wire and acts as a safeguard against the loss of high-frequency pulses via the H.T. battery. It is probably only necessary on the shortest waves, as an R.I. transformer, at any rate, is found to be a perfectly successful choke on the broadcast waveband. From the foregoing remarks it will be realised that on no account may a fixed condenser be placed across the primary of the first transformer.

While dealing with this particular portion of the circuit it will be as well to notice that the reaction condenser is in reality directly across the high-tension battery. The positive side of the battery is connected to the plate of the valve and to one side of the condenser. The negative side reaches the opposite plates of the reaction condenser via the tuning coil.

Therefore an air dielectric condenser is not really "safe," as should the plates ever touch, the high-tension battery would be short-circuited. It would be wise to fit instead a mica dielectric variable condenser, such as the Polar or that marketed by Lissen. The only point against most

it is necessary to be careful that the H.T. positive is connected in each case to either the long or the short outside spring blades. Unless the connections are made consistently, the current will be reversed through the windings of the loud-speaker when the plug is moved from one jack to

a small stop inside the left-hand door of the cabinet so that the filament current is automatically cut off when the door is shut.

The manipulation of the tapped coil and the aerial-series condenser, as well as the method of using the frame aerial, have been dealt with before. Apart from these

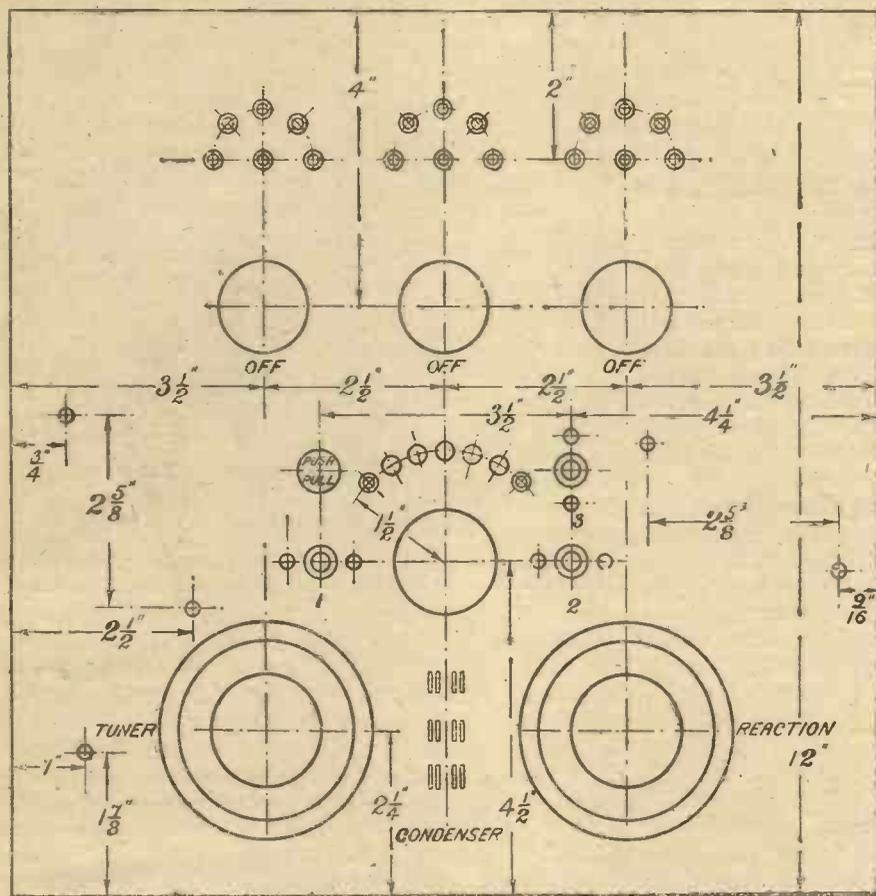


Fig. 3.—Layout of Front Panel.

mica dielectric condensers is the fact that they are fitted with odd types of dial and pointer. The dials cannot be conveniently replaced by standard ones, as the condensers work through about 340 degrees instead of 180, as do air-dielectric variable condensers.

When soldering the wiring to the jacks

another. The tip of the plug, of course, makes contact with the shorter of the outside spring blades of the jack into which it is inserted.

Another detail worth attention is to arrange that the push-pull switch in the filament current supply is "off" when pushed in. It is then possible to mount

adjuncts, the method of tuning in the local station is to set the reaction condenser at a low value and then search with the tuning condenser. Having located the desired station, apply the reaction condenser so as closely to approach the oscillation point, then carefully retune with the vernier. The sensitiveness of the set depends almost entirely on how closely the oscillation point is approached. Adjustment of the rheostat of the first valve will be found to act as a vernier control of reaction within certain limits.

Suitable Valves

All valves do not work equally well in a Reinartz receiver. The finest arrangement for this particular set that the writer knows is three-Marconi-Osram DE5, or B.T.H. B4 valves, with 60 volts to the plate or anode of the first valve and 80 volts to the amplifiers. If other valves must be used which have not such long straight portions of their characteristic curves, they had better be 4-volt valves; in any case use a 6-volt accumulator and have the rheostats adjusted so that nearly all their resistance is in circuit. Such an arrangement gives a bias of about 2 volts to the grids. Some valves will not oscillate with less than 100 volts. D. H.

SIMPLE COIL FORMER

LOW-LOSS coils of the air-spaced type need to be wound on some sort of former, which can easily be made in the following manner from an empty can of the required diameter.

A sharp tin-opener will be wanted to cut neatly the bottom from the tin, and also to cut the top out of the cover, leaving the latter just a ring of metal.

Remove this ring from the can, which thus becomes an open-ended cylinder.

With stout scissors or shears cut from top to within an inch of the bottom a tongue of metal about 1/4 in. wide. Repeat this operation at two other places, so that the resulting slits in the canister are equidistant.

The ring made from the cover is now

replaced, but whereas it formerly fitted on outside the tin, it must now be pressed inside; in this position it has the effect of restoring to the cylinder the rigidity lost by cutting the slots down most of its length.

As this former can be used for any number of coils, it repays a certain amount of care in the making. E. S. T.

A wireless association has been formed in Czecho-Slovakia under the title of "Ceskoslov. Radiosvaz" in order to further the broadcasting interests in that country. Up to the present the use of the German language has been prohibited in the kingdom, but permission has now been granted to use it in broadcast talks and lectures.

A LOUD-SPEAKER TIP

SOME loud-speakers are provided with an adjusting screw on the under side of the base, which can only be manipulated with a screwdriver when the instrument is lifted off the table. With this arrangement it is difficult to judge the adjustment to a nicety. An adjusting lever which can be manipulated without moving the instrument is a great improvement, and can be easily fitted by soldering a piece of 1/8-in. diameter brass rod or a flat strip to the head of the screw, so as to project about 1/4 in. beyond the periphery of the base. The rubber feet on the base keep the lever clear of the table, and adjustment can then be made by a slight movement of the lever. E. B. R.

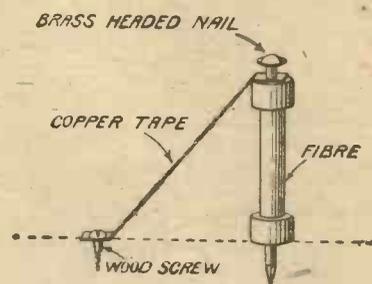


Fig. 4.—Support for Aerial Wire.

AROUND THE SHOWROOMS

A Series-parallel Variometer

A VERY efficient variometer has recently been placed on the market by the Marconiphone Co., Ltd., of Marconi House, Strand.

This instrument is very soundly constructed and differs from the usual type of variometer in that a neat system of switch-

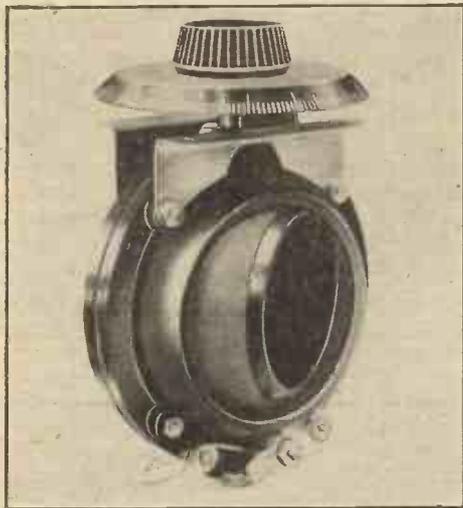
metres, and it was thus possible to tune in the usual B.B.C. stations and 5XX without any additional coils.

Gripsit Wiring Washers

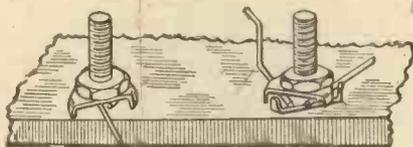
THE number of devices introduced to facilitate the somewhat difficult process of wiring is endless. The Kirby Banks Screw Co., Ltd., of Beeston, near Leeds, are

the matter is being given more attention, and the Scientific Supply Stores, of 80, Newington Causeway, S.E.1, are manufacturing a horn for attachment to any loud-speaker base that is as pleasing to the eye as to the ear.

The horn is composed of a non-resonant material resembling wood-bark in



Marconiphone Variometer.



Gripsit Washers.

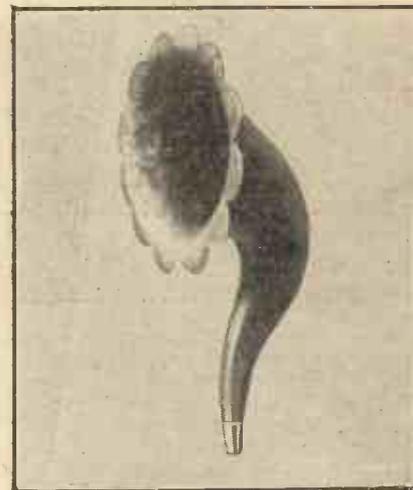
placing on the market a little gadget known as the Gripsit wiring washer.

These washers, as will be seen in the drawing, are triangular in shape, the edges of the triangle being curled up to engage the wire. The washers may be used in an infinite number of ways, and should prove a boon to the experimenter or the home constructor who dislikes soldering.

Non-resonant Loud-speaker Horn

THE average wireless amateur takes an objection to loud-speakers for two reasons: The unsightliness of the horn, and the nasal, distorted tone which, unfortunately, is sometimes produced by a few horn-type loud-speakers.

It is interesting to note, therefore, that



Non-resonant Loud-speaker Horn.

ing (by means of a cam-shaped piece on the rotor shaft) is employed to connect the windings in series or parallel.

On actual test with a standard Post Office aerial I found that the wavelength range was approximately 300 to 1,600

appearance. On test, fitted to a standard loud-speaker base, the makers' claim was proved that the material of the horn does not reduce signal strength. If anything, the volume was slightly greater than that with a metal horn. VANGUARD.

PROGRESS AND INVENTION

Socket Connector

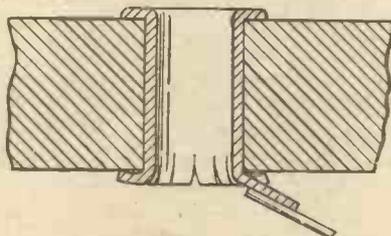
PATENT No. 230,894/23 (Kenneth Noss Arnold, of Horndean, Hants) describes an improved socket connector for inserting in panels. The device comprises a metal sleeve suitable for fixing into panels to receive internally a pin or plug contact or allow a conductor to pass through. It has a flange at one end of the sleeve, a soldering lug for a wire connection at the other end, and expansible or tapping means for securely fixing into the panels.

The sleeve is made of german silver, brass, copper or other suitable metal of high conductivity and of a thickness to be readily punched into shape.

One form of sleeve is inserted in the hole in the panel from the front and is fixed by expanding the rear end of the sleeve or preferably by slipping over it a loose washer with an expander or other suitable tool.

The connecting wire may be soldered

after passing it round the sleeve a few times. The sleeve is thus firmly secured to the panel by the flange at the front and the expanded metal or the washer at the back, and a wire is soldered to the



Socket Connector (No. 230,894/23).

tag or lug, the whole then forming a permanent socket connector.

