

SPECIAL CHRISTMAS AND NEW YEAR NUMBER

The **Wireless 6^d** **Constructor**

EDITED BY PERCY W. HARRIS M.I.R.E.

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No. 51.

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VICTOR KING SUCCESS



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**"VI-KING"
FIVE**

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As some of the arrangements and specialities described in this Journal may be the subject of Letters Patent the amateur and trader will be well advised to obtain the permission of the patentees to use the patents before doing so.

Edited by PERCY W. HARRIS, M.I.R.E.

Chief Radio Consultant:
Capt. P. P. ECKERSLEY, M.I.E.E.



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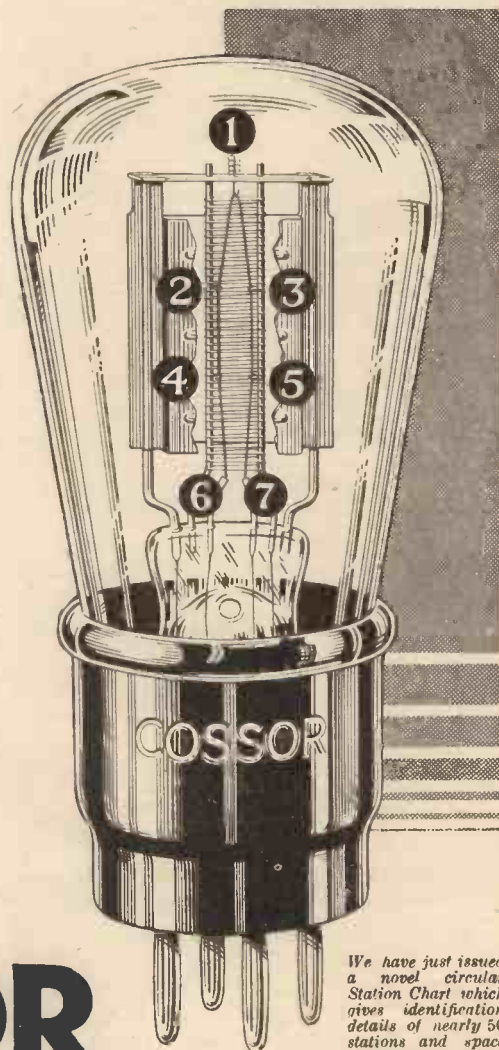
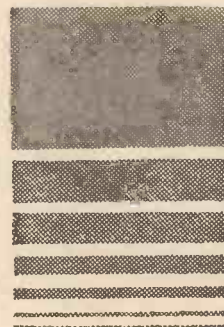
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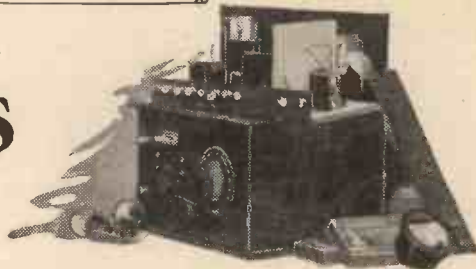
DEFINITELY FREE FROM MICROPHONIC NOISES

The WIRELESS CONSTRUCTOR

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THE EDITOR'S CHAT



Do you build our sets, or just read about them? There is definite benefit to be derived from home-construction, no matter how simple may be the set you choose to build.

There are quite a number of regular readers of the WIRELESS CONSTRUCTOR who take the paper for its general interest, although they themselves have not yet taken any practical steps to make home-construction their hobby.

In many cases the purchaser of a factory-built set has aroused their interest in radio generally, and in their desire to know more about it they have purchased this journal and thereupon become regular readers. It is for them that this particular chat is intended.

A Timely Question

I want to take this opportunity of asking them just why they have not become practical workers. The question is timely because we are now in the best time of the year for radio work. The evenings are dark, wireless conditions are at their best, and the show being a thing of the past, new components and the latest technique are now available to them. The probable answer to the question is, in many cases, that they are not quite sure where to begin.

Best Way to Start

Undoubtedly the best way is to start with a single-valver. Several excellent designs of this kind of set have been published recently, and nothing teaches one better the effect of changes in coils and condenser, the method of coupling to the aerial, the importance of correct reaction setting, proper filament voltage, and a hundred and one other things, than the simply built single-valve set.

It does not matter whether your present commercially built set is functioning well or not. Experiments with a single-valve set will give you

a surprising amount of information. The valve will be a detector, and as the detector is a vital part of every receiver you will be able to learn just what the detector does.

Later you can add very simply a stage of low frequency, and by the purchase of relatively few additional parts you can modify your home-built receiver to make it into one of the already published two-valve designs.

A MERRY XMAS.

This is the Christmas and New Year Number of the "Wireless Constructor," and we therefore take the opportunity of wishing you, one and all, a Right Merry Xmas and a Prosperous New Year. To many of you overseas the greeting must perforce arrive a little late, but it is none the less sincere for that, and we trust that everyone, at home and abroad, will increase his prosperity and happiness as we hope he will increase his radio successes. To all readers of the "Wireless Constructor"—A Merry Xmas!

Do not worry about cabinet, neatly-laid-out panel, or the "professional touch." Remember that the parts screwed to a wooden board, with the condenser attached to simple brackets, rather than to a panel, will facilitate changing components, and will teach you just as much as the most carefully-built receiver.

If you had visited, as I have, the laboratories of many of the great inventors, and if you had seen some of

the famous commercial receivers in the stage when all the vital data concerning them was being worked out, you would appreciate what the Americans call "the bread-board layout" means of construction.

Using Existing Components

One of the great virtues of wireless as a home-constructor's hobby is that practically all receivers are made up by joining together bunches of components in different ways. When a new circuit comes out, experimenters who have been "in the game" for some time generally are able to try it out with the parts they have on hand, and if it turns out to be something of value they can then, without risk of failure, build the new set in finished form.

If, however, it gives no better results than are obtained with other arrangements, the experimental gear can be taken down again, and the parts put by for the new series of experiments.

A Glorious Possibility

Some of the leading firms in the wireless industry employ as their designers and engineers enthusiasts who began in just the same way as I am recommending you to while there is always the glorious possibility of the young experimenter with his simple gear, working perhaps in his bedroom, evolving something entirely new of great commercial importance, but which has nevertheless eluded the research of scientists and engineers with the best-equipped laboratories in the world.

And so, reverting to the beginning of this chat, let me ask the question again: "Why not start now?" Wireless components were never so cheap as they are now, while the quality is higher than ever before. Go to it!

THE B.B.C. AS BACKERS

Opera broadcasts are popular among many listeners, as the demand for the published libretti proves, so that the B.B.C.'s opera backing if necessary in return for 60 broadcasts a year is a legitimate licence revenue appropriation. But those other schemes . . . !

WHAT will the B.B.C. save next? By the look of it, certainly not money.

It has "saved" the Promenade Concerts at the Queen's Hall, various musical societies, and now it is going to save Grand Opera.

Well, it must be admitted that, so far, the B.B.C.'s saving campaigns have been very worth while, and the money spent—or invested—has yielded a handsome return to listeners in the form of very fine concerts and outside broadcasts, etc.

A Milch Cow

There were signs the other day, however, that the B.B.C.'s willingness to act the part of saviour has attracted the attention of people who imagine there is an unlimited amount of surplus cash in the Savoy Hill coffers. And to take one instance, a supporter of the National Theatre scheme blandly suggested some of these misnamed B.B.C. "profits" should be set aside as a sort of subsidy for a National Theatre.

Luckily this amazing suggestion met with the reception it deserved—it was widely ridiculed and generally condemned; but, nevertheless, the very fact of the suggestion being made indicates the prevalence of the belief that the B.B.C. is a sort of milch cow which can be easily tapped when schemes like a National Theatre need a subsidy.

Well, the matter was raised in the House of Commons and we gather that the Government have not yet been approached. Government sanction would be necessary before listeners' money could be "raided" for this grandiose theatre scheme, and we feel safe in saying that the plan suggested by Mr. Granville Barker is as good as dead.

Value for Money

Quite a different proposition is the B.B.C.'s decision to come to the rescue of Grand Opera, because listeners will really reap a fine reward—in the shape of 60 first-class opera broadcasts a year.

Theatre broadcasts are seldom worth while—unless the shows are of the musical variety—but every

listener knows what fine broadcasts can be had from Covent Garden.

The new arrangement has been made between the Covent Garden Opera Syndicate, Ltd., and the B.B.C. for carrying out a scheme of Grand Opera production over a number of years. The undertaking will be administered by a company to be known as the Covent Garden Opera Syndicate (1930), Ltd., under the chairmanship of Mr. F. A. Szarvasy, the originator of the proposal. More than 200 performances will be given yearly, allocated between the Grand

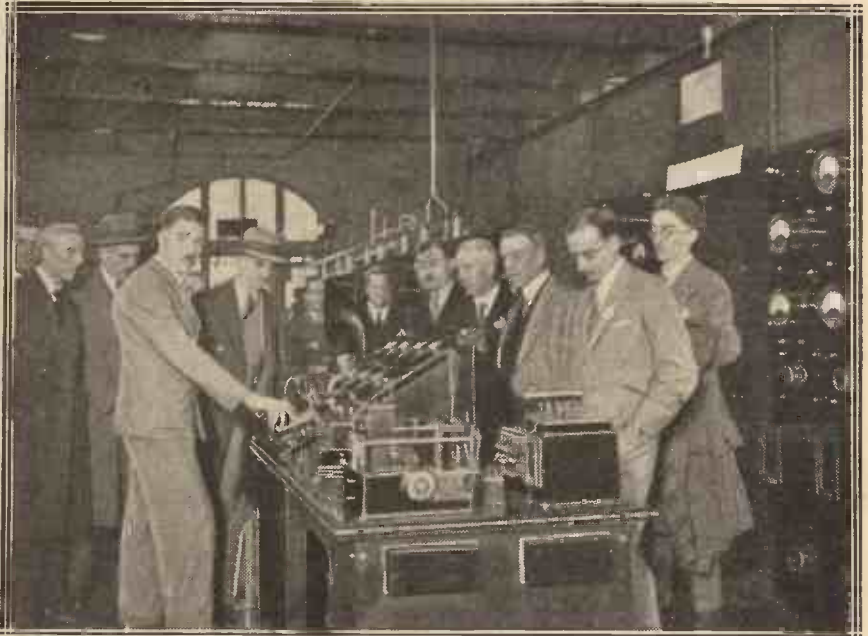
of Sir Thomas Beecham and the Imperial League of Opera. At least sixty performances a year will be broadcast.

The absence of guaranteed support over a considerable period has been a serious handicap to the development of Grand Opera in this country. Plans could be made only on a seasonal basis and additions to repertoire were restricted. Despite the enthusiasm and sacrifice of opera lovers, it is unlikely that the Covent Garden season would have continued otherwise than in a limited sense up to 1932, if it had not been for the new arrangement.

The Listeners' Return

And so, all things considered, the money put up by the B.B.C. will be well spent, and listeners have no reason to grumble, or to fear that their licence money is being frittered away.

OUR EMPIRE LINK AT RUGBY



Visitors to the recent Empire Conference inspecting the apparatus at the giant Rugby station which provides a link with every part of the Empire.