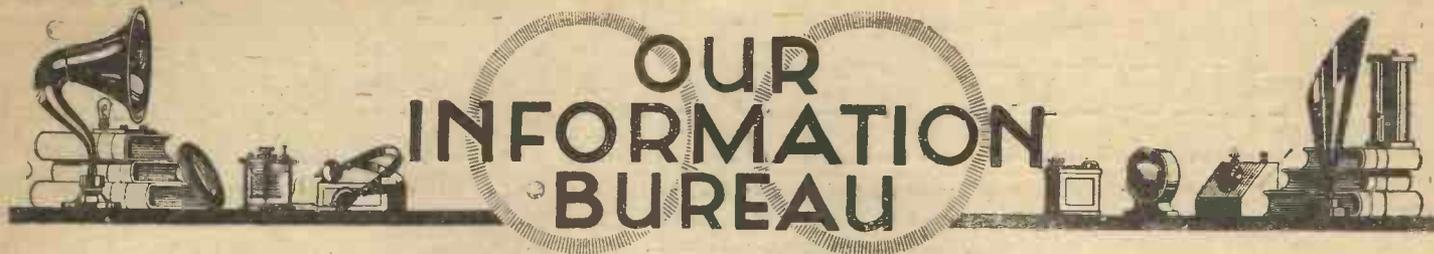
Several of these socket connectors can be fixed into holes spaced at correct distances apart to form holders for valves or tuning coils or other components.

Dull-emitter Valves

A SPECIAL method of preparing the filaments of dull-emitter valves is the subject of Patent No. 230,226/24 (Leonard Angelo Levy, Shoot-up-hill, Cricklewood).

Thorium oxide mixed with a suitable organic reducing agent is applied as a continuous film to the surface of a filament of tungsten or other suitable refractory conducting material.

The filament and its coating is then heated in a vacuum to an orange-red temperature for a short period of time, during which the thorium oxide is reduced to metallic thorium. A number of bodies can be employed as reducing agents for thorium, but it is preferable to use one which does not melt on heating but which chars uniformly over the surface of the filament. Cellulose acetate and cellulose nitrate are very suitable, as are Canadian balsam and cumar resin.



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, lay-outs, diagrams, etc., on separate sheets containing your name and address. Always send stamped, addressed envelope and attach Coupon (p. 736).

Coils for Chelmsford

Q.—In the transformerless reflex set described in A.W. No. 137, what coils should I use to receive 5 XX?—L. M. G. (S.W.1).

A.—Try a No. 200 in the aerial circuit, a No. 250 in the anode circuit, and a No. 300 in the crystal circuit.—J. F. J.

Spark Stations

Q.—What spark stations have the following call-signs: O S T, G L D, G N F, G C C and F F H?—H. W. S. (Bristol).

A.—These call signs belong respectively to: Ostend, Land's End, North Foreland, Cullercoats and Hayre.—J. F. J.

Reception without Crystal

Q.—I have a crystal set, but have found that I can receive without a crystal. I can find sensitive spots on the empty crystal cup by touching various points of it with the cat-whisker in the same way as when setting the crystal. I have made sure that the rectification is not being done by minute pieces of crystal as the cup is quite clean. Is this something new?—R. A. (F.10).

A.—It has been known for many years that under certain conditions rectification can take place at the slightly oxidised surface of a metal, and so you have not come across anything new. Such detectors are, however, comparatively insensitive and are now of no commercial interest.—J. F. J.

L.F. Transformers

Q.—I have had three L.F. transformers (all of different well-known makes) burn out in the last four months. I have never used more than 80 volts H.T. Can you make any suggestion as to what may have been the cause? My set consists of a detector followed by two L.F. valves.—D. L. K. (Wigan).

A.—You have been very unfortunate, and your experience is by no means common. Unless you have somehow got the H.T. connected directly across the windings the trouble must be due to breaking the H.T. circuit suddenly. In future always connect up the H.T. battery with the valves turned off and then light the filaments gradually by slowly turning the rheostats. When switching off turn out the valves before disconnecting the H.T.—J. F. J.

Falling Off of Signals

Q.—I have a four-valve set which at first worked well. It has not definitely broken down but the signal strength has gradually fallen off until now results are very poor indeed. Can you suggest a possible cause of the trouble?—G. J. (N.3).

A.—The indications are that the trouble is being caused by the deterioration of something that was O.K. when the set was first installed. First suspect that the H.T. battery is becoming exhausted and then look for bad connections in the aerial, lead-in, tuning coil and earth lead. Also make sure that the actual earth connection is good. Take the valves from the sockets and slightly splay out the valve pins with a penknife, and do the same with any plug-in coils. If you are using dull-emitters it is possible that the filament emission has fallen off.—J. F. J.

Tuning for Crystal Set

Q.—Which is the better form of tuning to use for a crystal set: coil and condenser or variometer?—D. M. (Oldham).

A.—For the 300-500 metre waveband only, the variometer is the simpler and possibly the more efficient method. However, it is difficult to increase the tuning range of a variometer efficiently, and if you also desire to receive the long-wave stations we should advise you to use plug-in coils tuned by a parallel variable condenser.—J. F. J.

Cosor Valves

Q.—Can you supply me with particulars of the different types of Cosor valve, especially filament volts and current, anode volts, and amplification factors?—J. L. P. (Doncaster).

Type	Fil. volts	Current consumption	Uses for which valve is suitable	Anode voltage	Impedance (approx.) in ohms	Amplification factor	Watts max.
P1	4-4.5	.75	Detector and low frequency	30-80	25,000	7.0	3.0
P2	4-4.5	.75	High frequency, reflex and resistance-capacity coupled circuits	30-80	40,000	10.5	3.0
W1	1.8-2	.3	Detector and low frequency	20-80	19,000	7.2	.6
WR1	1.8-2	.3	Detector and low-frequency	20-80	19,000	7.2	.6
W2	1.8-2	.3	High frequency, reflex and resistance-capacity coupled circuits	20-80	30,000	10.5	.6
WR2	1.8-2	.3	High frequency, reflex and resistance-capacity coupled circuits	20-80	30,000	10.5	.6

A.—The information you require is given in tabular form above.—J. F. J.

Valve-crystal Reflex

Q.—I have a single-valve and crystal reflex but can still obtain reception when the cat-whisker is lifted from the crystal. Does this indicate a fault, and if so, how may it be cured?—C. H. (W.3).

A.—When the catwhisker is lifted any rectification that takes place is obviously being done by the valve, which in this circuit should be amplifying only. Whether the effect indicates that the set is not being worked to the best advantage depends upon the degree of rectification. If you mean that you can merely hear the local station very faintly with the whisker lifted, and that reception is satisfactory with the crystal in circuit, there is no need to worry, as it is practically impossible to work a valve in a dual capacity without strong signals being slightly rectified. If, however, very little difference in strength is noticed when the crystal circuit is broken the valve is obviously being worked at an unsuitable point on the characteristic curve, and the operating point should be changed by a judicious arrangement of H.T. and grid bias voltages.—J. F. J.

Tuning Loose-coupled Set

Q.—I have a two-valve set consisting of H.F. (tuned anode) and detector. To obtain selectivity I am using loose coupling (with plug-in coils) and have fitted a tune-stand-by switch. Can you give me a few hints for working such a set so as to receive distant stations without interference?—H. G. N. (Bolton).

A.—First put the switch to the "stand-by" position and tune in the distant station, ignoring, for the moment, any interference from a near-by station. Now put the switch over to "tune" and readjust all condensers so as to receive the desired station as strongly as possible (using the closest possible coupling).

Loosen the coupling very gradually by moving the coils farther apart, a very little at a time, and re-tuning all circuits after every slight movement of the secondary coil so as to keep the desired station always "in sight." You must loosen the coupling until any signals from near-by stations are so much reduced in volume in comparison to the desired signals that they cease to interfere.—J. F. J.

H.T. From the Mains

Q.—What is the value of the resistance mentioned in the second column of the article "Solving the Current supply Problem," in A.W. No. 144, and where is it to be connected?—F. H. (Salford).

A.—The resistance which is referred to is inserted in the metal cap of Osclim lamps

when sold for lighting purposes, and is connected in series with one of the electrodes. These lamps can now be obtained for wireless purposes, in which case this resistance is sometimes omitted, and you should be careful to obtain the right type of lamp.—J. F. J.

Reception with H.F. Valve Out

Q.—I have a four-valve set consisting of one H.F. (tuned anode), detector, and two L.F. valves. I get very good all-round results, but I find that I can still hear with the H.F. filament turned off, though of course not so strongly as with it on. Even when the valve is removed from the set altogether I can still receive, though more faintly still. Surely this is not correct? What is wrong, and how can I remedy it?—P. S. C. (Scarborough).

A.—The effect is normal and does not indicate anything wrong. The signals pass to the grid of the detector valve through the capacity existing between the leads and components of the H.F. circuit. Every conductor possesses capacity, and so it is unavoidably present in the best designed circuit, though in H.F. amplifiers these casual capacities should be reduced to a minimum. When you remove the H.F. valve from the socket you reduce the capacity coupling between aerial circuit and detector grid and the signals are much weaker. If the strength of reception diminishes but slightly when the H.F. valve is turned out, it shows an undesirable amount of stray capacity present, and this should be reduced by a better design of the set.—J. F. J.

Receiving F L

Q.—If I use a No. 35 coil with parallel .0005 condenser for 2 L O, and a No. 200 coil for Chelmsford, what coil should I use to receive the Eiffel Tower on my crystal set?—H. F. D. (Brighton).

A.—Probably in your case a No. 250 coil would bring in F. L.—J. F. J.

Some facts about Valve life

"I may say I have had a Cossor Detector Valve to use now for ten months, and to the best of my belief has given one thousand one hundred and forty-three hours reception and I think everyone will have to admit that this valve is one of the best ever made."—H. G. PAULSON, Hope Road, Edale, via Sheffield.

"I wish to tell you how very pleased I am with your valves which give such satisfactory results. A valve I bought from you over a year ago is still going strong, though on occasions it has been used to test the units of my H.T. battery.

Last night, using a single reflex circuit, using the above-mentioned valve, I clearly received between 12.50 and 3 a.m. this morning part of the programmes from W. B. Z. and W. G. Y. This is the first time I have set up to try and get America. I am delighted with my success, as I am only fifteen, and I attribute it to the Cossor Valve."—H. C. T. ALLEN, Ashford, King's Road, Sherbourne, Dorset

"I bought two of your valves at the beginning of August, 1923, and after daily use I passed them over to a friend of mine a month ago, and he is getting absolutely perfect results from them. These valves have been constantly carried about in a case or pocket and on the carrier of a motor cycle, and have never once let me down. I should think that record is hard to beat."—HENRY M. CONROY, 61 Hale End, Liverpool

"Exactly a twelvemonth ago, I purchased two of your Cossor Valves, a P.1. and P.2., for use in a reflex circuit, the S.T.100

They have been in use exactly 12 months at an average of six hours per night, Sundays included, until last night when the P.1. went out and will not light again. The Red Cap is still on duty and functioning as well as ever.

I may add that I have the following Stations to their credit: all B.B.C. Stations, including Belfast, of course, Hull, Dundee, Swansea slag at good 'phone strength. Cardiff, Bournemouth, Newcastle, Chelmsford, at good loud speaker strength, and occasionally a few of the others, according to conditions prevailing at the time of reception. The total burning hours of your valves is as follows—

- 6 hours per night (average)
- 42 weeks
- 2,184 hours for the 12 months

Thanking you as the indirect cause of my having spent so many pleasant hours at such little cost."—W. M. JENKINS, 21 Brookland Terrace, Nautymoll, near Bridgend, Glam.

"It may interest you to know that I am still using a Cossor P.1. No. R364, which I bought in February 1923

It was used practically every evening for 18 months and has been used on an average about one evening a week since that time (by the evening I mean all the time the London Station has been broadcasting)

I used it as a detector last night and received W.G.Y. just audible off detector only, but quite good off detector and two L.F. The first stage of amplification is also a Cossor P.1. which I have had for over a year."—J. W. HARRIS, 12 Rapier Road, Wembley.

"I feel I should like you to know the result I am getting with Cossor Valves. I bought a P.1. just twelve months ago, and used it as a H.F. amplifier with crystal rectifier for about three months. I then converted it to a single valve and crystal dual and ran it like this until before last Christmas, when I bought another P.1. and converted the Set into the S.T. 100 circuit.

As I use the Set at least 100 hours per month the first valve had given 1,200 hours' service already, and is still going strong, but I suppose I cannot expect it to last a great deal longer."—L. FELLOWS, Garston, Watford

"In the beginning of October, 1923 I built the S.T. 100 circuit and purchased two of your valves. Since that time they have been in use practically every evening for about 3 1/2 to 4 hours, say on an average of at least 25 hours per week and sometimes they have been used at other than broadcasting times for experimental purposes. This makes over 1,000 hours' work with a 6-volt accumulator and over 100 volts on the plate. I have mentioned this fact to several of my radio friends and they have been very much surprised at the long life."—WALTER RANKIN, 3 Barbara Street, Barnsbury N.

"I have had in (practically) continuous use for nearly fifteen months (i.e. the customary 2 or 3 hours on most nights) two Cossor P.1. Valves which are still going. Rightly or wrongly I am inclined to think that their performance is exceptionally good for the rate, if not somewhat remarkable."

I shall be glad to know if you have mentioned this to your friends. I am in ordinary use (not for sale) to your knowledge."—"The Laurels," Clydesdale, Mon

"I have issued of letters of commendation."

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"In April, 1923, I purchased a Two valve Set and Two-valve Amplifier, each fitted with Cossor Valves. These have been in regular use ever since, averaging 12 hours weekly

They perform as well now as at the start of their life, and as this is over 1,000 hours, it is really a wonderful career."—J. COOMBS, 25 Sandford Avenue, Wood Green, N

"Items in the New York programme included the songs 'Fair moon to thee, I sing, from Sullivan's H.M.S. Pinafore, and 'If I built a world for you.' A lecture given by a University gentleman was also very distinct. The lecture was announced to begin at 8.15 (New York time) and was still proceeding when I retired to bed at 2 a.m.

I regard the foregoing as a rather remarkable achievement, being obtained with a one-valve home-made Set, and the valve a Cossor P.1. This valve I bought on May 19th last, and it has been in continual use daily since, and is still going strong."—H. S. JOHNSON, 13 Emery Street, Cambridge

"I should just like to do you to inform you that in January I purchased two of your P.1. Receiving Valves, and since had over 4 hours about 12 hours on continuous use and are very satisfactory.

For some time I have used a transmitter filaments, plate plus, the aerial valve, and the set is still going strong."

"I have had in (practically) continuous use for nearly fifteen months (i.e. the customary 2 or 3 hours on most nights) two Cossor P.1. Valves which are still going. Rightly or wrongly I am inclined to think that their performance is exceptionally good for the rate, if not somewhat remarkable."

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They perform as well now as at the start of their life, and as this is over 1,000 hours, it is really a wonderful career."—J. COOMBS, 25 Sandford Avenue, Wood Green, N

"Thinking it might be of interest to you, I should like to congratulate you on the quality and durability of your Bright Emitter Valves. I have had in use (on an average of 14 hours per week) for twelve months three of your valves (my Set being a three-valve one), and can say without doubt they are as good to-day as when I first purchased them on March 7th, 1924.

I can without difficulty tune in all the British Stations and most of the Continental, and have picked up America direct with great clearness."

Whereas the other valves I have used are all worn out."

"I should just like to do you to inform you that in January I purchased two of your P.1. Receiving Valves, and since had over 4 hours about 12 hours on continuous use and are very satisfactory.

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They perform as well now as at the start of their life, and as this is over 1,000 hours, it is really a wonderful career."—J. COOMBS, 25 Sandford Avenue, Wood Green, N

"With reference to your advertisement in Popular Wireless about the length of life a valve should give, I should like to point out the results I have received with two of your Cossor P.1. Valves which I use as a detector and L.F.

The Detector Valve, No. F9471, which I bought twelve months ago has burnt over 2,000 hours, practically the whole of the broadcast hours during that period. The L.F. Valve, No. H3999, has burnt just over 1,000 hours in six months.

I think the above particulars speak very highly indeed of the efficiency of the Cossor Valves."—P. SMITH, 35a Portland Street, Walsall, Staffs.

"I have noticed that in the current issue of the Radio Times several letters appear testifying to the excellence of Cossor Valves."

"I would like to state that on February 14, 1923, I purchased a Wireless Set with two P.1. Cossor Valves. These valves have been functioning ever since, and I have had well over 2,000 hours of use of them. Is this a record (26 months)?"—LEONARD R. LEWIS, "St. Pauls," 134 Ongar Road, Brentwood.

"It is with great pleasure that I write to you on a matter which I think will interest you. On March 7th, 1924, I purchased two ordinary P.1. Bright Emitter Valves from a local dealer and they have been in constant use (7 days per week) the whole twelve months, and now they are as good as new."—E. T. BLACKHALL, 3 Landgate Square, Rye, Sussex.

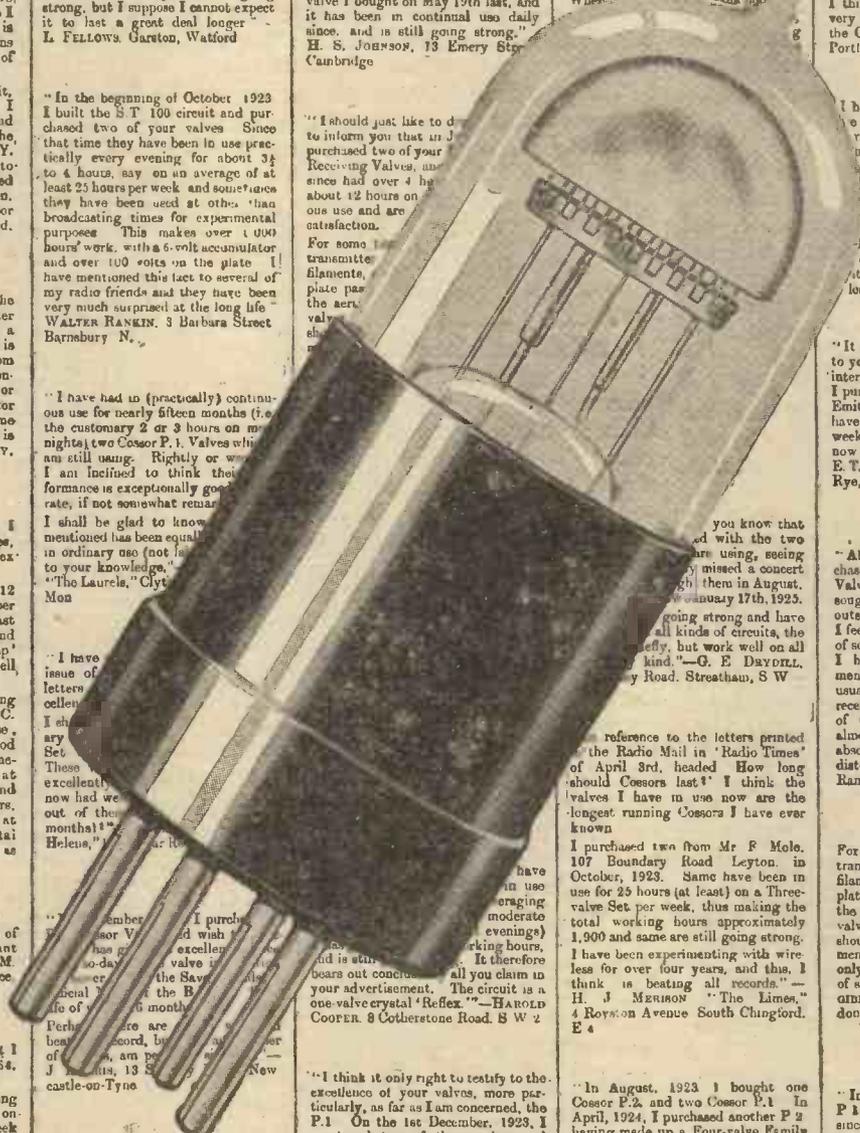
"About this time a year ago, I purchased a Cossor High Frequency Valve without any advice for I had sought none, but merely owing to the outstanding reputation of your firm I feel that it is my duty to inform you of some of the excellent results which I have obtained from the above-mentioned valve. Employing the usual one-valve detector circuit, I have received concerts from every Station of the B.B.C. in Great Britain at almost loud speaker strength, and absolutely free from any trace of distortion."—C. A. FRIEDMAN, 161 Ramsden Road, Balham, S.W. 12

"For some time they were used on a transmitter with 6 volts full on the filaments, and 600 A.C. volts on the plate passing about 8 to 9 amps in the aerial (No effect whatever on valves). Such a severe test as this should I think be sufficient recommendation for anybody, and I can only add my name to your large list of satisfied customers."—L. H. FRIZZIMON, 38 Trevinice Road, Wimbledon, S.W. 20

"In July, 1923, I bought one of your P.1. Valves which has been used ever since in a one-valve Dual Set

According to my log, same had up to last November completed 1,500 hours use, and since that time has been used as a stage of L.F. your P.2. taking its place, and is still giving full amplification.

On this one valve I had logged just over 100 telephony stations, including seven American."—C. R. PONTING, 71 Woolcott Street, Redland, Bristol



—now you'll choose the Cossor

RECORDING WIRELESS SIGNALS

IN the early days of commercial wireless when the coherer was the only form of detector available, automatic recording apparatus was exclusively employed, as the conductivity of these coherers changed sufficiently under the influence of the incoming signal to relay a current capable of operating a sensitive single contact relay or syphon recorder. In both these cases, whether reception was direct by syphon recorder or by relay in conjunction with a Morse inker, the message was printed permanently upon a slip of paper.

Automatic Needs

The range of a given size of wireless transmitting station has been greatly increased with the introduction of the crystal type of detector, and as under ordinary working conditions neither the changes in resistance nor the magnitude of the rectified currents flowing are sufficient to operate a relay, the automatic recording of signals has fallen somewhat into disuse. On account of its suitability the telephone receiver, except in a few special instances, is now invariably employed with these detectors.

With telephone reception the speed and accuracy with which messages can be received is dependent entirely upon the skill of the operator. A good operator can only receive at a speed of about thirty words a minute, and this speed is greatly decreased when code or cypher messages are being transmitted. Telephone reception has, however, the one great advantage of aural selection of the desired signals from other signals or disturbances having different note frequencies.

This note selection can, with the aid of special apparatus, be effected by purely electrical or acoustical methods.

With the rapid advance made in commercial wireless and the consequent heavy increase of traffic, the need has again arisen for some form of automatic recording apparatus. For transmission at ordinary speeds mechanical recording has little to recommend it over the ordinary aural method of reception, but at speeds higher than can be transmitted by hand, and where long periods of working are required, some form of automatic transmission and reception is practically a necessity.

Dictaphone System

The "dictaphone" method of recording is one that has been extensively used in practice, being suitable for use with detectors of the crystal type. In this system the received signals are passed, after detection, through a special type of telephone receiver, this receiver being arranged to record the message by impressing it

upon a revolving wax cylinder somewhat after the manner of an ordinary phonograph.

Another device capable of working with even the most sensitive of detectors is the Telefunken sound intensifier. With this instrument it is quite possible to operate a loud-speaker or syphon recorder. It consists of what are practically three tuned microphones in series with each other, the arrangement being shown in the diagram, Fig. 1.

The windings of the electromagnet S are connected to the terminals of the receiving set in place of the usual head-

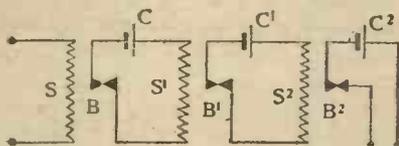


Fig. 1.—Telefunken Sound Intensifier.

phones, and the signal current flowing through this coil actuates a light armature. This vibrating armature, which should have a natural period of vibration equal to the frequency of the incoming signals, is arranged to open and close the microphone contacts B. The microphonic contact B controls the current flowing from the battery C, through the winding of the coil S1, much larger currents flowing through the second coil S1 than through the coil S. This increased action is continued through a third stage, the final currents being of sufficient magnitude to operate recorders or other apparatus.

Although very elaborate in construction and requiring very careful and delicate adjustment, this instrument is particularly selective, as the armatures being tuned to

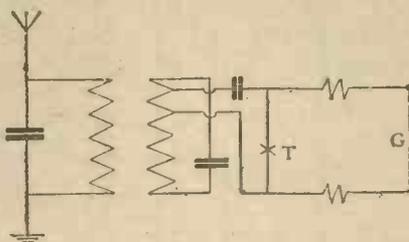


Fig. 2.—Photographic Recording System.

the frequency of the signals it is desired to receive, signals of other frequencies can be readily cut out.