Season of ten weeks at Covent Garden, Autumn and Winter Seasons there of six weeks each, and two-week seasons in at least six other centres throughout the country. Except for the Grand Season, popular prices will be charged at all performances, and the artistes employed will be almost exclusively British. An income of £30,000 has been guaranteed from various sources, and all the funds and earnings of the new company will be devoted to furthering the scheme. Arrangements are in the course of being completed for the participation

Subsidising national theatres and similar movements which would offer little or no return from the broadcasting point of view, will, we hope, be turned down just as often as they creep up.

And perhaps those who assist them to crop up will, in future, realise that a licence fund is not like income tax. It gives the option, no tax no wireless; and therefore must be regarded as a public subscription; and public money of this kind is not to be "milked" for schemes which yield nothing in return to the listener.

THE "VI-KING" FIVE

The very latest and greatest creation of a world-famous set-designer is presented here. It combines magnificent quality, ease of operation, and a range of reception that has never been excelled. A super set for Super Results!



DESIGNED
and
DESCRIBED
BY
**VICTOR
KING**

A SMALL party of people, some relations, some friends, are gathered together in the drawing room, or, as the highbrow would have it, the music room.

The room is not large, but it is strikingly furnished, all the furniture blending together with artistic harmony. One does not spot at first the neat cabinet radio set in one corner, and the gramophone in another, although somehow they may be expected.

A Wonderful Set

Everyone is waiting for dance music relayed from a London hotel.

Sitting near the radio is a young man. He refers to some notes made on a card and then sets the tuning dials and switches on the set.

Dance music comes through faintly and the guests begin to take notice. A small knob is turned, a slight touch given to the dials, and the music swells out and fills the room.

Everyone is satisfied, but satisfaction turns to surprise when the band stops and a guttural voice breaks in. What has happened? Is it a special relay from Germany? Is the announcer fooling?

"I'll now go over to the local," says the young man, and the mystery

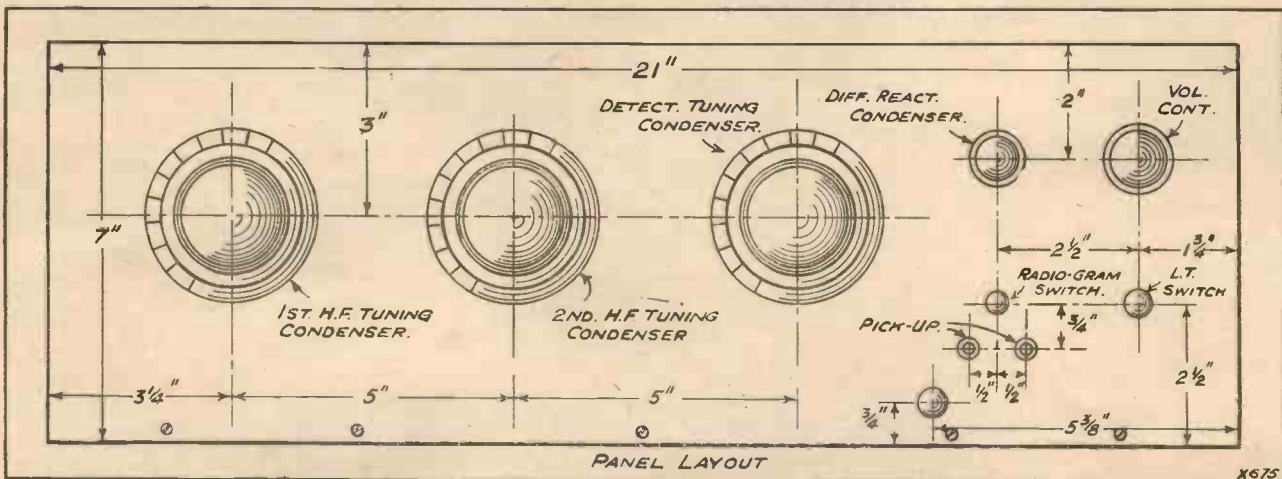
is solved. But what a wonderful set, thinks everybody.

The dials are reset, a switch moved, and in comes the local, a powerful station only a mile or two distant. The quality is perfect, there is no overloading, the volume is just right, not too loud and not too weak. There is no swamping of the H.F. stages here!

On the Long Waves

Later, at midnight, the set will be put on long waves by the movement of just merely one knob. Nothing else; and a programme will roll in from the continent with surprising "nearness."

YOU WILL FIND THAT THE TUNING IS DELIGHTFULLY EASY



So great is the power developed, even on weak stations, that tuning is remarkably easy. As will be seen, the panel layout is quite straightforward, making for facile handling.

The "Vi-King" Five—continued

That is a true and unexaggerated picture of the "Vi-King" Five. Handsome, powerful, pure, a real programme-provider. It is my latest pet, and has replaced a faithful friend of long standing which was considered absolutely "the last word."

Your Wish Come True

Radio enthusiasts, like other people, have their dreams, and I expect you have conjured up such a set in your mind, at some time or the other, and wished it possible. Well, you need no longer wish; just build this "five" and experience for yourself what volume it will give on any station, local or otherwise.

Two properly designed S.G. stages of H.F. amplification are easily able to overload an ordinary detector valve, and it is not unlikely that the second H.F. valve will also be overloaded.

The result is that no matter how much you waggle the volume control on the L.F. side of a set, you are bound to get bad quality due to overloading.

At first sight the obvious thing to do under such circumstances would be to employ a volume control on the S.G. valve, such as a rheostat in one of the filament leads, or a voltage control for the screening grid.

Unfortunately such methods are limited to small variations of volume

but it is arranged in a special way which gives it other advantages.

Perfect Volume Control

The volume control for the local station consists of a neutralising type condenser connected in series with the aerial lead, and a switch is provided so that it may be shorted out of circuit. It is thus possible to set the volume, so far as the local is concerned, to a desirable value and always to be able to switch it on at this value at a moment's notice.

Naturally, small variations of volume will be desired from one item to another, and so a rheostat in the filament of the first H.F. valve is

YOUR SHOPPING LIST FOR THE "VI-KING" FIVE

Ebonite panel 21 in. × 7 in. × ½ in. or ⅝ in. (Lissen, or Goltone, Red Seal, etc.).

Special cabinet for above (Camco Master cabinet).

3 .0005-mfd. variable condensers (Polar, or Lotus, Lissen, Igranic, J.B., Formo, Ormond, Ready Radio, Dubilier, etc.).

1 .0001- to .00015-mfd. differential reaction condenser (Igranic, or Lissen, Formo, Magnum, Lotus, Wearite, Ready Radio, Dubilier, J.B., Polar, Ormond, Parex, etc.).

1 30-ohm filament rheostat (Wearite, or Igranic, Lissen, Gecophone, etc.).

1 L.T. switch (Bulgin, or Lotus, Igranic, Ready Radio, Magnum, Red Diamond, Keystone, Goltone, Junit, Lissen, Wearite, Benjamin, etc.).

1 Single-pole change-over push-pull switch (Red Diamond, or Lissen, Bulgin, etc.).

2 Panel-mounting sockets for pick-up connections (Clix, or Eelex, etc.).

1 D.W.A. coil unit (Lewcos).

2 D.W.G. coil units (Lewcos).

3 Ordinary sprung-type valve holders (Lotus, or Clix, Benjamin, Igranic,

Telsen, Junit, Bulgin, W.B., Lissen, Dario, Magnum, Wearite, etc.).

2 Vertical-mounting sprung-type valve holders (W.B., or Junit, Bulgin, etc.).

1 Neutralising type condenser (J.B., or Bulgin, Igranic, Magnum, Lissen, etc.).

1 "On and off" switch (Benjamin, or other good make).

2 2-mfd. fixed condensers (T.C.C. and Lissen, or Igranic, Hydra, Ferranti, Dubilier, Formo, Mullard, etc.).

2 1-mfd. fixed condensers (Dubilier, etc.).

2 .25-mfd. fixed condensers (T.C.C., etc.).

2 .002-mfd. fixed condensers (Lissen, or Dubilier, T.C.C., Igranic, Ediswan, Telsen, Mullard, Ready Radio, Formo, Watmel, etc.).

1 .0003-mfd. fixed condenser (Lissen, or Telsen, etc.).

1 .01-mfd. mica fixed condenser (Mullard, etc.).

1 Complete igang switch action for coils (Lewcos).

1 Output choke (Lissen, or Varley, Ferranti, Atlas, R.I., Igranic, Wearite, Magnum, etc.).

1 L.F. transformer (Ferranti A.F.3, or

Lissen, Telsen, R.I., Igranic, Varley, Lewcos, Lotus, Mullard, Brown, etc.).

1 100,000-ohm resistance and holder (Varley, or Dubilier, Lissen, Igranic, Mullard, etc.).

1 2-megohm grid leak and holder (Dubilier, or Lissen, Telsen, Igranic, Mullard, Ready Radio, Ediswan, Ferranti, Graham-Farish, etc.).

1 1-megohm grid leak and holder (Graham-Farish, or Telsen, etc.).

1 .25-megohm grid leak with terminals (Lissen, etc.).

4 600- or 500-ohm fixed resistances (Parex, or Ready Radio, Magnum, Wearite, Keystone, etc.).

1 H.F. choke (R.I., or Lewcos, Dubilier, Varley, Telsen, Igranic, Lotus, Parex, Ready Radio, Keystone, Watmel, Wearite, Magnum, etc.).

1 Terminal strip 19 in. × 2 in.

11 Insulated terminals (Belling Lee, or Eelex, Igranic, etc.).

2 Standard vertical screens, 10 in. × 6 in. (Magnum, or Ready Radio, Wearite, Keystone, Parex, etc.).

Piece of copper foil about 22 in. × 10 in. (Parex, etc.).

Wire, screws, battery plugs, etc.

Having arrived at this question of volume, there are a few points in connection with it that I should like to mention. They concern the methods used to control it.

The usual scheme is a high-resistance volume control on the L.F. side (which is desirable), applied before the first L.F. valve. This arrangement is perfectly satisfactory with small sets having only one or no H.F. stages, or on large sets when receiving distant stations.

No Overloading

But naturally a large set will also have to work on powerful local transmissions, and it is then trouble begins.

where a large input is concerned. The reason for this is that as well as reducing the amplification obtained from the S.G. valve, they reduce the grid swing which the valve will take.

Consequently distortion will take place when volume is reduced too far by these methods. Obviously, therefore, we need a scheme which will adjust the receiver power to the right amount before it is applied to the first valve of the set.

Something is wanted which will have the same effect as though the aerial were taken down, cut shorter and erected once more. And that is the type of volume control which is incorporated in the "Vi-King" Five,

provided for this purpose. However, it should not be used to cut down the volume very much.

Provision for Pick-Up

You will see by the theoretical circuit diagram that provision is made for the use of a pick-up, and you may wonder about the control of volume when it is being used. For this purpose an external volume control is provided, and it is connected directly across the actual pick-up.