Brown Relay

An instrument working on somewhat similar lines to the above is the microphone relay of S. G. Brown. These relays, although very sensitive in action, have not been very widely used commercially for wireless reception, although they have

proved very useful for laboratory recording work.

At a demonstration given before the Radio Society of Great Britain, Mr. A. A. Campbell Swinton, using three Brown relays in series, made the signals from the Eiffel Tower and other stations both audible and visible to a large audience.

Although some form of relay capable of being operated by the small detector currents is generally considered necessary as a means of recording wireless signals, their use is not absolutely essential. Any form of current indicator, providing it has a sufficient degree of sensitiveness, can be arranged for automatic reception, but at very high working speeds the majority of these indicators are ruled out. What is really required is some instrument which could take the place of the telephones and possess the desirable factors of reliability, sensitiveness and robustness.

Einthoven Galvanometer

The Telefunken sound intensifier and the Brown relay, while excellent up to a certain point, possess, however, certain disadvantages for high-speed commercial work. Besides being very difficult to adjust and maintain in adjustment over long periods of working, they are easily affected by vibration, special precautions having to be taken to minimise the effects.

Mirror galvanometers, while sufficiently sensitive, are not suitable for working at high speeds, as their natural period of vibration is too long. The Einthoven string galvanometer is so far the only instrument that has been designed to give satisfactory results when working directly on receiver currents, either with or without a detector in circuit. This type of galvanometer is very sensitive, the latest designs being operated with a current as small as 10^{-6} ampere, with a natural period of swing of about one-three-hundredth part of a second. Unfortunately the instrument is too delicate for rough usage.

The Einthoven galvanometer is essentially a moving coil instrument and is remarkable for its dead-beat action. It consists of a very powerful electromagnet; the pole-pieces of which converge almost to points. A very fine silvered quartz thread or platinum wire is stretched between the pole-pieces, the tension being adjustable. When current from the detector is flowing through the thread of the galvanometer it is forced out of the magnetic field, the magnitude of the movement being proportional to the current flowing. The movements of the thread being very small, a microscope is necessary to render the movement visible.

(Continued on page 724)

Short Wave Reception

(Down to 20 metres)

DAY OR NIGHT

from America and other distant stations.

Only certain types of valves are suitable for this fascinating class of work and the combination

MARCONI VALVES

MADE AT THE OSRAM LAMP WORKS

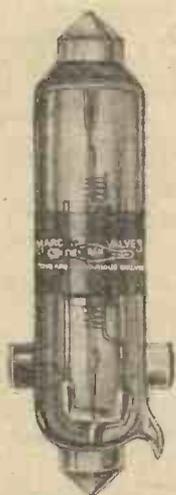
DULL EMITTER

D.E.Q. TYPE and D.E.V. TYPE

(Detector)

(G.P. & L.F. Amplifier)

has been found ideal for "picking up" world-wide amateur transmissions and broadcast concerts from KDKA.



D.E.Q. Type

Fil. volts 3
 Fil. current 0.2 amps.
 Amplification factor 20
 Impedance 100,000 ohms.
 Anode volts 20-60.
 Price 35/-

A leading British Amateur says:

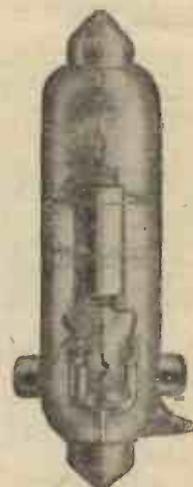
"I received here during the last few days, between the hours of 17.00 G.M.T. and 18.00 G.M.T., there being continuous daylight between transmitter and receiver, six American experimental stations. The receiver in use at my station and used in these test receptions employs the D.E.Q. MARCONI-OSRAM VALVE which alone I have found suitable for reception on these ultra-short waves."

(Signed) E. J. Simmonds.

20 D GERRARDS CROSS.

A special feature of these valves is their **LOW LOSS, LOW SELF-CAPACITY** construction, which ensures to you the best results.

SOLD BY WIRELESS AND ELECTRICAL DEALERS, STORES, ETC.



D.E.V. Type

Fil. volts 3
 Fil. current 0.2 amps.
 Amplification factor 6
 Impedance 24,000 ohms.
 Anode volts 20-60.
 Price 30/-

Advertisement of

THE GENERAL ELECTRIC CO., LTD.
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THE MARCONIPHONE CO., LTD.
 MARCONI HOUSE, STRAND, LONDON, W.C.2

"RECORDING WIRELESS SIGNALS" (continued from page 722).

For the purposes of recording, the thread is made to uncover a small slit in a screen, behind which a band of paper sensitive to light is drawn by means of a small motor. The Morse signals are recorded upon the paper band. After development an undulating white line is shown upon a black background.

Poulsen System

The Poulsen Company were the first to use this galvanometer for the photographic recording of wireless signals. Their arrangement is shown in Fig. 2. The oscillations in the receiver circuits are made to affect the thermo-electric detector T , and the current so produced is passed through the thread of the galvanometer G . For signals transmitted at the rate of 1,500 a minute 1×10^{-6} amperes is required to operate the galvanometer to produce good intelligible records, while for signals up to 2,500 a minute, a current of about 5×10^{-6} amperes is necessary.

Marconi System

By means of a somewhat similar arrangement the Marconi Company have received and recorded Transatlantic messages at Clifden, the results being very satisfactory.

The use of the three-electrode valve and the ease with which the received currents can be amplified appear to offer a ready solution to the use of recording apparatus, it being quite an easy matter to obtain a

current sufficiently large to operate an ordinary single-contact relay.

Where a valve is used as a detector a steady current flows from the plate to the telephones, relay or other instrument connected to the circuit. Upon receipt of a signal the plate voltage is varied, and it is these variations that must be used to operate the relay. The difficulty that arises is that the steady current which will flow permanently through the relay will practically wipe out the effect of the small variations unless methods are adopted which will counteract it.

Differential Relay

One arrangement employs a relay wound on the differential principle, the plate current being divided between the two windings, balancing the relay. Any variation of the plate voltage due to incoming signals will operate the relay, causing it to close the local contacts to which the recording apparatus is connected.

Another method employs an ordinary type of relay, the balancing of the plate current being done by means of resistances outside the relay. The arrangement is on the principle of the ordinary Wheatstone bridge.

Quite recently Mr. F. G. Creed, the inventor of the automatic printing telegraph, by means of which the Morse signals received are automatically printed in Roman characters, has endeavoured to apply his system to wireless working. A specially constructed relay is operated by the variations of the plate current, and

this relay in turn operates an ordinary Post Office relay, which again actuates the power relay of the printing apparatus.

M. J. M.

BROADCASTING WITHOUT CARRIER WAVES

EXPERIMENTS have recently been taking place at the University of Illinois, United States, with a system of broadcasting without the use of carrier waves.

The experimenters have succeeded in transmitting programmes from WRM by this system, in which carrier waves are only employed while sounds enter the microphone. The elimination of the carrier waves at other intervals has brought about increased sending efficiency and more selective tuning at the receiving end.

Under the present system of broadcasting, as most wireless enthusiasts are aware, the carrier wave, on which the sound wave is impressed, conveys all sorts of sounds, which only perfect modulation at the transmitting station and efficient detection at the receiving end can eliminate effectively.

C. E. G.

There is every prospect of the Welsh National Eisteddfod this year being broadcast by the B.B.C., as the result of negotiations that are now proceeding.



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This handbook, which is compiled from the writings of many contributors to "Amateur Wireless," seeks to show in close detail, and with the aid of 112 illustrations, how to make and operate about ten different types of valve sets.

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Compiled from the pages of "Amateur Wireless," this handbook deals in a simple, straightforward manner with the making of a number of crystal sets. With 114 illustrations.

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Detailed instructions for making the various components forming parts of many kinds of wireless receiving sets. It does not describe the making of any one complete set, but just all the parts likely to be required. With over 200 illustrations.

Wireless Telegraphy and Telephony and How to Make the Apparatus

This revised edition is by Mr. E. Redpath, the well-known writer on wireless. The explanations of principles are up to date, and there are directions for making apparatus, including detectors, amplifiers, single-circuit and complete short-wave receiving sets, a valve panel, and a five-valve amplifier.

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—Invaluable to the Experimenter

The "K" Tubular Fixed Condenser

embodies entirely new principles. Only the clips fix to the panel and capacities can be changed in 3 seconds. No need to work behind the panel with a tool that very often slips and damages your wiring. No soldering necessary. Capacities are accurate and not affected by changing atmospheres. Small under-panel space.

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 .001 } 2/-
 .002 } each.
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The "K" Square Law Variable Model

is so carefully and sturdily constructed that the usual condenser troubles are impossible. The Square Law Principle gives greater selectivity with a very gradual adjustment—enabling those hitherto difficult stations to be logged with ease.

PRICES:

Capacity.	Without Vernier.	With Vernier.
0.001 mf.	10/-	12/6
0.0005	8/3	11/6
0.0003	7/9	10/6
0.0002	7/3	
0.0001	6/6	

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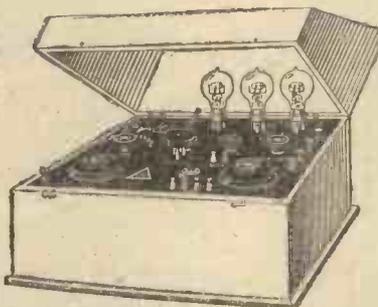
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You are sure of results when you assemble a Radiax Set. Hundreds of unsolicited testimonials confirm its fine performance on distant or local stations. It is replete with refinements which ensure best results under all conditions.

Deferred Payments if Required.

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TYPE	Filament Voltage	Plate Voltage	Amps	Usual Price	New Price
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"R" Amplifier ...	3.8 to 4.0	60 to 100	0.5	4/9	4/6
Tubular Detector	3.8 to 4.0	30 to 60	0.5	4/9	4/6
Dull Emitter ...	1.8 to 2.8	30 to 100	0.06	12/6	10/3

SQUARE LAW VARIABLE CONDENSERS

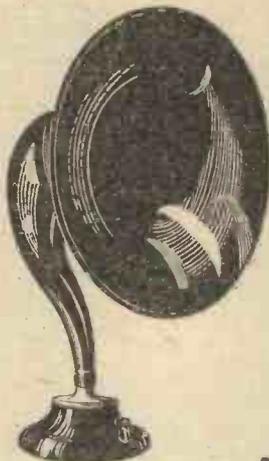
	Usual Price	New Price
.0005 Complete with Knob and Dial	5/11	5/6
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 First Floor, 180, Bishopsgate, LONDON, E.C.2.

Phone: Central 7361. Please remit sufficient postage. All goods sent at Purchasers' risk.

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By the peculiar construction of the throat and bell, distortion is kept at zero point and "muffling" is entirely absent.

The diaphragm adjustment is most flexible in its control.

THE "REVO" SENIOR

Specification: 22 in. high; Aluminium Trumpet 14 in. diam.; Finished Crystalline Black. Price, 80/-.

The "Revo" "Senior" Loudspeaker has two small brothers, the Junior and Baby, worthy followers, finished black, price 48/- and 25/- each respectively.

All guaranteed for 12 months.

At all dealers. If unable to obtain locally write direct:

THE CABLE ACCESSORIES CO., LTD.
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We produced the "Revo" Lightweight Headphone to meet the demand for a light, comfortable and ultra-sensitive phone. No pressure, no hair-tearing, no discomfort, no projections. 19/6. Guaranteed for 12 months.

"Revo"

"The Name for Perfect Radio"



NEGOTIATIONS are in progress between the B.B.C. and the authorities concerned with a view to services being broadcast from Westminster Abbey and York Minster.

Dance music will be broadcast more frequently from 2LO this summer, and the B.B.C. is negotiating for an extension of the hours during which dance music shall be transmitted.

An official of the B.B.C. states that the company is fully alive to the fact that from an educational point of view wireless transmission has merely begun to feel its way. The B.B.C. are very keen on making the transmissions as perfect as possible in every detail, feeling that any imperfection is as unsatisfactory to them as disadvantageous to the educational authorities.

A giant wireless experimental station is now under construction near Schenectady, United States, by the General Electric Company. The transmitting station,

which occupies a site 56 acres in extent, is situated six miles south of Schenectady. The aerial structures include three steel towers, 300 ft. high, arranged in the form of a triangle. From these towers almost any type of aerial may be strung for operation on wavelengths of from 600 to 3,000 metres.