If you will consider the matter for a moment you will appreciate that the ideal place for a pick-up volume control is actually on the gramophone

The "Vi-King" Five—continued

and not on the set. The set does not have to be touched when records are being played, but one is continually going to the gramophone

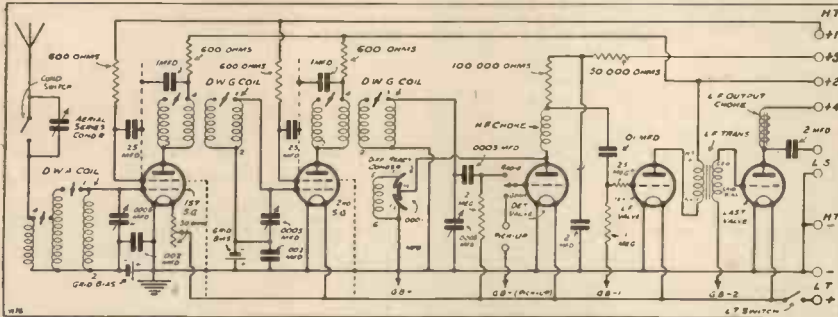
volume control should be quite handy so that the adjustment can be made immediately the record begins playing. Another of the special features of

by means of just one knob. This is accomplished by the special method provided on the dual-wave coils for joining their switches together.

The output filter is mounted inside the lower compartment of the cabinet. This compartment also contains the batteries or mains unit and the loud speaker.

Almost any type of chassis loud speaker can be mounted behind the fret in the front of the cabinet. The one I have used in the original receiver is a Mullard assembly. A complete list of the components needed and suitable makes are given in a special list as usual.

TWO H.F.'s, A DET., AND TWO L.F. STAGES!



For a five-valver the set is remarkably straightforward, and you will see that provision has been made for volume-controlling the "local" first by an aerial series condenser and then by a filament rheostat. This latter also serves for a volume control on distant stations when necessary.

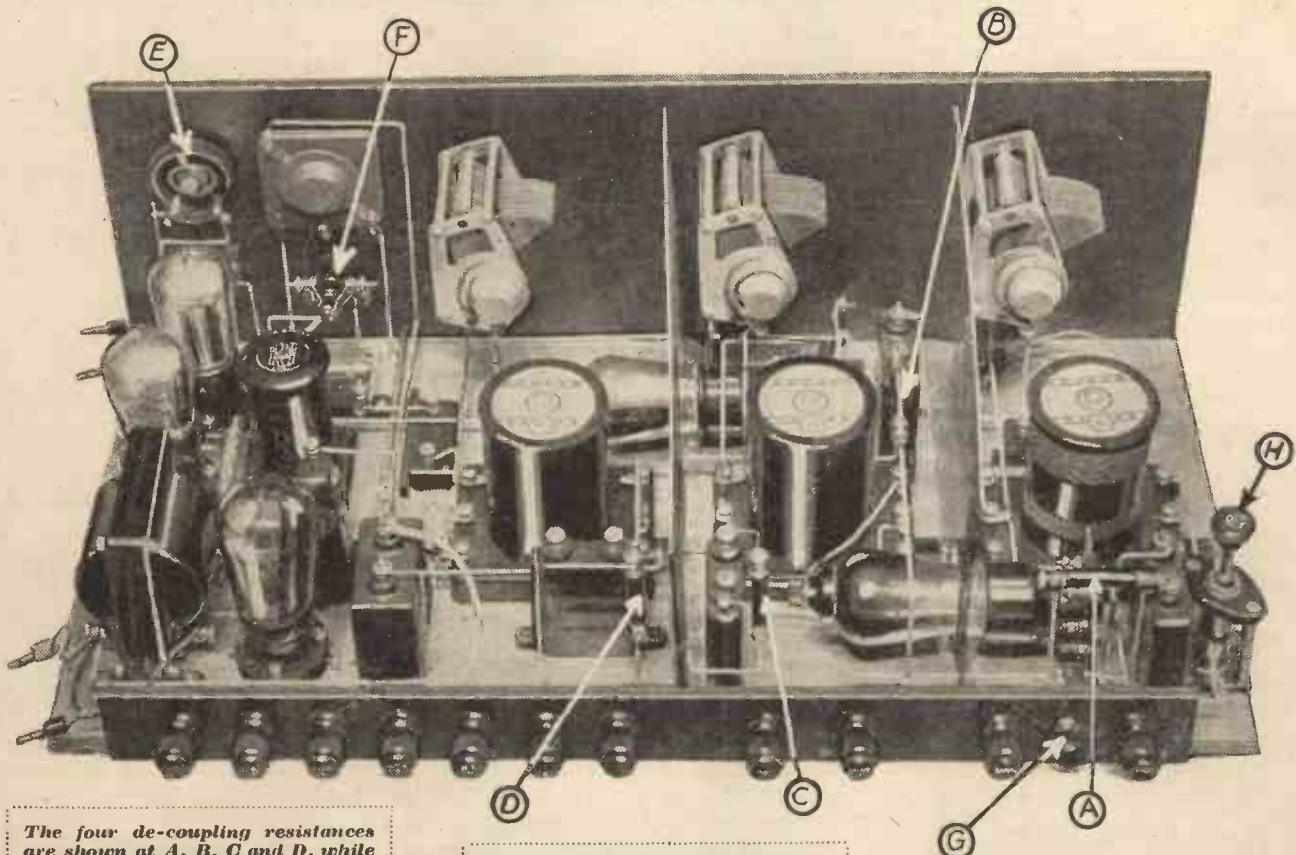
to change records. Also, the volume may require altering, according to the record that is put on, and the

the set is the wave-change switching, which, in spite of the fact that there are three tuned circuits, is carried out

Well Screened

There are several points in the construction of this receiver which call for special comment. First of all, there is the screening. There is a screen over the whole of the baseboard and two vertical ones next to the H.F. stages.

WHAT THE SET LOOKS LIKE BEHIND THE PANEL



The four de-coupling resistances are shown at A, B, C and D, while E is the filament rheostat for controlling volume. The pick-up switch is shown at F.

The volume-controlling condenser and its shorting switch are indicated by H and G respectively.

Although the S.G. valves appear to be "lying down," you'll find they "stand up" to the foreigners in marvellous style.

The "Vi-King" Five—continued

screens for the switching links to pass through. When the set is wired-up the whole of the screening is connected to earth.

You will therefore understand that it is very important that none of the metal connecting parts of the components, or soldering tags, should be allowed to touch it.

Making Sure of Insulation

With components such as valve holders, where there are metal springs and the heads of screws uncovered on the underside of the component, it is desirable to provide some form of insulation between them and the baseboard screen.

The most convenient way to provide this insulation is to cut out pieces of cardboard and put them under the components before the latter are screwed down.

"The tuning will be found to be very constant, and if a chart showing stations and condenser readings is made it will be very easy to find a certain station at a moment's notice."

Where soldering tags are used under terminal screws, and they are near to the heads of holding-down screws, particular care must be taken to turn the tags away from the screws to avoid the possibility of shorts between the tags and screws.

And now for the wiring-up. In order to keep the wiring as simple as possible, all points which have to be electrically connected to L.T. — are taken direct to a point on the screen, when this is the most convenient method of wiring. On the wiring diagram all such points are marked with a J.

An Important Point

The wire from the volume-control rheostat to the filament of the 1st H.F. valve has to run right across the set, and it is therefore taken through holes in the baseboard and run underneath. The two holes for this wire are marked with X's on the wiring diagram.

On the particular make of valve holders used for the H.F. valves in the original set there are five terminals and five sockets. The object is to

make them suitable for use in sets that use 5-pin mains valves as well as in sets using ordinary valves.

One of the terminals is not used and is so marked on the diagram. It is the one which is joined to the centre socket of the valve holder.

The second H.F. stage—that is, the one between the two vertical screens—should be wired first of all. While this is being done the first vertical screen must be removed to enable you to get at the components.

When you have done this, put the screen back and wire the rest of the set. There is nothing difficult about the wiring, but don't forget to allow

plenty of room for the valves to be inserted.

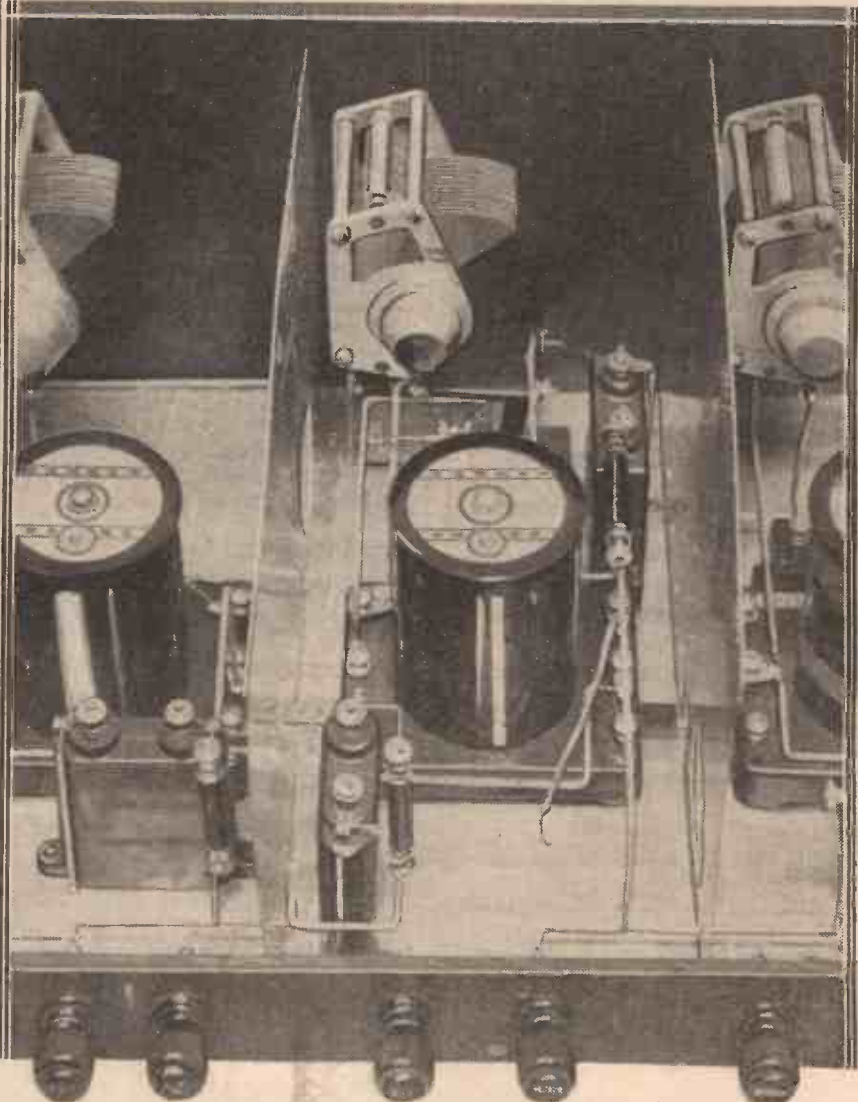
A separate small sketch is given showing the connections for the output filter components. The two wires marked output are connected to the two output terminals on the set's terminal strip.

H.F. Grid Bias

Two small grid-bias batteries will be required for the H.F. valves. Generally 1½-volt ones will be found sufficient, but sometimes up to 4½ is beneficial.