May 13 is Sullivan's birthday, and the event is to be commemorated by a special programme of his works, to be conducted by Mr. Geoffrey Toye at 8 p.m., the vocalist being Mr. Leonard Lovesey (tenor).

The chamber music programme for May 14 contains one item of outstanding interest, the song cycle for voice and string quartet "Love Blows as the Wind Blows," by George Butterworth.

The Ministry of Health has refused to incorporate in its general insurance of houses any responsibility for damage by fire or lightning caused through wireless aerials.

Mr. Walter Sherratt, a wireless amateur, at Cowes, has succeeded in establishing communication with the wireless station in Reijkjavik, Iceland. He was informed by the station that he was the first amateur in the world to have wireless communication with Iceland.

A military band programme will be provided by the 2LO Military Band on May 10; songs by Frank Phillips (baritone), and entertainment by Wilson James and David Jenkins ("The Wranglers"), are also included in the programme.

The chamber music programme from 5XX for May 13 will be given by Mr. Dale Smith (baritone), with the Kutcher String Quartet. The principal item of the programme is Haydn's Quartet in G minor, Op. 74, No. 3.

By listening-in throughout a 10,000-miles railway tour through the United States, Canada and Mexico, which will last for a month, members of the Brooklyn Chamber of Commerce hope to find the causes of fading and alteration of signal strength experienced during summer weather.

The broadcasting of nightly bulletins for motorists is being considered by the Automobile Association.

The British Broadcasting Company has been granted permission to broadcast a service from Canterbury Cathedral. The

(Continued on page 728)

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RADIOGRAMS (continued from page 726)

date selected is Friday, June 5, the occasion of a special service in commemoration of the tercentenary of Orlando Gibbons. The choirs of the cathedral and of the Chapel Royal will take part in the service.

A new broadcasting station is shortly to be erected in Prague, which, it is expected, will have an effective range covering London, Madrid and Moscow. The Ministry for Posts and Telegraphs is carrying on negotiations with a view to erecting a high-power station which will broadcast to the whole world.

Since the special wireless exhibition held at Prague in connection with the Spring Fair the interest in wireless has increased and the number of licences granted to individuals is growing steadily.

On May 8 a popular evening programme will be broadcast, the vocalists being Miss Elsie Hulme (contralto), Mr. Sydney Coltham (tenor), and Jack Hellier, the actor-entertainer.

A community singing concert will be relayed from the Royal Albert Hall on May 9.

A Marconi telegraph office was opened at Manchester on April 20, for the acceptance and delivery of Marconigrams.

At the annual business meeting of the Scottish Choral and Orchestral Union in Glasgow the chairman said that but for

more concerts given, and fees received from the B.B.C. they would have been in the position of having to make another call on the guarantors of the Union.

With the construction during this summer of wireless stations at Aklava, at the mouth of the Mackenzie River, and at Fort Smith, in the Mackenzie River basin, the system of communications for the north-western section of the North-West Territories of Canada will be complete. The next station to be erected will be on the western shores of Hudson Bay.

On the afternoon of May 10 a Schumann symphonic programme will be conducted by Mr. Percy Pitt. The main item is the great work *Manfred*, which will be declaimed by Henry Ainley. At 6 p.m. the Children's Corner will be relayed from the Aberdeen station. In the evening, instead of the customary fortnightly light programme by de Groot, a special programme will be given by the J. H. Squire Celeste Octet, with various other artistes.

The programme for May 11 centres round the thought of "the merry month of May"; the orchestral music, vocal items and even the humour bubbles over with the "May" spirit. Mr. Michael Head, Mr. Charles Wreford (entertainer), and the London Singers will all contribute to the programme.

WAHG (Richmond Hill, Long Island), which succeeded in transmitting to Aus-

tralia the sound of a locomotive bell, has won the silver cup offered by the Broadcasting League of Australia. The distance between the stations is 12,175 miles.

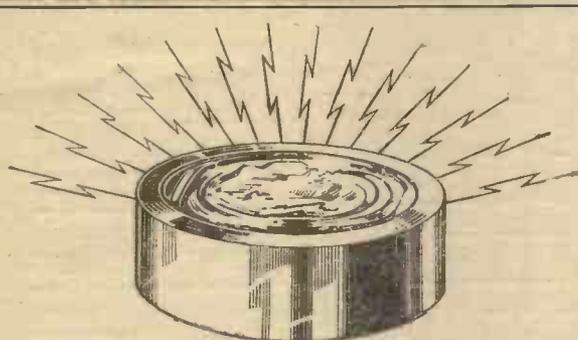
The first International Congress of Wireless Amateurs recently took place in Paris. Delegates from twenty-one countries assembled to discuss plans for co-operation among wireless enthusiasts throughout the world.

2 MG (Bearsden, Glasgow) is carrying on communication with American stations with an input of only eight watts. Clear reception is reported from Springfield, Mass. 2 MG hopes to attempt Transatlantic telephony soon.

The S.B. programme for May 12 is in three parts: the first is a classical programme by the Band of H.M. Scots Guards, and will last forty minutes. After this Philemon's weekly talk, "From my Window," will be followed by a short play, *The Avengers*, by Una Broadbent and produced by R. E. Jeffrey. This is a Scandinavian play taken from an incident in the Icelandic Sagas *The Bredwellers* and *Giali the Outlaw*. The Savoy bands will be heard from 10.30 p.m. till 11.30 p.m.

The fourth of the series of "Radio Fantasies" broadcast from the Birmingham studio will be relayed from 5 X X on May 14.

The Johannesburg station is now working on a wavelength of 450 metres.



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CHIEF EVENTS OF THE WEEK

SUNDAY, May 3

ALL STATIONS	11.0	Military Sunday Service, relayed from York Minster.
London	4.0	Organ Recital.
Birmingham	9.0	Chamber Music Evening.
Bournemouth	4.0	The J. H. Squire Celeste Octet.
Cardiff	9.0	Old Masters—11.
Manchester	4.0	Light Symphony Concert.

MONDAY

London	8.0	Band of H.M. Scots Guards.
Bournemouth	8.30	Speeches relayed from the Dorset Dinner, Holborn Restaurant, London.
Cardiff	7.30	Concert relayed from Central Hall, Newport.
Aberdeen	8.0	Ballad Concert.
Glasgow	8.0	Popular and Literary.

TUESDAY

5XX London	9.0	"All Arts Week" Concert.
London	8.0	Symphony Concert

WEDNESDAY

London	8.0	"Old Times"—Music Hall Songs of Years Gone By.
London	10.40	"The Coronation Anthem" (Handel); Opera, <i>The Magic Flute</i> (Mozart).
Birmingham	8.0	Symphony Concert.
Glasgow	8.0	Symphony Concert.

THURSDAY

London	8.0	Chamber Music—Brahms and Tchaikovsky.
Bournemouth		"Among the Mountains."
Belfast		Springtime Programme.

FRIDAY

Bournemouth	9.15	Song Cycles
Manchester	8.0	2nd Edition of <i>The 7.30 Recue.</i>
Newcastle	8.0	Symphony Concert.

SATURDAY

London	8.0	Community Singing Concert.
Manchester and 5XX Belfast	8.0	"Old Masters."
Belfast	7.30	Nautical Programme.

THE R33 AND INTERFERENCE

THE Postmaster-General's attention has been called to the fact that during the recent flight of the R33, communication between the airship and the Croydon and Pulham aerodromes was seriously impeded by oscillation from wireless receiving sets.

The consequences which might result from interference with communication with aircraft in danger are very grave, and the Postmaster-General warns the owners of wireless receiving sets that the use of reaction to such an extent as to cause interference is an offence which directly contravenes one of the conditions of their wireless licences, and renders the licence subject to withdrawal.

Hanging Wallpapers in the ordinary rooms of an average dwelling-house does not present any great difficulties, provided a few simple rules are adhered to, and these are well illustrated and described in an article appearing in the current issue of THE AMATEUR MECHANIC AND WORK (3d.). Other articles appearing in the same number are "Utilising Waste Tinfoil, etc.," "Easily-made Swing Posts"; "Motor-cycle Magneto Troubles"; "Winding Anti-capacity Basket-coil Variometers"; "Adding Phones to the Set"; "Spinning Small Articles in the Lathe"; "The Successful Cutting of Glass Circles"; "Colour Photography: Working the Agfa Plates"; "Non-stop Spinning Tops."



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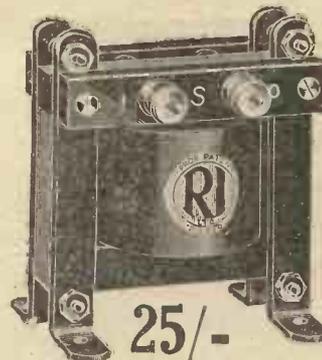
Volume and distance are easy to the majority of Transformers, but the power of **perfect reproduction** is practically unknown. A note is reproduced technically correct—correct because it remains the same note that was transmitted, in other words its pitch is correct, but it is a thin, poor specimen of the real thing; it is, in fact, a mere imitation that has lost all the intimate personality of the instrument and its master, for the secret of musical architecture lies in the attendant delicate overtones.

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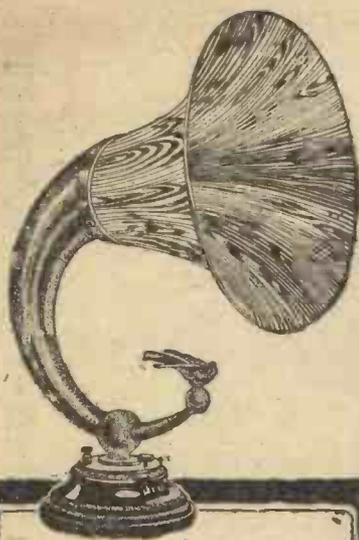
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NOTE.—In the following list of transmissions these abbreviations are observed: con. for concert; lec. for lecture; orch. for orchestral concert; irr. for irregular; m. for metres; and sig. for signal.

GREAT BRITAIN

The times given are according to Greenwich Mean Time.

London (2LO), 365 m. 1-2 p.m., con. (not daily); 4-5 p.m., con.; 6.0-6.35 p.m., children; 6.40 p.m., light music; 7-7.30 p.m., time sig., news, talk; 8.0-10 p.m., music; 10.0-10.30 p.m., time sig., news, talk; 10.30-11.0 p.m., music. Tues. and Thurs. the Savoy Bands are relayed until 11.0 p.m., and on Sat. until midnight.

Aberdeen (2BD), 495 m. Belfast (2BE), 435 m. Birmingham (511), 475 m. Bournemouth (6BM), 385 m. Cardiff (5WA), 351 m. Glasgow (5SC), 420 m. Manchester (2ZY), 375 m. Newcastle (5NO), 400 m. Much the same as London times.

Bradford (2LS), 310 m. Dundee (2DE), 331 m. Edinburgh (2EH), 328 m. Hull (6KH), 335 m. Leeds (2LS), 346 m. Liverpool (6LV), 315 m. Nottingham (5NG), 326 m. Plymouth (5PY), 335 m. Sheffield (6FL), 301 m. Stoke-on-Trent (6ST), 306 m. Swansea (5SX), 481 m.

Chelmsford (high-power station), 1,600 m. Experimental transmission every Monday at 10.30 p.m. from one or other main or relay station.

CONTINENT

The times are according to the Continental system; for example, 16.30 is 4.30 p.m., and 08.00 is 8 a.m. (B.S.T.).

AUSTRIA.

Vienna (Radio Wien), 530 m. (1.4 kw.). 09.00, markets (exc. Sun.); 11.00, con. (Tues., Thurs., Sat., Sun.); 13.05, time sig. weather; 15.30, Stock Ex. (exc. Sun.), news, con.; 17.10, children (Sat.), women (Wed.); 18.30, lec.; 19.00, lec. (Fri.); 19.30 news, weather, time sig., con., lec., news; 19.45; Engl. (Mon., Fri.); 22.00, dance (Wed., Sat.).

Graz (Radio-Hekaphon), Relay, 404 m. (500 w.). Own con.: 11.0, 17.00, 20.00.

BELGIUM.

Brussels, 265 m. (1½ kw.). 17.00, orch., children (Wed. and Thurs.); dance (Tues. and Sat.); 18.00, news; 20.00, lec., con., news (opera, Mon. and Wed.).

CZECHO-SLOVAKIA.

Prague (Strasnice), 570 m. (1 kw.). 10.00, Stock Ex. (weekdays); 11.00, con. (Sun.); 11.30, Stock Ex. (weekdays); 17.00, Stock Ex., con. (Wed., Sat.); 18.00, Stock Ex. (weekdays); 19.15, con. or lec., weather, news, children (Sat.); 20.00, con., dance.

Brünn (OKB), 1,800 m. (1 kw.). 10.00, con. (Sun.); 14.00, Stock Ex., news; 19.00, lec. or con. or dance.

DENMARK.

Copenhagen (Kjobenhavns Radiofoni station), 775 m. (1 kw.). 19.35, notices, lec., con.* (Tues., Thurs., Sat.); 21.30, Esperanto (Wed.). * This con. is also relayed by the Aalborgshus ship station on 445 m. Sun.: Copenhagen only.

Lyngby (OXE), 2,400 m. (2½ kw.). Weekdays: 19.20, news, Stock Ex.; 21.00 and 22.00, news, weather, time sig. Sundays: 16.00 and 21.00, news.

Ryvang, 1,190 m. (1 kw.). 20.00, con., news (almost daily).

FRANCE.

Eiffel Tower, 2,650 m. (6 kw.). 06.40, weather (exc. Sun.); 11.00, markets (exc. Sun. and Mon.); 11.15, time sig., weather; 14.45, 15.35, 16.30, Stock Ex. (exc. Sun. and Mon.); 18.15, con.; 19.00 and 22.10, weather; 20.30, con. (on 2,200 m.), Wed., Sun. (temp.).

Radio-Paris (CFR), 1,750 m. (about 5 kw.). Sundays: 12.45, con.; news; 16.30, Stock Ex.; 20.15, news, Esperanto, con. or dance. Weekdays: 12.30, con., markets, weather, news; 20.15, news, con. or dance.

Le Matin, Paris, provides a special con. every 2nd and 4th Sat. in the month at 21.00. CFR frequently relays 5XX after 22.00.

L'Ecole Sup. des Postes et Télégraphes (PTT), Paris, 458 m. (800 w.). 14.00, lec. relayed from Sorbonne University (Thurs.); 15.00, outside relay (Sat., irr.); 15.45 and 17.00, lec. relayed from Sorbonne (Wed.); 16.00, outside relay (irr.); 20.00, Engl. talk (Tues.), children (Thurs.); 20.30, lec. or con., almost daily.

"Le Petit Parisien," 345 m. (500 w.). 21.30, con. (daily, exc. Wed., Fri.).

GERMANY.

Berlin (Vox Haus), 505 m. (1½ kw.). 09.00, sacred con. (Sun.); 10.00, markets, news, weather; 11.00, con. and tests; 12.00, educ. hour (Sun.); 12.15, Stock Ex.; 12.55, time sig., news, weather; 14.15, Stock Ex.; 15.00, educ. hour (Sun.), markets, time sig.; 15.30, children (Sun., Wed.); 15.35, Esperanto (Sat.); 16.30, orch.; 18.20, educ. lec., women; 19.00, French (Mon.), lec.; 20.00, theatre news (Tues.); 20.30, con., weather, news, time sig.; 22.30, chess (Mon), French (Tues.), dance (Thurs., Sat.).

* If operatic transmission, at 19.15. Will be increased to 81.10 kw.

Königswusterhausen (LP), 2,450 m. (5 kw.). Wolff's Buro Press Service: 07.30-21.00. 1,500 m. (6 kw.): 11.30, con., Esperanto (Sun.). 3,150 m.: Telegraphen Union: 07.45-19.45, news. 4,000 m. (10 kw.): 07.00-21.00, news.

Berlin (Witzleben), about 500 m. (10 kw.). Testing shortly.

Bremen, 330 m. (1 kw.). Relay from Hamburg. 13.45, own con. (Sun.), 16.30 (daily).

Breslau, 418 m. (1½ kw.). 11.15, Stock Ex., weather; 12.00, con. (daily); 12.55, time sig. (Sun.), weather, Stock Ex.; 12.35, time sig. (weekdays), news, weather; 15.00, news; 16.00, children (Sun.); 17.00, con.; 19.00, lec.; 19.30, lec. (Sun.), Engl. (Mon.), shorthand (Wed.), Italian (Thurs.); 20.30, con., weather, time sig., news; 22.00, dance (Mon.), cabaret (Tues.).

Cassel, 288 m. (1½ kw.). Relay from Frankfurt.

Dresden, 280 m. (1½ kw.). Relay from Leipzig.

Frankfort-on-Main, 470 m. (1½ kw.). 08.30, sacred con. (Sun.); 10.45, Stock Ex.; 11.55, time sig., news; 12.55, Nauen time sig.; 15.00, Stock Ex., markets; 16.00, children (Sun.), markets, news; 16.30, con., children (Wed.); 17.00, con. lec. (Sun.); 18.00, markets, lec.; 18.30, shorthand (Thurs.), 19.00, Esperanto (Fri.); 20.00, lec., con., news, weather, Engl. (Mon.); 22.00, con. or dance (almost daily).

Hamburg, 395 m. (1 kw.). Sundays: 08.55, time sig., weather, news, lec., women; 11.15, sacred con.; 12.15, chess; 13.15, lec.; 14.30, chess; 17.00, children, con.; 19.15, Engl., sport, weather; 20.00, con. or opera, news (in English), dance. Weekdays: 07.25, time sig., news, weather, markets; 08.30, theatre news; 12.15, markets; 12.55, Nauen time sig., shipping news; 14.45, markets, police news; 16.10, women; 18.00, children (Mon., Tues.); 19.00,

(Continued on page 732)



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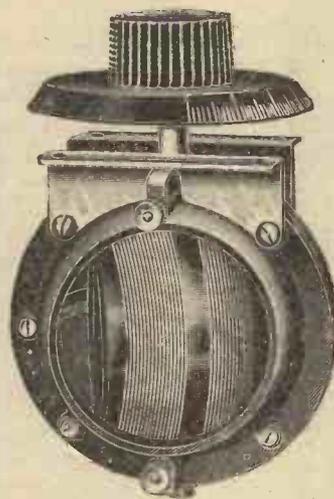
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"BROADCAST TELEPHONY" (cont. from page 730)
 lec.; 19.30, English (Tues., Fri.), Spanish (Thurs.); 20.00, con. or opera; 22.00, markets, news (in English), dance.

Hanover, 296 m. (1½ kw.). Relay from Hamburg. Also own con., 13.45 (Sun.), 16.30 (weekdays).

Königsberg, 463 m. (1 kw.). 09.00, sacred con. (Sun.), markets (Wed., Sat.); 12.55, time sig., weather, news; 16.00, markets; 16.30, con. (children, Mon.); 19.30, lec., Esperanto (Wed. and Sat.); 20.00, con. or opera, weather, news, dance (irr.).

Leipzig, 454 m. (700 w.). 08.30, sacred con. (Sun.); 10.00, markets, news; 11.00, educ. hour (Sun.); 12.00, con. (daily); 12.55, Nauen time sig., Stock Ex., news; 16.00, con. (Sun.), markets; 16.30, con. (weekdays), children (Wed.); 17.30, lec.; 18.00, markets, Stock Ex., lec.; 18.30, wireless talk (Sat.); 19.00, Engl.; 20.15, con. or opera, weather, news; 22.00, con., cabaret or dance (not daily).

Münich, 485 m. (1 kw.). 11.30, lec., con. (Sun.); 12.55, Nauen time sig., news, weather; 15.30, markets; 16.00, orch. (Sun.), children (Wed.); 16.30, con. (weekdays); 17.00, lec. (Sun.); 18.00, con. (Sun.); 18.30, lec., chess (Tues.), Engl. (Fri.); 19.15, Italian (Tues.); 20.30, con., news, weather, time sig.; 22.15, late con. (irr.).

Munster, 410 m. (2½ kw.). 12.00, con., news (Sun.); 12.30, news (weekdays); 12.55, Nauen time sig.; 15.30, news, time sig.; 16.00, con., children (Mon.); 19.00, Italian (Tues., Sat.), Esperanto (Wed.); 19.40, news, weather, time sig., lec.; 20.25, women (Mon.); 20.30, con.; 22.00, Engl. (Tues., Fri.).

Nuremberg, 340 m. (800 w.). Relay from Munich.

Stuttgart, 443 m. (1½ kw.). 11.30, con. (Sun.); 17.00, con. (Sun.), children (Wed., Sat.); 18.30, time sig., news; 19.00, lec.; 19.30, Esperanto (Thurs.); 20.00, con. (daily); 21.15, time sig., late con. or cabaret.

HOLLAND.

Amsterdam (PCFF), 2,125 m. (1 kw.). Daily: 08.35-16.50 (exc. Mon. and Sat., when 10.50-11.50), news, Stock Ex. (PX9), 1,070 m. (400 w.), 21.20, con. (Mon.). (PA5), 1,050 m., 20.20, con. (Wed.).

Hilversum (HDO), 1,060 m. (2½ kw.). 12.20, news; 14.50, con. (Sat. and Sun.); 18.20, children (Mon.); 20.20, con. or lec. (Wed., Fri.), relay of Mandelberg con., Amsterdam (Thurs.), opera or con. (Sat.).

Bloemendaal, 345 m. 10.20 and 17.20, divine service (Sun.).

ITALY.

Rome (IRO), 425 m. (2½ kw.). 10.45, sacred service (Sun.); 13.00, news (irr.); 16.45, children, Stock Ex., orch. relayed from Hotel di Russia, news; 20.45, con., news, dance; 21.15, Esperanto (Mon.).

NORWAY.

Oslo, 380 m. (500 w.). Testing, daily, about 20.30.

POLAND.

Warsaw (Radiopol), 385 m. (½ kw.). 18.00, tests.

RUSSIA.

Moscow (Central Wireless Station), 1,450 m. Sundays: 13.45, lec.; 16.30, news and con. Weekdays: 14.00, markets; 16.30, news or con.

(Sokolniki Station), 1,010 m. Sundays: 15.30, con.; 18.00, lec. and con. (Tues., Thurs., Fri.).

(Trades Union Council Station), 450 m. 18.00, con. (Mon., Wed.).

SPAIN.

Madrid (R1), 392 m. (3 kw.). Sundays: 19.00, time sig., con., lec. Weekdays: 13.30, news, lec.; 19.00, *La Libertad* con. (Tues., Thurs., Sat.); 23.00-01.00, Radio-Madrid con., time sig., lec. (Mon., Wed., Fri.).

Barcelona (EAJ1), 325 m. (600 w.). 18.30, lec., markets, Stock Ex., con.

Bilbao (Radio Vizcaya), 350 m. (1 kw.). 19.00, con., news.

Seville (EAJ5), 350 m. (1 kw.). 19.30, con., news, weather.

SWEDEN.

Stockholm (SASA), 427 m. (500 w.). Sundays: 10.55, sacred service; 17.00, children; 18.00, sacred service; 20.00, con.; 21.00, news, con., weather. Weekdays: 12.30, weather, Stock Ex., time sig. (12.55); 20.00, lec. (irr.), then same as Sun.; 22.00, dance (Wed., Sat.).

Gothenburg (SASB), 290 m. (500 w.). 10.55, sacred con. (Sun.). From 12.30 onwards S.B. from Stockholm.

Malmö (SASC), 270 m. (500 w.). As Gothenburg.

Sundsvall (SASD), 545 m. (500 w.). As Gothenburg.

Boden (SASE), 2,500 m. (500 w.). As Gothenburg.

Falun (SMZK), 370 m. (250 w.). 20.00, S.B. from Stockholm thrice weekly.

Joeköeping (SMZD), 265 m. (250 w.). See Falun.

* Local programmes are also broadcast at times.

SWITZERLAND.

Lausanne (HB2), 850 m. (500 w.). 08.05, weather; 13.30, weather, markets, time sig., news; 17.00, children (Wed.); 18.55, weather, news; 21.15, con. (exc. Wed.), dance (Thurs. and Sat.).

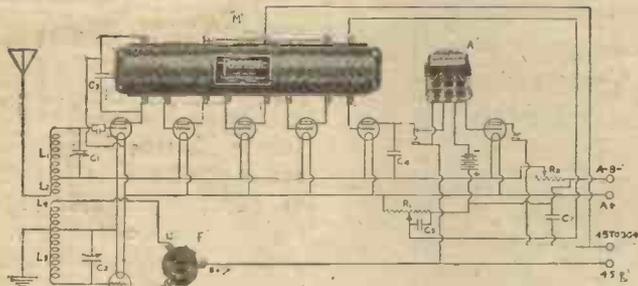
Zurich (Höngg), 515 m. (500 w.). 12.00, weather; 12.55, time sig., weather, news, Stock Ex.; 16.00, con. (exc. Sun.); 18.15, children (Mon., Wed., Thurs., Sat.); 19.00, weather, news (exc. Sun.); 20.15, lec., con., dance (Fri.); 21.45, news.