The H.F. bias batteries can stand on the baseboard, but the main

A CLOSE-UP OF THE SECOND STAGE



Near the dual-range coil, with its tuning condenser, are grouped the components in the second H.F. stage, those in the foreground being the bypass condenser and its associated de-coupling resistance.

The "Vi-King" Five—continued

grid-bias battery is attached to the side of the cabinet. That completes the constructional details.

Full details of the accessories and voltages to use will be found in the special operating chart. Condensed instructions regarding the handling of the controls are also given.

Kept in Step

The three tuning dials will keep practically in step over their whole range. The tuning will be found very constant, and that if a chart showing stations and condenser readings is made it will be very easy to find a certain station at a moment's notice.

The series aerial condenser should be adjusted as follows. Set reaction at zero, and turn the rheostat volume control to maximum volume.

Next push in the shorting switch for the condenser and, starting with the condenser at maximum, gradually reduce its value until the volume from the local is sufficiently reduced and there is no overloading.

You should set the volume so that reception is at the loudest you will require. Further reductions can be made with the control on the panel.

H.T. Voltages

The value of the H.T. voltage on H.T.+3 should be adjusted so that the control of reaction is quite smooth. Incidentally, when working on distant stations, you may sometimes find it possible to quieten a noisy background by reducing the volume a little by means of the rheostat, and bringing it up again to the desired strength by applying a little reaction.

You can run this set either from batteries or mains eliminator. The use of the latter will not affect the voltages required by the various tappings or the types of valves to employ, and all details given regarding the operation will apply just the same.

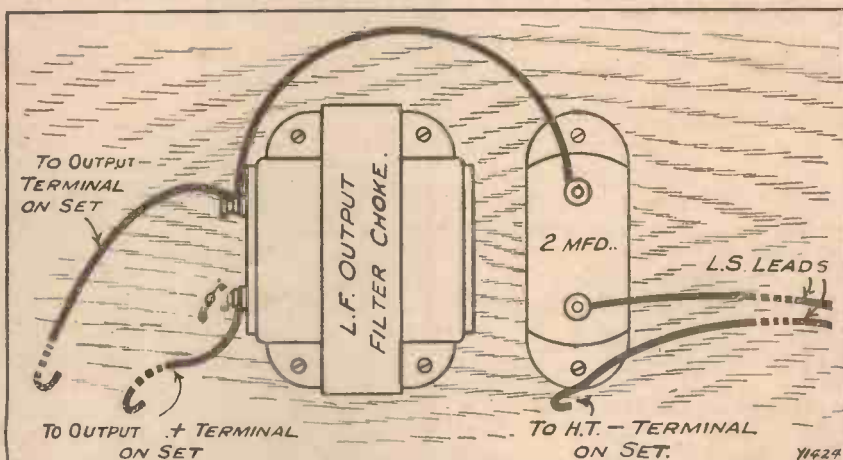
Naturally, if you have mains available you should utilise them, for on a large set such as this a mains unit is

good results and no distortion, and choosing a power valve which is just large enough to handle the amount of volume which you will desire, and no more.

Some Final Hints

Do not be tempted to omit the output filter components because they are not mounted on the main baseboard. They are really quite

THE FILTER FOR THE LOUD SPEAKER



It consists of the L.F. choke and the large condenser connected as shown.

more convenient and generally more economical. If you use batteries for the H.T. supply they should be of the triple capacity type, and the total current consumption should be kept down as low as possible.

Anode Current Consumption

This can be done by using as much grid bias, both on the H.F. and L.F. valves, as you can consistent with

vital items in a powerful set, and can have a large effect on quality.

Incidentally, if you are going to use the receiver with a D.C. mains unit it is as well to put another 2-mfd. fixed condenser in series with the L.S. lead that goes to the H.T. negative terminal. The usual fixed condensers for D.C. mains work in series with the aerial and earth leads will also, of course, be necessary.

THE "WIRELESS CONSTRUCTOR" "VI-KING" FIVE

(Circuit is 2 S.G. H.F., Det., and 2 L.F., with wave-change switching.)

VALVES.

1st and 2nd : Screened-grid.
 DETECTOR : H.F. type or special detector type.
 1st L.F. : L.F. type valve with impedance of about 10,000 ohms.
 LAST VALVE : Super-power type.

VOLTAGES.

L.T. : 2, 4, or 6 volts, according to the voltage of the valves chosen.
 H.T. + 1 (serves screening grids) : 60-80 volts.
 H.T. + 3 (serves detector) : Up to 60 volts. Use value to give smooth reaction.
 H.T. + 2 (serves 1st L.F. and anodes of S.G. valves) : 120 to 150. According to rating of valves used.
 H.T. + 4 : As high as possible up to maximum of power valve, which it serves.
 G.B. FOR S.G. VALVES : $\frac{1}{2}$ to $\frac{1}{4}$ volts.
 G.B. - Pick-up $\frac{1}{2}$ volts.
 G.B. - 1 (supplies 1st L.F. valve) } See makers' valve details.
 G.B. - 2 (supplies power valve)

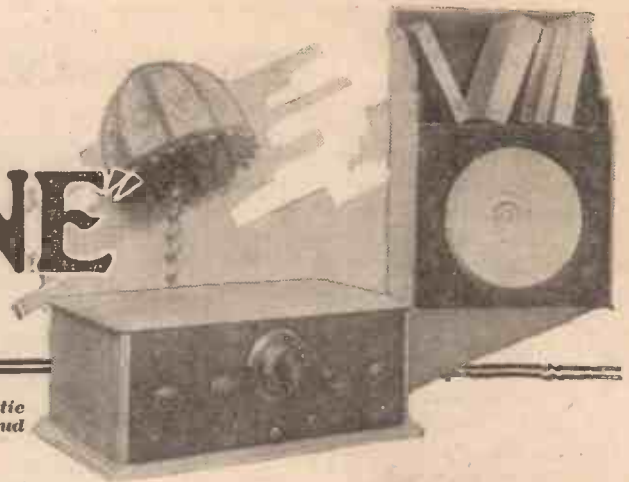
THE CONTROLS.

TUNING. Three main dials to left of panel.
 REACTION. Top knob to left of volume control.
 VOLUME CONTROL. Top right-hand knob.
 "RADIO-GRAMO" SWITCH. This is the knob immediately above the two pick-up sockets.
 "ON-OFF" L.T. SWITCH. Lower right-hand knob. Pull out to switch on set.
 WAVE-CHANGE SWITCH. Small knob nearest to bottom of panel. Push in for long waves, pull out for medium.

NOTES.

Volume control on panel should only be used to make small alterations to volume. Use neut.-type condenser on baseboard to cut down volume of powerful local station. Switch mounted on terminal strip shorts this condenser out of circuit when working on distant transmissions.
 Volume control for gramophone pick-up should be connected directly across pick-up and mounted near to the turntable.

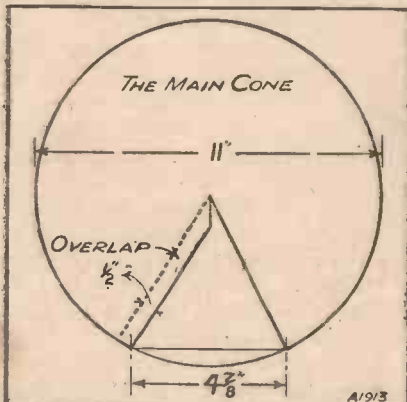
The "BRYTACONE"



Better definition, brighter broadcast reception, and more realistic reproduction are the results of constructing this novel cone loud speaker.

DURING the autumn and towards Christmas, perhaps more than at any other time of the year, there is always an intensive campaign of set re-building. Readers come away from the Radio Exhibition fired with enthusiasm and full of bright ideas as to how this, or that, can be improved, and absolutely no effort is spared in achieving that "Best you've ever heard" receiver.

CUTTING THE CONE



The cone should be made by cutting the paper as shown here.

But—and we fear that in many cases it is a very big "but"—how many of you give an equal amount of attention to the ways and means of doing justice to the improved design when it is completed?

The Cost is Low

Time and again we have come up against really creditable efforts in the nature of beautifully built receiver designs—sets which represent the very last word in modern receiver practice—which are being "bottled up" by the use of antiquated and, in so far as modern practice is concerned, inefficient loud speakers.

And it always seems to us to be such a pity, because there are now so

many excellent loud speakers on the market at prices within the reach of all; quite apart from which, if you are at all constructionally inclined, you can, for a matter of twenty or twenty-five shillings, make a loud speaker to give you really pleasing results.

For example, the WIRELESS CONSTRUCTOR "Brytacone," which is illustrated and fully described in this article, can be built for a cost of very little over thirty shillings, or, if you choose a cheaper cone unit, for even less. And as for results—well, we can truthfully say that by actual comparison under working conditions the "Brytacone" can safely be classified as among the best of the cone speakers we have ever heard.

Natural Reproduction

As a matter of fact, one of the chief merits of this new cone of ours is very aptly summed up by the name we have given to it. We have all been concentrating so much upon the attainment of that rather pleasing bass effect which helps to give fullness, or, if you like, depth, to the transmission, that we have been rather apt to overlook the fact that if we only obtain the low notes at the expense of the high ones then we are not very much better off than we were before. In fact, the "boomy" effect so often apparent when the high notes are missing may tend to make the results sound even worse than before.

In tackling the problem in the Research Laboratories we have assembled dozens of different cone arrangements, because we felt that it required something more than theoretical considerations to arrive at a really worth-while design. And by this infallible method of "try it and see" we have finally arrived at a design which gives just the effect we have been after.

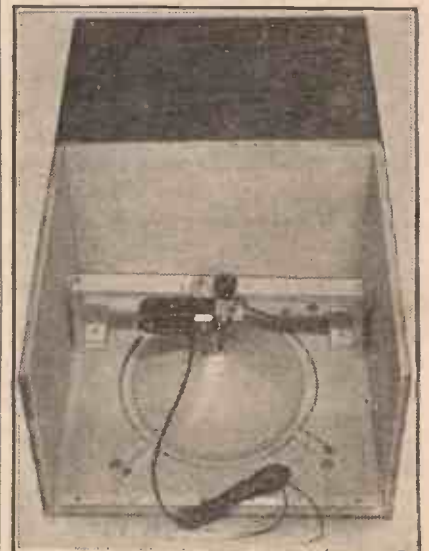
The "Brytacone" does not give a "boomy" effect, any more than it over-accentuates the high notes. It is a happy compromise between the two, with sufficient bass to be pleasing and enough high notes to give that brilliance that makes the reproduction sound so natural.

It's Very Sensitive

Additionally, this new loud speaker of ours has its cone built up on a new principle, and this gives it a rather higher degree of sensitivity than is obtained with the more conventional arrangement.

And now, having given you an idea as to what can be expected of this new loud speaker, we intend to leave the rest to your own judgment, and to devote the rest of our space to the constructional details.

BEHIND THE SCENES



The "Brytacone" is here shown lying face downwards so that the fixing of the unit and positioning of the cone on the baffle could be carried out.

The "Brytacone"—continued

First of all, let us go into the question of the cabinet into which the loud speaker is built, because at first sight the somewhat complicated appearance of the case used for the original loud speaker may act as a deterrent!