Geneva (HB1), 1,100 m. (temp.). New station shortly testing.

BUILD the VOKES McLAUGHLIN ONE-CONTROL SUPER HETERODYNE

THE PRECISE SUPER MULTIFORMER.

One Instrument which does the work of four.



Every station within range comes in by turning one dial. Fully illustrated Constructional booklet including full size drawings, 5/- post free. Write or call for particulars of complete sets of parts as specified by the author, or individual parts to suit your own requirements.

DURHAM FIXED AND VARIABLE METALLIC GRID LEAKS AND RESISTANCES.



Manufactured by a process developed by a professor of electrical and a professor of chemical engineering of one of the largest universities of the Eastern United States after months of scientific research. The Durham Metallic Grid Leak is made from a rare metal deposited on the inner or outer surface of a glass rod or tube, ensuring PERFECT RESISTANCE, CONDUCTIVITY, PERMANENCE of RESISTANCE and ABSOLUTELY NOISELESS OPERATION.

50,000 ohms resistance ... 3/6	VARIABLE GRID LEAKS.
100,000 " " " " ... 3/6	1,000 to 100,000 ohms ... 3/-
2 megohm " " " " ... 3/-	1 to 5 megohms ... 3/-
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N.B. All our products are fully tested and guaranteed by our Principal, C. G. Vokes, A.M.I.Mech.E., etc.

C. G. VOKES & COMPANY,
 38, Conduit Street, Regent Street, London, W.1.

Telegrams: Folberth, Piccy, London. Telephone: Gerrard 4693.



Replaces all long-wave transformers in any type or modification of the superheterodyne circuit. The instrument has met with the unanimous approval of noted radio experts and is already demanded by the public which is rapidly learning of its superiority over the conventional type of superheterodyne transformers. It cuts in half the time and eliminates all trouble in building the superheterodyne, and assures the builder of successful results due to the short connections which are required from the instrument to the respective valve sockets—thus preventing the experimenter from unconsciously causing undesirable coupling between circuits.

Price £4 17 6

WIRELESS GRAMOPHONE LOUD SPEAKER.

The **Dulce-Tone**

is a link between your Wireless Set and the Gramophone.

The Dulce-Tone is NOT AN ATTACHMENT. It is used simply by placing the needle of the gramophone on the vibrating reed of the Dulce-Tone. It does not require the removal of any part of the machine. Dulce-Tone can be used and then laid aside as easily as a record—in fact, the operation is virtually the same. Hence it does not reduce the use or availability of the gramophone for the playing of records.

Price £2 10 0



TRADE NOTES AND CATALOGUES

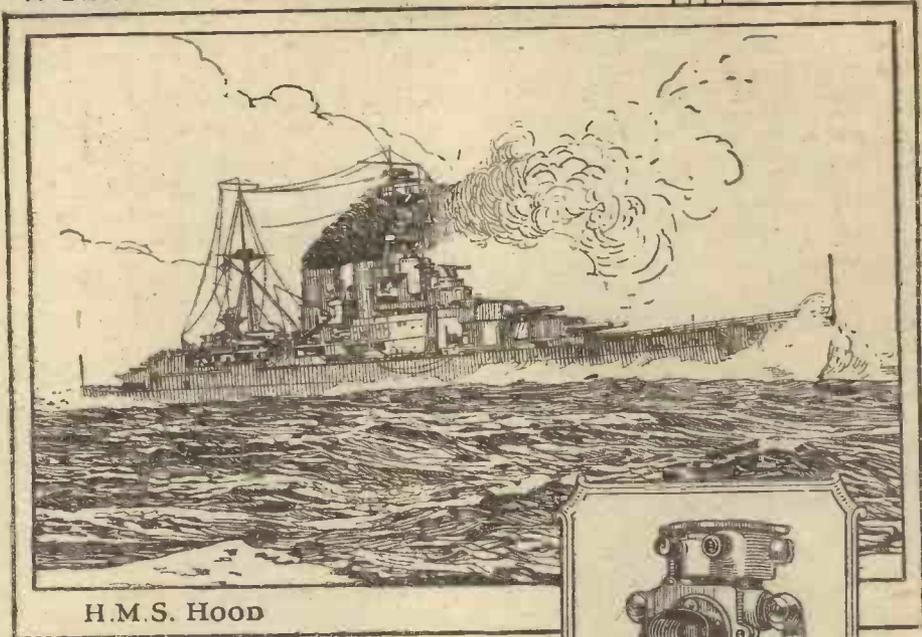
FULLER'S United Electric Works, Ltd., of Chadwell Heath, have recently issued an eight-page list (No. 91c) dealing with their standard dry and inert cells, low-tension dry batteries and grid-bias batteries, Sparta high-tension dry batteries and grid-bias batteries, have been specially developed for wireless work. The list is fully detailed.

A. J. Stevens and Co. (1914), Ltd., of Walsall Street, Wolverhampton, have sent us a very attractive showcard illustrating the A.J.S. loud-speaker. It is interesting to note that horns for the A.J.S. loud-speaker can be made to match any wood ranging from ebony, rosewood and mahogany to the lightest of oak.

Siemens Brothers and Co., Ltd., of Woolwich, have sent us an illustrated leaflet dealing with their high-tension dry batteries. In this leaflet are published for the first time full details of a new type of high-tension dry battery which Messrs. Siemens have just put on the market and which has been specially designed to meet the increasingly heavy demands which are being made upon H.T. supply.

From R. A. Rothermel, Ltd., of 26, Maddox Street, Regent Street, W.1, we have received a catalogue of components suitable for well known American super-heterodyne, ultradyne and neutrodyne receivers, together with a large range of low-loss condensers.

A BRITISH BATTLESHIP



H.M.S. HOOD

On Land and Sea

Loud Speaking Telephone Apparatus manufactured by **THE HOUSE OF GRAHAM** is used throughout the British Navy and adopted by many Foreign Governments, as also by leading Shipping Companies in all quarters of the Globe.

With over thirty years pre-eminence in every field of Loud Speaker application, the utility, technical efficiency, and reliability of **GRAHAM** instruments are conclusively demonstrated.

Just as the most exacting requirements of Naval and Maritime experts have been adequately met by production to meticulously accurate standards, so the present-day needs of Radio reception have been fully satisfied in the evolution of the **AMPLION** Loud Speaker.

A Product of The House of Graham

Many patented and therefore exclusive features contribute to the superlative qualities of the **AMPLION**, recognised as the World's Standard Wireless Loud Speaker, and acknowledged as synonymous with

"Better Radio Reproduction."

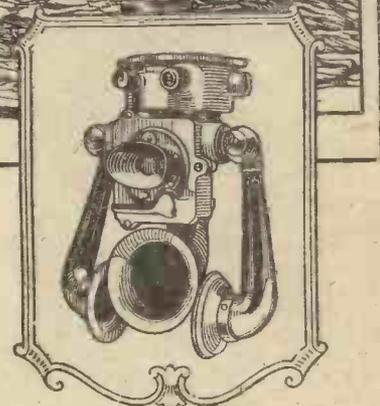
Obtainable from **AMPLION STOCKISTS** and **Wireless Dealers everywhere.**

ALFRED GRAHAM & COMPANY

(E. A. GRAHAM)

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Demonstrations given during broadcasting hours at:
West End Showrooms - - - 25-6, Savile Row, W.1.
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A typical Graham Loud Speaking Naval Telephone, as fitted on board ships of the Royal Navy.



The **AMPLION** shown is the "NEW" Junior-de-Luxe Model A R 114 at £3 : 5 : 0

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The cheapest high-frequency valve on the market and the most satisfactory as a detector and amplifier. Adaptor for same 1/- each.

5/- each, 4 for 19/-, postage paid, at Buyer's Risk.

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Wind that COIL yourself with the "SIMPLEX" WINDER

No matter what type of coil you require, Basket, Crown, Dumbbell, or Lattice, you can wind them all on the Patent "Simplex" Adjustable and Convertible Coil Winder, and you will save its cost over and over again, besides having coils that will give better results. Send 4/- to day for the most modern and important wireless invention. Postage 4d. extra. Trade Enquiries Invited. **GODFREY Bros. 68 Plumstead Road, London, S.E.18**

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"Perfection in Detection"

A Permanent Wireless Detector
Practically every technical and popular Wireless paper in the country has endorsed in the strongest of terms the remarkable advantages the R.I. Permanent Mineral Detector possesses over every other form of crystal detector. The demand for this detector has exceeded that of any other wireless component since broadcasting was introduced, and wireless experts are unanimous in their opinion that it is only a question of time before one is used in every crystal set. **"No Catwhisker is employed."** Rectification is obtained by a selected piece of rare mineral in combination with another mineral. A spring plunger is fitted to one of the elements and enables the point of contact to be moved if desired, although this is not necessary.

You want a detector that is permanent, that remains permanent, that can be used by a child as well as an adult—in any set, whether crystal, valve, or reflex, and at the same time is as good as any crystal combination. Write for new booklet:

"The Discovery of 1925."
The R.I. Detector is now obtainable from all reliable dealers or direct from the makers.

PRICE 6/-
Complete with metal brackets and screws for mounting.

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NEW OXFORD ST.
LONDON, W.C.1**

RI
Contractors to the Admiralty and all Government Departments



KDKA on a Crystal,

SIR,—With reference to the letter of G. W. (Essex) published in No. 149.

(1) Doubtless I was one of many listening-in on the morning in question, and I quite think that if KDKA was being relayed by a Continental station or an English amateur I should have been informed almost immediately.

(2) I will demonstrate my set with pleasure by appointment. I should, however, like to point out that conditions for D.X. work are not now so favourable as they were two months ago.

Re the letter of J. G. R. (Glasgow).—

(1) Is your correspondent aware of the fact that powerful oscillation may be obtained on a crystal set from a valve set employing five or more valves operated at a distance of nine to fifteen miles? The effective range for a valve set to improve a crystal set rarely exceeds one mile. The nearest set that might possibly have been working in this district would be quite two miles distant.

(2) In December last when tuning-in morse (600 metres) one afternoon I distinctly heard the 2 LO tuning whistle, and bringing the knob round it became stronger until reaching a maximum at 326 metres. I am roughly eighty miles from 2 LO.

(3) KDKA has been working on 325 metres several times since its change to 309 metres.—S. M. Stafford (Thrapston).

[This correspondence is now closed.—ED.]

Berlin Transmissions.

SIR,—Many of your readers who have heard A 8 may be interested to know that the station is operated by Dr. Roehau, of the Lorenz Co., Berlin. Dr. Roehau would be glad to have the reports of amateurs, and the following should be included in the report: Receiver used, strength, aerial, weather conditions and time.

The wavelength used in the present tests is 45 to 50 metres, but will be reduced to 20 to 25 shortly. Any amateur interested who would like to know the times of transmission can have them from the writer at the address below, where all reports should be sent.—T. WALKER, 34, Ontario Buildings, Preston's Road, Poplar, London, E.14.

Other Correspondence Summarised

B. D. (Essex) wishes to know which station continuously transmitted on Good Friday the following signals: six letter "g's," dash, eleven dashes, six letter "g's"; then ensued pause of twenty seconds when the foregoing was repeated.

F. W. S. (Park Road, Devizes, Wilts) has twenty-six back numbers of last year's "A.W.," to which any reader is welcome on receipt of postage.

P. T. G. (Wakefield) wishes to express his appreciation of the generous treatment he has received from the Radio Communication Co., Ltd. Without quibble, and within seven days, they replaced a "Polar" condenser which he did not consider up to standard.



CLUB DOINGS

Golders Green and Hendon Radio Society...

Hon. Sec.—MR. W. J. T. CREWE, "The Dawn," 111, Prince's Park Avenue, Golders Green, N.W.11. The members spent an enjoyable evening on April 1, when many lively discussions took place.

Coventry and District Co-operative Radio Society

Hon. Sec.—MR. A. CURTIS, West Orchard, Coventry. On April 1 a lecture on the development of wireless was given. It was illustrated by a series of lantern slides kindly loaned by Messrs. Marconi. This was followed by practical work with the society's receiver in trying out different circuits.