Actually it doesn't matter "two hoots" what you choose as a housing for the cone assembly, and in so far as results are concerned the same effect would be obtained with an empty soap box as with a highly polished cabinet! So that if you do not feel inclined to tackle the wall-bracket-bookshelf-cum-loud-speaker idea employed in the original model (the construction of which is not half so difficult as it may at first sight appear), then you will probably be able to obtain a cheap loud-speaker cabinet or box to serve the purpose quite as well.

The Wood to Use

If you decide to make your own cabinet on the lines of the one used for the original "Brytacone," the following notes will probably help you in the not difficult task.

The material for the cabinet consists of a ready-planed board, $\frac{3}{8}$ -in. or $\frac{1}{2}$ -in. thick, 12 in. wide and 6 ft. 6 in. long. (This length allows 6 in. for waste.) Naturally, the type of wood with which to make the case is not very important so long as you choose a wood that will not warp easily.

Actually the best wood for the purpose is $\frac{3}{8}$ -in. ply, but it has the disadvantage that it is not so easy to cut with an ordinary saw as oak or mahogany. Also, if you do decide to use $\frac{3}{8}$ -in. plywood it is doubtful whether you will be able to obtain it in one piece, and you may therefore have to purchase two smaller pieces.

Assembling the Cabinet

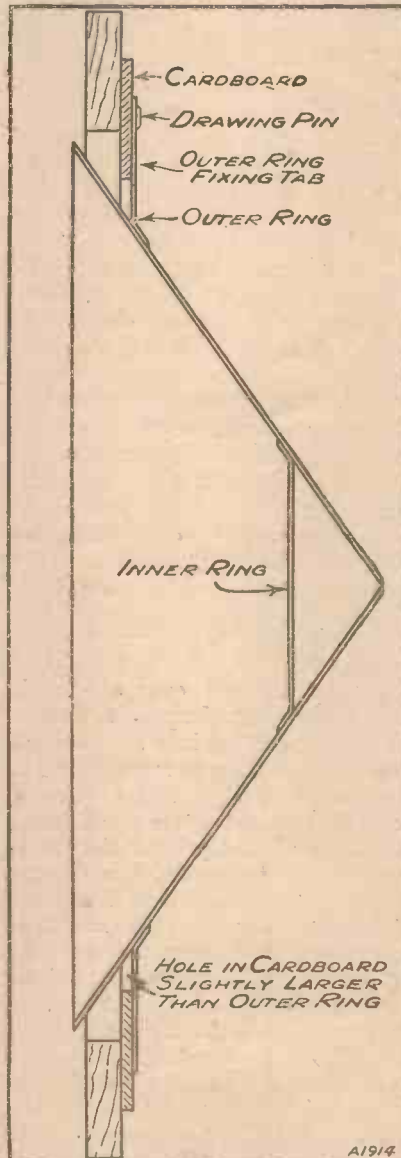
Having obtained the necessary material, mark it out in accordance with the diagram shown on the next page. There should be two side pieces, each one 20 in. by 8 in.; a piece to form the shelf, 8 in. by 11 $\frac{1}{4}$ in. (this is calculated on the use of $\frac{3}{8}$ -in. material); a piece for the back-rest of the bookshelf, 12 in. by 8 in., and finally a piece for the front which should be 12 in. square.

The cutting of the 9-in. hole in the front piece and the "fancy work" on the two sides should be carried

out with what is known as a keyhole saw, and if you do not possess and are unable to borrow one you can purchase a suitable tool for something less than two shillings.

Assembling the cabinet, once the various sections have been prepared, is quite a straightforward job, and

SUPPORTING THE CONE



Side elevation of the cone showing how the cardboard surround, and the outer ring are placed for supporting the cone. Note also the position of the inner ring.

you can obtain all the details that are likely to be required from the diagram in which the finished cabinet is shown.

For the construction of the cone and the two rings which form part

of the cone assembly you will require some "Kraft" paper. As this material is obtainable in more than one thickness, it will be necessary when purchasing it to specify "120 lb. to the ream."

You will be able to obtain all the required details of the cone and the rings from the diagram provided, and all that it is necessary for us to mention in this connection is that the number of "teeth" around each of the two rings is quite immaterial.

Just draw in with a pair of compasses a line where the teeth begin, and another to mark where they end, and then sketch them in free-hand with a pencil, making each one roughly about a quarter of an inch wide.

You Need Dry Joints!

The large circle of paper, which is, of course, for the main cone, should now be transformed into a cone by sticking together the two sides formed by the removal of the V-shaped piece. A $\frac{1}{2}$ -in. overlap is allowed for this purpose, as you will have noticed in the diagram.

When the joint is quite dry, next take the smaller of the two teathed rings and bend the teeth up to an angle of something rather less than forty-five degrees. You will be able to obtain an idea of the angle required if you refer to the diagram on this page in which is shown a side elevation of the completed cone.

It is by means of these teeth that the smaller—or, as it is called in the diagrams, the inner—ring is secured to the main cone, and when this is fastened in position the larger ring should be treated in exactly the same way. When you come to fixing the second ring in position you will find it best to work with the cone placed flat on a table or bench, with the apex pointing upwards.

Mounting the Cone

Before leaving the question of the cone construction, we ought perhaps to emphasise the necessity of making these joints very secure. A loose tooth may produce all sorts of unpleasant buzzes in the finished loud speaker.

The method of building the finished cone into the cabinet is clearly shown in the elevation drawing. A piece of fairly stout cardboard to cover the

The "Brytacone"—continued

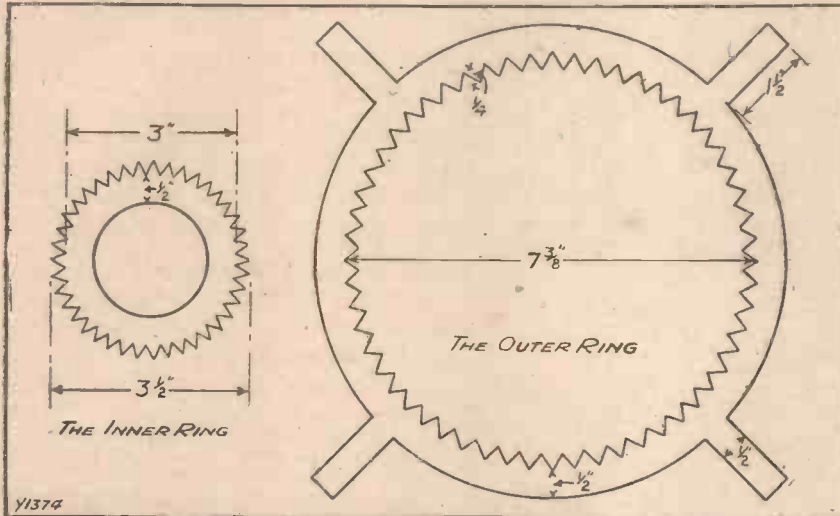
inside of the front of the cabinet will be required at this stage, with a hole in it slightly larger than the outer ring.

pulling the cone out of centre, the sensitivity of the finished loud speaker may be affected.

screw at first, and swivel the unit until true alignment is obtained.

In conclusion, make a special point of screwing up the nuts on the reed—one on each side of the cone—so that there is absolutely no play between the reed and the cone. Any play at this position will tend to decrease the sensitivity of the loud speaker.

THE SECRET OF THE SPEAKER'S SUCCESS



Y1374

The stiffening and support rings placed respectively inside and outside the cone.

This should be stuck to the inside of the cabinet, after which the actual cone can be fixed in position by means of the four tabs. Ordinary drawing-pins will do for this fixing operation, but take care to fix the cone so that the outer ring is quite clear of the cardboard disc. As a matter of fact, the cone must not touch either the cabinet or the cardboard disc, except at the four points where it is held in position.

To simplify the reed centring operation you will find it best to fix the actual cone unit by only one

A Washer Tip

Most modern cone units are supplied with both felt and metal washers, and if these are placed on either side of the apex of the cone a very rigid job should result.

If you find that the angle of the washers is different from that of the cone, it is a simple matter to render them suitable by cutting down to the centre and either bending out or closing them to the required angle.

To avoid all possibility of "chatter" between the reed and the cone it would be as well to soak the cone washers in glue before securing them finally into position.

The Wooden Support

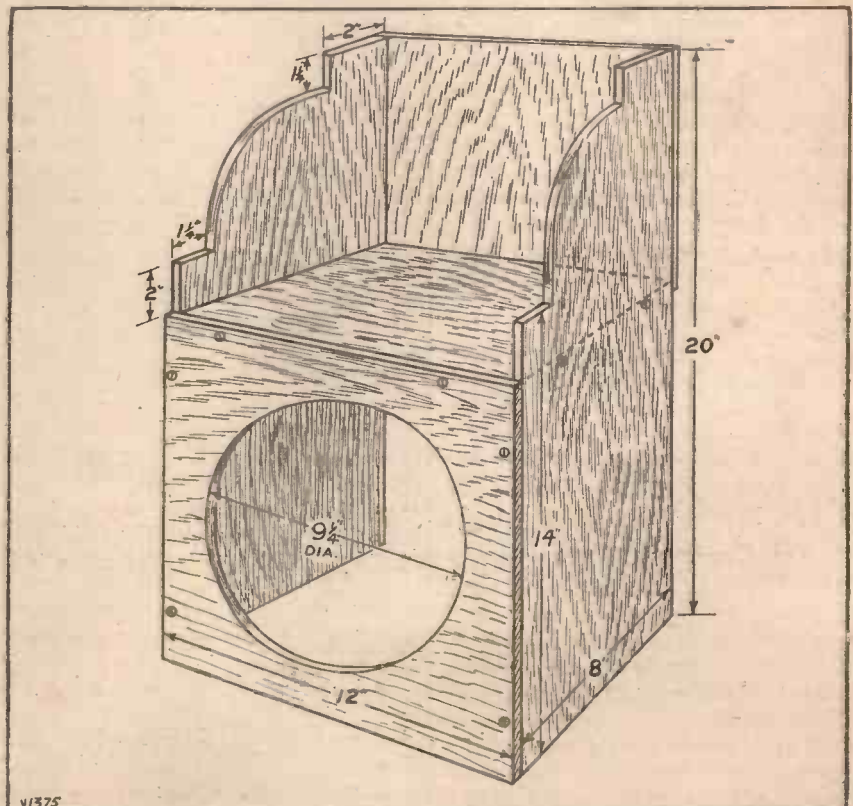
All that now remains to complete the construction of the loud speaker is the fixing of the actual cone unit. We have purposely omitted the dimensions of the wooden support for the cone unit, because the positioning of the unit will depend upon the particular make chosen.

The unit employed in the original model was a Blue Spot 66P. unit.

See that you mount whichever one you choose so that the reed is dead in line with the apex of the cone, and in relation to the front of the cabinet the cone should be fixed so that the reed protrudes through the apex of the cone for a distance of about three-quarters of an inch.

This point of getting the reed absolutely central in relation to the apex of the cone is rather an important one, because if it is mounted out of line, apart from the danger of

USEFUL, ORNAMENTAL, AND EASILY MADE



Y1375

The cabinet is built to the dimensions given above. It is not a difficult task, and makes a handsome and useful bookshelf when finished.