Croydon Wireless and Physical Society

Hon. Sec.—MR. H. T. P. GEE, Staple House, 51-52, Chancery Lane, W.C.2.

At the last meeting Mr. A. T. Dale and Mr. W. F. Pearson gave a lecture on the super-heterodyne circuit, bringing with them a set embodying this circuit which had been made up by Mr. Pearson.

Dorking and District Radio Society

Hon. Sec.—MR. A. J. CHILD, High Street P.O., Dorking.

At a recent meeting a lecture by Mr. G. E. Taylor was given which was entitled, "The Care and Maintenance of Accumulators." The composition, method and objects of charging and testing were fully described.

Golders Green and Hendon Radio Society

Hon. Sec.—MR. W. J. T. CREWE, "The Dawn," 111, Prince's Park Avenue, Golders Green, N.W.11. A lecture was delivered on April 15 by Mr. F. McCable on "Measuring Instruments and Their Functions." Numerous types of moving-iron, moving-coil and hot-wire instruments were described and the advantages and disadvantages of each type pointed out.

What Every Wireless User should know about the Crystal is the title of an interesting booklet published by Messrs. Harding, Holland and Fry, Ltd., of 52, Queen Victoria Street, E.C.4.

Some very interesting facts about wireless crystals, the processes of manufacture and preparation, and the best methods of using them for reception are all included.

Readers of AMATEUR WIRELESS will be interested to know that they can obtain a free copy of this booklet if they will send a postcard to the firm mentioned.

ANNOUNCEMENTS

"Amateur Wireless and Electrics." Edited by Bernard E. Jones. Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. It will be sent 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 the Proprietors, Cassell & Co., 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," La Belle Sauvage, London, E.C.4.

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For PERFECT Reception

WIRELESS ON EASY TERMS!

GAMAGES have now extended their easy payment system to Wireless, and you may now secure on payment of first deposit Wireless Sets and Apparatus from £5 upwards, balance being payable in monthly instalments. Write for details to Wireless Dept.

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VALUE!



THE "ELLA"
High and Low Reading
VOLTMETER

For use on Accumulator and High-tension Batteries. Pocket type, as illus. Panel mounting type. Post 4d. Price

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The "Brownie Headphone"
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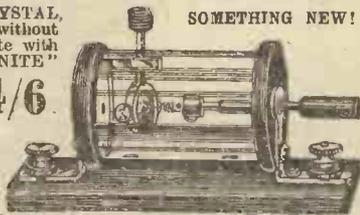
The finest Crystal in the World. Gives maximum results with minimum re-adjustment. Highly sensitive and remains in adjustment longest.

Normal Size with Silver Cat's Whisker to fit the cup. Price post free 1/- Large Size with Silver Cat's Whisker (easily broken). Price post free 1/6

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with the new REVOLVING CRYSTAL, which enables all spots to be used without removing Crystal. Supplied complete with a piece of our famous "PERMANITE" Crystal and Silver Cat's Whisker. SOMETHING NEW!

Price for Panel Mounting. 4/6
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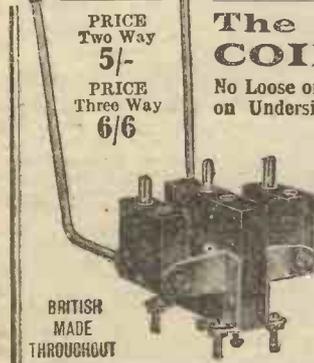
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The "Duo-Lateral" COIL HOLDER.

No Loose or Dangling Wires; Direct Connection on Underside of Panel; Reversible Pins; Anti-Capacity Handles

With the Gamage Duo-Lateral Coil Holder, there are no loose or dangling wires; it is electrically connected (through the stout metal brackets) to the underside of the panel by screws and nuts provided for the purpose. Insulated parts are made of best ebonite and metal parts of Nickel-plated Brass.

Price for Two Way 5/- Post 3d. Price for Three Way 6/6 Post 3d.



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TAPPED COILS

The making of a tapped coil is a difficult task for the most enthusiastic amateur, and it is well to purchase complete units such as Efesca series of tapped coils. In these the ideal has been attained in every respect—the winding is particularly accurate, each tapping is soldered up to its corresponding stud, and the whole unit is arranged for the Standard Efesca One-Hole Mounting to the panel. The unit incorporates a switch as an integral part and the tappings are so arranged that there are no dead ends.

Ask your Wireless Dealer to show you Efesca components, or write to us for Catalogue 522/8 describing Efesca Products.



EFESCA TUNED ANODE

An alternative method to H.F. Transformer Coupling. Must be used in conjunction with a variable condenser of .0008 to .0005 mfd. Wave-length range, 150 to 2,500 metres. Complete with self-contained split switch, knob pointed and scale, one-hole fixing. 21/- each.

Sold by all Wireless Dealers and Electricians.

Wholesale only—

FALK, STADELMANN & CO., Ltd.,

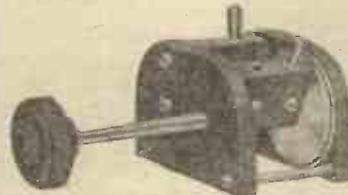
Efesca Electrical Works.

83-87, FARRINGDON RD., LONDON, E.C.1.

And at Manchester Glasgow and Birmingham

ADDS CHARM AND EFFICIENCY TO ALL RECEIVING SETS.

"LOTUS" Cut Geared Vernier COIL HOLDER



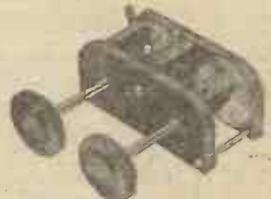
Vernier Movement, actuated by Three Sets of Encased Precision Cut Gears, representing a Reduction of 8 to 1.

Moving Block Cannot Fall.

"LOTUS" COIL HOLDERS

are made from BAKELITE MOULDINGS, with Nickel-Plated Brass Parts.

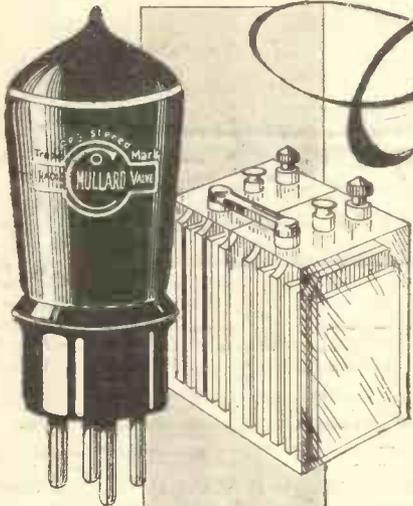
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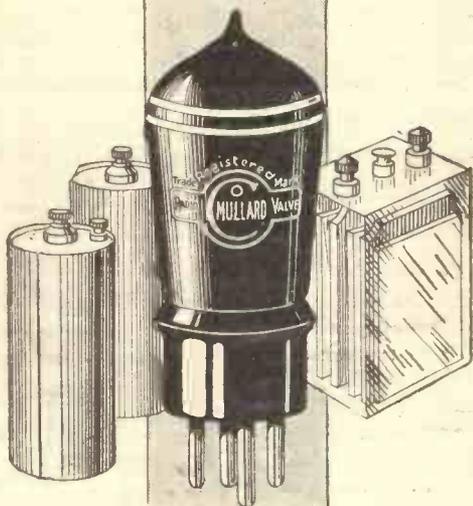
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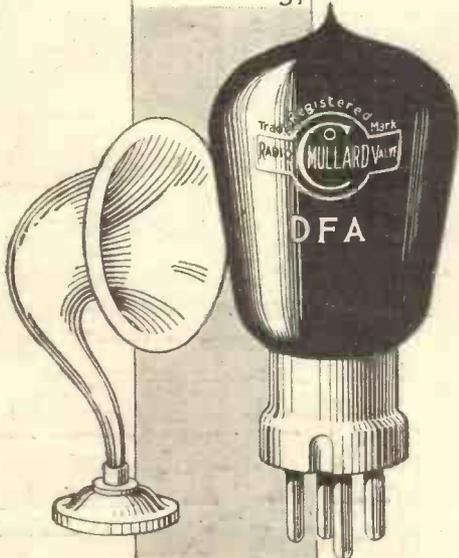
Comprehensive Range



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Here are Master Valves for *perfect long distance and pure tone reception.*

You will find in these three groups a range of Master Valves that will produce the finest wireless reception from your set.

Each type of valve is the best that modern research can produce. Make your own choice.

BRIGHT FILAMENT VALVES

(For four-volt accumulators.)

Mullard H.F. Red Ring Valves for H.F.
AMPLIFICATION - - - - - 11/- each.

Mullard L.F. Green Ring Valves for L.F.
AMPLIFICATION - - - - - 11/- each.
(Recommended for reflex and dual circuits.)

DULL FILAMENT VALVES

Mullard H.F. Double Red Ring Valves for
H.F. AMPLIFICATION.

Type D.3 for accumulators (1.6—2 volts) - 18/- each.
Type D.06 for dry cells (2.5—3 volts) - 21/- each.

Mullard L.F. Double Green Ring Valves for
L.F. AMPLIFICATION.

Type D.3 for accumulators (1.6—2 volts) - 18/- each.
Type D.06 for dry cells (2.5—3 volts) - 21/- each.

NOTE.—Mullard Double Green Ring Valves will operate small and medium sized loud-speakers.

LOUD-SPEAKER VALVES

Mullard D.F.A.0 (.35 amp.) for 4-volt accumulators 26/- each.
Mullard D.F.A.1 (.2 amp.) for 6-volt accumulators 30/- each.

Leaflet V.R. 23 gives full information:

All these Valves bear the hall-mark of

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THE MASTER VALVE

THE MULLARD RADIO VALVE CO., LTD. (A.W.),
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Use a Radio Switch!

MANY switches sold are undesirable for radio work—they have been designed from the purely electrical point of view, which is not good enough for radio, where the currents dealt in are so small.

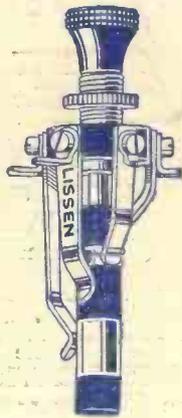
Lissen Switches, on the contrary, have been designed primarily for radio, but they are useful also for other switching purposes. You just gently pull or push them, and you hear them make with a reassuring "click"—and you know they are free from capacity effect.

A little family of SWITCHES, you just gently pull or push them all

WHAT the LISSEN 5-POINT SWITCH DOES

- (a) Switches off one stage of L.F. without touching the filament control—a separate switch for each stage.
- (b) Connects the telephones to the plate of whichever valve it is desired to use, and at the same time switches off the L.T. current from the unused valve.
- (c) Cuts out a stage of H.F. in the same way as it does L.F. (we do not recommend any switching in H.F. circuits where it can be avoided, but where it is desired to use a switch, this is the switch to use).
- (d) Will also disconnect both the H.T. and L.T. Batteries, and short the aerial to earth so that the receiver can be left adjusted ready for switching instantly into commission next time. With diagram ...

4/-



LISSEN REVERSING SWITCH

Particularly useful when the LISSEN 5-point switch is used for cutting out one stage of H.F. When a H.F. stage is cut out, and reaction is being taken off the aerial circuit, it is necessary to reverse the reaction coil connections for each H.F. stage cut out, and this new LISSEN switch conveniently does it. Can also be used anywhere when it is necessary to reverse the connections of a battery, a coil, or a condenser, for instance. **VERY USEFUL FOR COMPARATIVE TESTS.** With diagram ...

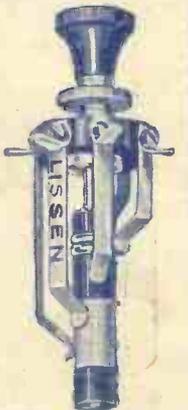
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THE LATEST ADDITION to the LISSEN Family of SWITCHES—the LISSEN Double Pole, Double Throw

This is the very newest of the series, retaining all the neatness of the others, providing in a compact form the means for making all the connections required of a d.p., d.t. switch. As good as the rest. LISSEN ONE-HOLE FIXING, OF COURSE. Similar to LISSEN 5-point Switch. Price ...

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LISSEN 2-WAY SWITCH

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LISSEN SERIES PARALLEL SWITCH

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Parts that pull together—when you know that every vital part in your receiver is pulling strongly with each other, you know that you have a receiver which is the best that you can ever get.

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