Some typical radio faults reviewed and questions answered.

By P. R. BIRD.

Does Volume Control Prevent Overloading?

"THIS talk about preparing for a Radio Christmas, with music brightening the home, is all very fine," says a Chatham reader. "But what can you do if distortion accompanies that music?"

Apparently he had pulled handfuls of hair from his head in an endeavour to get over the difficulty, but he was still up against a jarring and unpleasant "edginess" when loud passages were handled at full power.

Thinking the cause of the distortion might be overloading, he got a friend to bring round a milliammeter, and they connected it in the plate circuit of the last valve. With bated breath they watched the needle, and, sure enough, every time the loud speaker "dithered" on the loud notes the needle flickered and seemed unhappy!

Knowing this to be a sure sign of overloading, our Chatham friend rushed out and bought a volume control, fitted it across the secondary of the last L.F. transformer and confidently tried the effect of that. Alas, still not perfect!

Cause and Cure

Much of the trouble had cleared away, but the tendency to "jar" was still evident in the loud speaker, though the milliammeter needle showed no trace of a flicker! (It was a very sensitive instrument, too.)

Though new to this reader, the trouble is not a rare one, and if he had placed his milliammeter in the preceding valve's plate circuit he would have located the further dis-

ortion without help. For overloading was still the cause, and volume controlling was the right cure for it.

Not the Last Stage

Where he had "slipped up" was in assuming that the overloading was all occurring in the last stage, and that a volume control there would remove the cause. Actually he was overloading the first L.F. valve, too, and that effect would not be shown up by a milliammeter placed in a later stage.

IS YOUR SET "PLAYING UP"?

Present-day radio is remarkably reliable. But every set "goes off" sometimes, and therefore it should not be assumed that it is wearing out. All it wants is proper maintenance—like a car or a bicycle, or any other similar contrivance. If you have any knotty little problem requiring solution, remember that the WIRELESS CONSTRUCTOR Technical Queries Department is in a position to give you an unrivalled service. Full details, including the scale of charges,

Using a Loud Speaker as a Microphone

Several "festive" inquiries from fathers of families about the method of using one loud speaker to "broadcast" a message from the set to another loud speaker in a different room remind me that this stunt may be unknown to many who would appreciate it. It is very easily tried.

The essentials are the "distant" loud speaker (or loud speakers) and the low-frequency portion of the set. In addition, a loud speaker (or 'phone earpiece) is required to act as the "microphone."

To take a typical case, let us suppose that the set is a "Det. and 2 L.F.," transformer-coupled, and one loud speaker normally works in the kitchen and another upstairs where the set is.

A Kitchen Surprise

To give the kitchen loud speaker a surprise local broadcast from upstairs, we must undo the radio end of the set and arrange to speak into the upstairs loud speaker.

It must be joined across the low-frequency amplifier input, which in this case is the primary of the first L.F. transformer. So we carefully undo the leads which go to "H.T. + " and "P" (or to OP and IP, or whatever they are marked), and join the loud-speaker tags to the primary,

can be obtained direct from the Technical Queries Department, WIRELESS CONSTRUCTOR, Fleetway House, Farringdon Street, London, E.C.4. A postcard will do. On receipt of this all the necessary literature will be sent to you, free and post free, immediately. This application will place you under no obligation whatever. London Readers, Please Note: Application should not be made by telephone or in person at Tallis House or Fleetway House.

When this was pointed out and the suggestion made that a volume control should be tried across the first L.F. secondary, a joyous reply was received by return. Evidently feeling in high spirits, the writer had no time to sit down and pen a long letter. But he sent ours back instead, with an endorsement.

This took the form of a big star, in red ink, against the suggested remedy, and at the foot of the page another red-ink star with the motto:

*Suggestion Tried:
Distortion Died!!
Nuff sed.

leaving the proper wiring to it free and bent back out of danger of "shorts."

(It is, of course, very important that no stray wires should touch, or maybe the valves will go. And, as always when altering the wiring, the H.T. negative lead should be disconnected from the battery until the alterations are complete.)

When it is safely wired across the primary it will be found that with the set switched on it is possible to speak or sing into the upstairs loud speaker a "programme" that will be heard downstairs. Great fun!

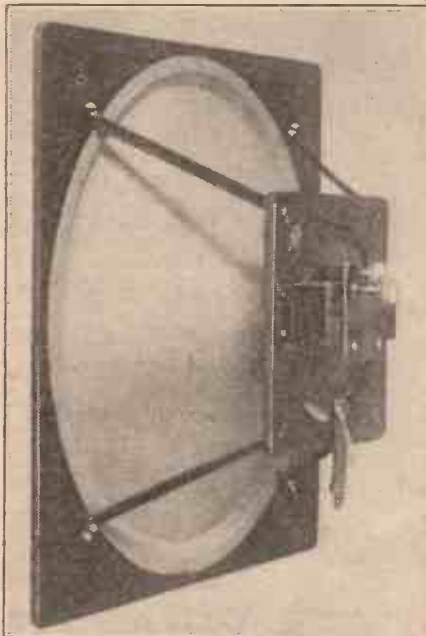
AS WE FIND THEM



The Wates Double Cone

THE STANDARD BATTERY CO., 184/188, Shaftesbury Avenue, W.C.2, have sent us one of their latest double-cone assemblies, complete with a Star unit.

The chassis consists of two cones,



The Wates double-cone assembly and "Star" loud-speaker unit, which can be mounted in any suitably-sized cabinet.

one having a diameter of about 18 in., and the other a diameter of approximately 6½ in. The makers state that the cones are doped with an oil which produces a disinclination for them to deteriorate through dampness, heat, etc. The unit is a solidly constructed job and is adjustable. Tested on a straightforward broadcast receiver

the speaker was found to possess very good sensitivity. That is to say, in order to obtain adequate volume in a medium-sized room it is not necessary to use anything more than an ordinary power or super-power valve, and normal H.T. voltages of 100 or 120.

We can commend this unit and chassis to the notice of constructors who are contemplating the purchase of a speaker at a very moderate price.

Bulgin Switches

Messrs. A. F. Bulgin are now marketing a number of exceedingly well-made switches.

There is one which is enclosed in an insulating moulding, and which seems to be specially suitable for mains equipments. This switch is very nicely finished, and has a neat insulating knob and a black indicating tab with the words "on," "off," set out in white lettering.

There are also two other switches. These are of the toggle type, and are nickel-plated. One of them is a straightforward "on-off" switch, while the other is suitable for changing over from the H.T. eliminator to the trickle-charger.

The make and break with these switches is quite definite, and on test the insulation between terminals with the switches in the "off" position was found to be infinity at 500 volts.

Polar Condensers

We have received from Messrs. Wingrove & Rogers, Ltd., 188-189, Strand, London, W.C.2, a twin '0005-mfd. "Ideal" condenser designed for use in single-control "ganged"

circuits. There are two sets of fixed vanes, which are insulated from each other, and two sets of moving vanes, which rotate together on a common spindle.

The dial is of the slow-motion type, and a one-hole fixing is employed. Placed between the two sets of moving vanes is an aluminium screen which also acts as a strut or extra support for the condenser assembly.

It would, of course, be exceedingly difficult to make two tuned H.F. stages keep in step over the whole wave-length range covered by the condensers. In view of this the makers supply a tuning condenser which can be connected across one of the sections to balance out the effect of any small variations in the tuning coils and their associated wiring.

This twin-condenser assembly is beautifully constructed and we could not detect the slightest signs of side-or end-play in the spindle. Ball bearings are employed throughout, and the movement is perfectly smooth. Connections from the moving vanes to the end-plate and terminal is made via a flexible pigtail.



A very neat Bulgin "on-off" switch. The switch contacts are completely enclosed by an insulated casing.

As We Find Them—continued

We have also examined the latest Polar slow-motion differential condensers, capacity .00015 mfd. each side. This condenser now has brass end-plates, and it is an excellent mechanical job. This is a feature of Polar components that we have commented upon before. Faulty insulation in the case of a reaction condenser can cause a heap of trouble, but the "Polar" emerged successfully from our test. The insulation at



The Wates "Polyscope," a gadget specially designed to assist listeners to test their sets.

500 volts between both sets of fixed vanes and the moving vanes was infinity.

It is a component that we can recommend.

Exide Batteries

The Chloride Electrical Storage Co., Ltd., have sent us two samples of their new unspillable type 2-volt accumulators. One of these is of the free acid type, i.e. it is similar to the normal type of cell except in the arrangement of the plates and the shape and construction of the container.

The other makes use of a jelly acid, and may be broadly termed a non-liquid type. The makers state that the celluloid containers have been re-designed and reinforced, and call attention to the following features:

New moulded celluloid boxes, which have been re-designed and reinforced to overcome every weakness.

The following are features of the new box:

(a) Moulded lid; no joints to leak, and corners which are as strong as the main body of the box.

(b) Re-designed unspillable device which is even more effective than before.

(c) New method of sealing, so that the lid tends to shrink on to the box.

(d) Bottom reinforced by moulded shoe which makes leakage at this point quite impossible.

(e) Increased strength at filler caps.

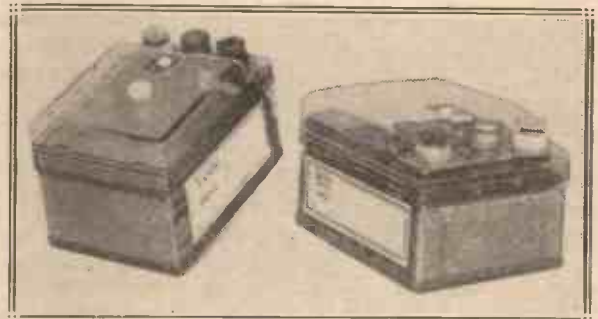
(f) Non-interchangeable, vari-coloured, round and hexagonal terminals, with larger and more effective gaskets which eliminate leakage.

We tested the free acid sample for leakage by shaking and by inverting it for one and a half hours. We could not detect any acid spots or other indications of spilling at the end of that period.

Both of the cells submitted have been in use in the WIRELESS CONSTRUCTOR laboratory for some weeks and are giving excellent service.

In the case of the jelly acid type (J.W.E.—7), there is, of course, nothing to spill, since the electrolyte is semi-solid.

These are the latest Exide unspillable accumulators which are suitable for use in portable sets. One of them is of the free acid type, while the other employs a jelly or semi-solid electrolyte. They are soundly constructed and the celluloid containers have been re-designed and reinforced.



These cells are eminently suitable for portable sets, and the ratings are: capacity 16 ampere-hours, charging rate 1 ampere for the free acid type; and 24 ampere-hours, 2 amperes respectively for the jelly acid model.

Wates Testers

The Standard Battery Co., Shaftesbury Avenue, London, W.C.2, have submitted two of their new testing "gadgets." The first is called the "Polyscope." It consists of a container for a small dry cell, terminating in a spike at one end and a split socket at the other.

The spike is used to make contact with a suitable point on the object undergoing test or measurement, and the split socket accommodates a lead connecting to one side of a milliammeter, pair of 'phones, or other test meter.

It is thus possible to apply various tests for continuity, and to see whether condensers are broken down, etc. The makers supply a leaflet giving full instructions with each "Polyscope."

The second is a neat test plug for valves. It has five pins, the centre one of which is removable, so as to

enable ordinary 4-pin valves to be tested out.

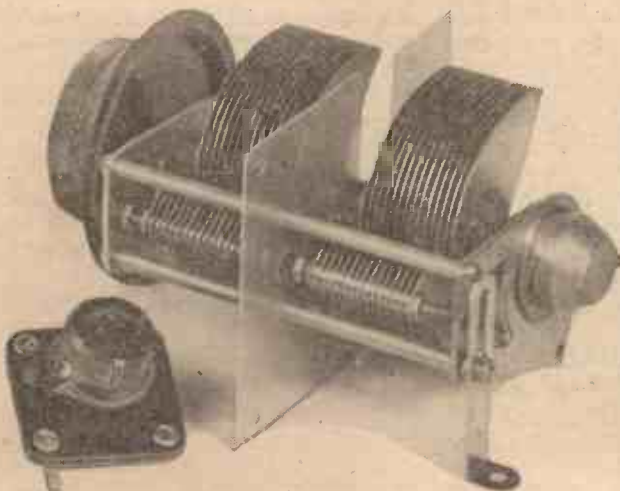
The procedure is as follows: The valve under test is removed from its holder and the test plug is inserted. The valve is then placed in the test plug. There are two terminals on this plug and to these are joined the leads from a milliammeter.

When the valve is switched on in the usual manner a reading is obtained on the meter indicating the anode current flowing through the valve.

It is thus possible to ascertain whether the valve is functioning correctly and to check up such things as grid-bias adjustment and so forth.

This tester is a very useful little gadget and saves time and trouble in carrying out adjustments and tracing faults.

The makers could improve it by marking the terminal to which the plus lead of the milliammeter should be connected.



The "Polar" twin-gang condenser and trimmer. The capacity of each half of the twin assembly is .0005 mfd., and the dial is of the slow-motion type. The trimming condenser is to enable the tuning circuits to be balanced up correctly and compensates for any slight differences due to the coils and wiring, etc.



SAVOY HILL NEWS

Adrian Boult's Success—New Television Development—More Candidates for the Board—Many B.B.C. Staff Changes—Anti-Alcoholic—The New Empire Station—Stump in Appeals—The Blattnerphone—Transatlantic Relays Disappoint—Regional Directors' Status.

BY OUR SPECIAL COMMISSIONERS

Adrian Boult's Success

WITH the successful debut of the new orchestra, Dr. Adrian Boult has firmly established himself at Savoy Hill as chief conductor. But his success has proved to be much wider than in conducting. Dr. Boult, as music director of the B.B.C., has already proved himself to be an administrator of more than ordinary talent and experience. Moreover, the confidence with which he is regarded and accepted by the musical world generally is a remarkable new asset to broadcasting. Dr. Boult has put the B.B.C. on the map in music; in a few months he has become easily the most important and interesting personality of the Programme Department.

There is already some talk of the "inevitability" of Dr. Boult's succession to Sir John Reith when the latter sees fit to retire. But this is a contingency too remote to merit serious consideration now.

New Television Development

Mr. R. E. Jeffrey, one-time Production Director at Savoy Hill, and more recently with the films at Elstree, has enthusiastically sponsored a new television process which he hopes will be so good that it will drive the Baird process out of the ring or force a merger.

Negotiations have begun with the B.B.C. to get the new process on the air early in the New Year. No reports are as yet available of the early tests, much secrecy being maintained about the details as well as the names of those concerned.

More Candidates for the Board

Political circles are already paying some attention to the appointment

of the new B.B.C. Board which takes office at the beginning of 1932. Favoured names at present are as follows: Captain Ian Fraser, Col. Moore-Brabazon, Mr. George Grossmith, Mr. Cochran, Mr. J. C. Squire, Major Evelyn Wrench, Dean Sheppard, The Hon. Harold Nicholson, Mr. Gerald Barry, Dame Edith Lyttelton, Mrs. Ethel M. Wood, Lord Cecil, and Captain Reginald Berkeley.

There is also some mention of Mr. Filson Young, who has been an active advisor at Savoy Hill for the past five years, and is said to be agreeable to joining the Board if asked by the Prime Minister. The number of vacancies is unlikely to be less than

two or more than four. A Parliamentary discussion is certain.

Many B.B.C. Staff Changes

A new "general post" is in progress at the B.B.C. The authorities now move people round regularly in order to broaden experience and to give individuals better chances of finding their métier. Mr. Moray MacLaren, the novelist, whose recent book, "Return to Scotland," was so well received, changes over from being Assistant Editor of "The Listener" to be Information Officer for Scotland; while Mr. "Bobby" Roberts, the popular amateur actor, moves from the "Radio Times" to join the staff of the Belfast station.

I hear that these two moves are the prelude to more far-reaching changes, affecting particularly the Talks Department. It is believed also that Mr. Cleghorn Thomson, the talented young Scottish Regional Director, will return shortly to Head Office to take up policy work for Sir John Reith.

Anti-Alcoholic

An eminent authority on culinary science was approached recently by the B.B.C. to spare a little of his wisdom for listeners. He agreed in the first instance, and set about preparing his succulent talks. Then to his astonishment he learned that there was to be no wine or any other form of alcohol in anything he recommended. Of course, the series became impossible, and the authority abandoned it.

There is a good deal of indignation among most members of the staff of Savoy Hill at this unnecessarily drastic application of "temperance"

MIKE'S MONKEY TRICK



A monkey at the New York Zoo chatters to his specially-made "mike" for the benefit of little listeners to the "Children's Hour."

Savoy Hill News—continued

principles. Although Sir John Reith's prohibition views are known and respected, he is not blamed for this excess of suppression, the opinion being that the Board of Governors is responsible.

The new Chairman, Mr. Whitley, is well known as a temperance worker, and, of course, "strong drink" has no more inveterate enemy in the world than Mrs. Philip Snowden. It is observed, however, that the B.B.C. manages to "square its conscience" to the extent of accepting advertisements of "medicinal and tonic wines."

The New Empire Station

• Although little consolation or encouragement was forthcoming from the Dominions represented at the Imperial Conference, the B.B.C. with Treasury and Crown Colony backing is going straight ahead with the pro-

Unfortunately it is about four years later than it should have been, and the B.B.C. is not entirely blameless. It is only recently that a sense of imagination has established itself at Savoy Hill.

Slump in Appeals

Although some broadcast appeals continue to be well supported, there is a slump in the results secured by the majority. As I have frequently pointed out in this page, one appeal a week is far too many for the wireless public.

Indeed, the prolonged continuance of this number may have prejudiced the whole future of broadcast appeals. The right number is certainly not more than twelve a year; that is, one a month. Local interests could be served where local stations are available, but on the same scale.

And another thing: When will

be adopted for permanent use. At present it is to be confined to rehearsals and O.B. commentaries; but the extension of the application of this or another similar device will be general when Empire broadcasting gets going properly, as already mentioned on this page.

Transatlantic Relays Disappoint

Although most technical difficulties have been overcome, there is still no prospect of any regular system of programme exchange across the Atlantic. The obstacle is the absence, on the other side, of any programme material to interest the B.B.C. or the British public.

Apparently the Americans are anxious to take great slabs of B.B.C. music and drama in order to fill up the sustaining programmes which form a background for the sponsored programmes on which their broadcasting lives.

But there is little or nothing to offer in exchange. Symphony music is done much better by the B.B.C. orchestra. There is not much "in" the dance-band position. Most of the American vaudeville is too slangy to be recognisable here.

Political speeches are of only local American interest. An occasional commentary on a baseball match or an eye-witness account of an American Rugby game would have "stunt interest" value, but there would be no demand for a regular service of this sort of thing.

In fact, so far as exchange overseas is concerned it would seem that there is little prospect of mutually satisfactory arrangements until the Dominions set their broadcasting houses in order. They at least will have material of regular interest to the Mother Country, if only on patriotic grounds.

Regional Directors' Status

The hard-bitten "centralisers" have at long last received a setback in the struggle with the "regionalisers" of broadcasting. I hear the Control Board at Savoy Hill are inviting the Board of Governors to consider a radical improvement in the status and remuneration of regional directors.

It seems likely that enough notice will be taken of this recommendation to put the Regions in a much more favourable position than before.

RADIO ACTIVITIES IN RUSSIA



Members of a Russian radio club and some of the sets they have made. The designs appear to be rather old-fashioned in comparison with our own efforts, don't they?

ject of creating and continuing a permanent efficient service by short wave to the Empire.

There will be a small-scale raid on the Treasury balance of B.B.C. licence revenue. This will cover the capital charges. The programme charges will be met by the B.B.C. and the Colonies combining.

I expect work to start on the new G 5 S W at Daventry in February or March, and to be finished in October or November. The service will be in working order by January 1st, 1932. This should prove an inestimable boon to Britons and others beyond the Seas.

charities realise that appealing by broadcast is a fine art which very few people have mastered? Lord Knutsford and Sir Gerald du Maurier are pre-eminent. Many literally "golden" opportunities have been wantonly wasted by office-holders of charitable organisations doing the broadcast appeals, "ex-officio," without any consideration of voice, manner or matter.

The Blattnerphone

The B.B.C. is experimenting with the Blattnerphone process of "bottling" programmes for subsequent reproduction, and it is believed at Savoy Hill that the process will



We have had scores of letters asking for a two-valver using the famous "Paratune" principle, so we have designed this magnificent little wave-change set. It is cheap and easy to build, and gives exceptionally fine results, either on the local or "DX" broadcasts.

Designed by the "Wireless Constructor" Research Department.

PARTS YOU WILL REQUIRE

- Ebonite panel, 14 in. × 7 in. × 1/4 in. or 3/8 in. (Goltone, or Lissen, Red Seal, Paxolin, etc.).
- Cabinet for above, with baseboard 10 in. deep (Pickett, or Camco, Keystone, etc.).
- 1 .0005 variable condenser (Lissen, or Lotus, J.B., Formo, Ready Radio, Dubilier, Polar, Igranic, Ormond, etc.).
- 1 Slow-motion dial for above (Lissen, or Igranic, J.B., Ready Radio, Lotus, Formo, Ormond, Brownie, etc.).
- 1 .0001-.00015 differential reaction condenser (Ready Radio, or J.B., Polar, Lissen, Igranic, Lotus, Ormond, Dubilier, Formo, Magnum, Wearite, Parex, etc.).
- 1 L.T. switch (Benjamin, or Lissen, Lotus, Igranic, Bulgin, Goltone,

- Keystone, Ready Radio, Red Diamond, Wearite, Junit, Magnum, etc.).
- 1 Paratune coil unit (Wearite, or Magnum, Ready Radio, etc.).
- 2 Sprung-type valve holders (Lotus, or Igranic, Benjamin, Lissen, W.B., Bulgin, Junit, Telsen, Dario, Clix, etc.).
- 1 L.F. transformer (Igranic type J, or Lissen, Ferranti, Telsen, Varley, Mullard, R.I., Lotus, Lewcos, etc.).
- 2 Single-coil mounts (Bulgin, or Lissen, Lotus, Keystone, Wearite, Magnum, etc.).
- 1 400-ohm baseboard-mounting potentiometer (Lissen, or Igranic, Ready Radio, Wearite, etc.).
- 1 .0003-mfd. maximum compression type condenser (Formo, or Lewcos, Lissen, Polar, etc.).

- 1 .001 fixed condenser (Dubilier, or Telsen, Lissen, Ediswan, Ready Radio, T.C.C., Ferranti, Watmel, Igranic, Mullard, Formo, etc.).
- 1 .0003-mfd. fixed condenser (T.C.C., or Lissen, Telsen, etc.).
- 1 H.F. choke (Telsen, or Lewcos, R.I., Lissen, Varley, Ready Radio, Keystone, Magnum, Watmel, Wearite, Dubilier, Igranic, Lotus, Parex, etc.).
- 1 2-megohm grid leak and holder (Ediswan, or Ferranti, Lissen, Igranic, Dubilier, Ready Radio, Telsen, Mullard, etc.).
- 1 14 in. × 2 in. terminal strip.
- 9 Terminals (Igranic, or Belling and Lee, Eelex, etc.).
- Wires, screws, battery plugs and spring clip, etc.

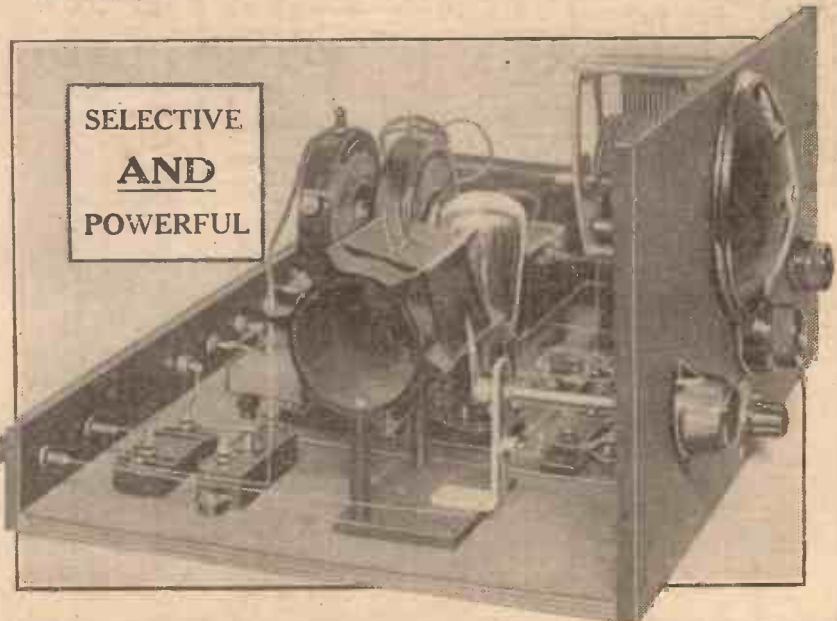
Is it possible to make a valve give one hundred per cent results?

Its amplification factor is invariably stated by the makers amongst the other useful data that they issue. And with the types generally used in receiving sets the figure will be found to vary from a minimum of about 5 to a maximum somewhere around 500.

How Much "Mag."?

The actual figure will, of course, vary with the type of valve, but, alas, whatever it is it is only a theoretical figure. In practice we cannot obtain a magnification from the valve equal to the figure quoted.

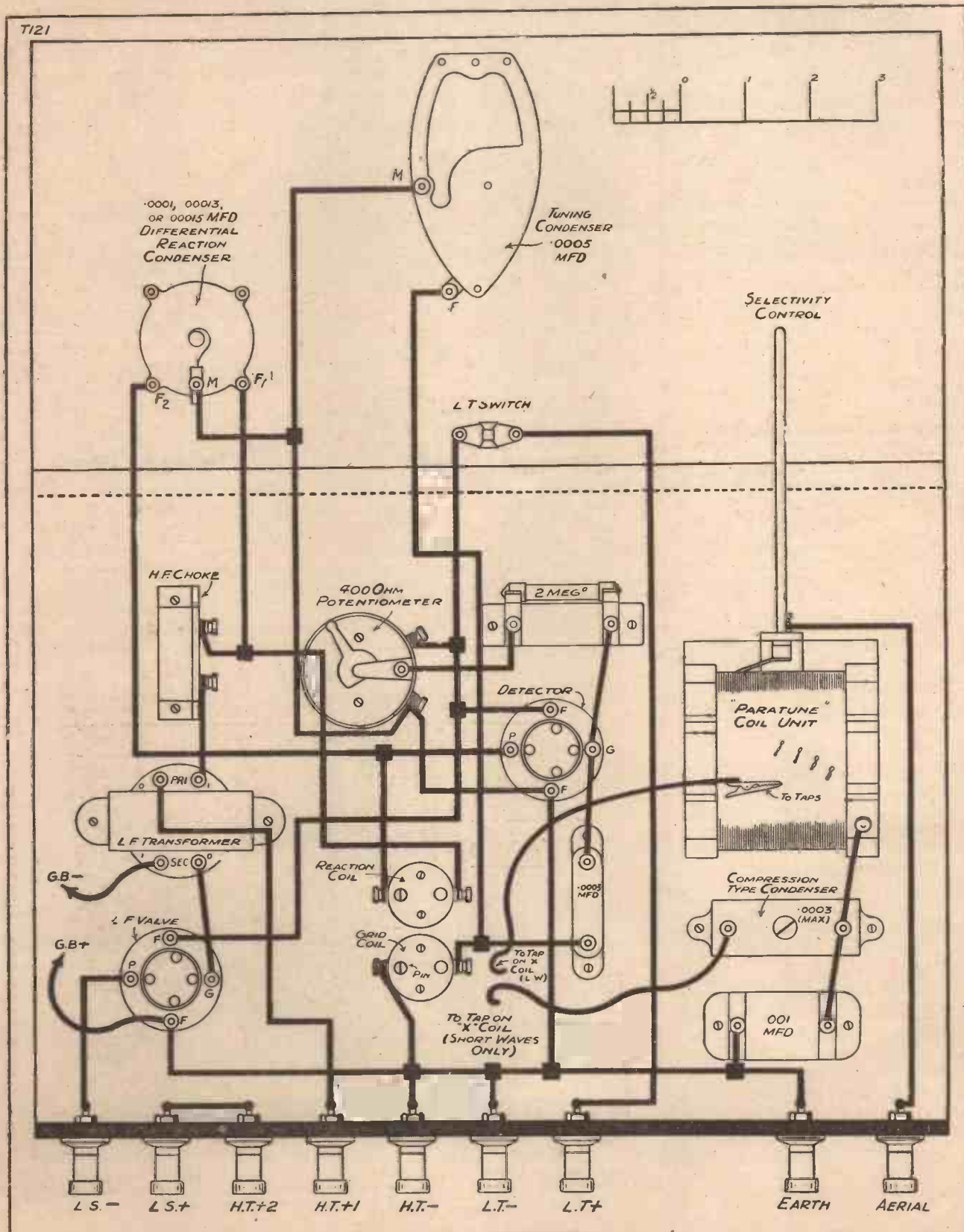
The ratio of the theoretical figure to the practical is very much higher in H.F. stages than in the stages which follow the detector valve. For instance, an S.G. valve may have a



SELECTIVE
AND
POWERFUL

A thoroughly efficient, easy to-build, easy-to-handle two-valver. The "Paratune" system of tuning enables maximum selectivity to be obtained, and, furthermore, increases the sensitivity.

The "Paratune" Two—continued

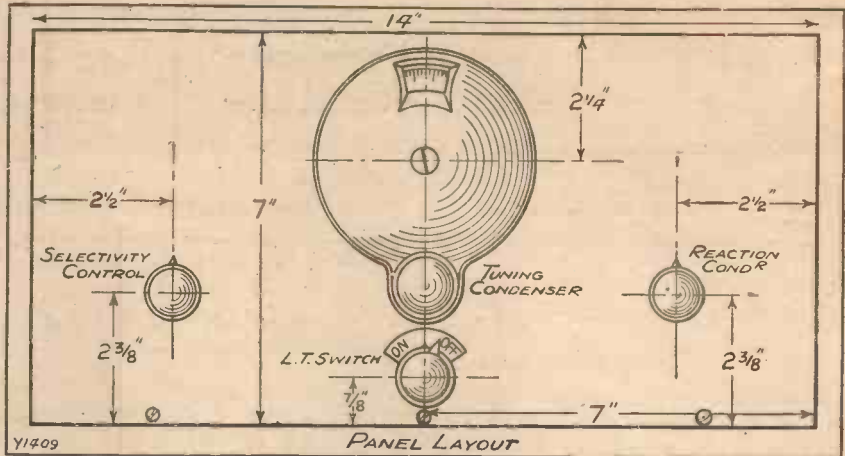


The "Paratune" Two—*contd.*

magnification factor of several hundreds, but in practice we may not be able to obtain an amplification of more than 30 or 40 from an H.F. stage in which it is employed.

The Gain Per Stage

The reason for such large differences is mainly the impossibility of using as high an anode circuit impedance as desirable. And this is accounted for by losses in coupling devices, and necessary compromises such as obtaining a proper balance between



The panel layout is arranged so that it is symmetrical in appearance, and also makes the handling of the set extremely easy.

THE "WIRELESS CONSTRUCTOR" "PARATUNE" TWO

(Circuit is Det. and 1 L.F., employing special selectivity scheme.)

VALVES.

- 1st: H.F. or special detector type.
- 2nd: Power valve.

COILS.

- GRID COIL (holder nearer to terminal strip): Medium waves, No. 69X. Long waves, No. 250X.
- REACTION COIL: Medium waves, Nos. 35 or 50. Long waves, No. 100 or No. 150.

VOLTAGES.

- L.T.: 2, 4, or 6 volts, according to voltage of valves employed.
- H.T. + 1: Up to 60 volts.
- H.T. + 2: Up to maximum rating of power valve.
- G.B.: Value to suit power valve and H.T. voltage used on it.

OPERATION.

MEDIUM WAVES.

Tune on main dial and control reaction with right-hand knob. Left-hand knob is adjusted to keep Paratune coil in step with tuning dial. Adjust potentiometer in conjunction with voltage on H.T. + 1 to give smooth reaction.

Compression-type condenser on baseboard controls selectivity. The smaller its capacity the greater the degree of selectivity.

LONG WAVES.

Operation of tuning and reaction condensers is same as on medium waves. Left-hand knob is now used to cut out interference from medium-wave stations.

NOTES.

When working on medium waves attach flex lead from compression-type condenser to tap on "X" coil. For long waves use flex lead with spring clip on end. Spring clip should be tried on different taps.

real selectivity without loss of sensitivity, powerful loud-speaker results without distortion, and a nice smooth control of reaction so that distant stations can be received properly. If we can get all this, and yet not sacrifice our two main points of simplicity and economy, we truly have a really fine set.

The "Paratune" Does It

A tall order, you will no doubt think. Yes, it is, but then the WIRELESS CONSTRUCTOR Research Department is used to meeting exacting requirements in the way of set designs!

So let us introduce you to the "Paratune" Two, which more than meets the difficult desiderata outlined

selectivity and amplification in the case of an H.F. valve.

In the case of a multi-valve set, say a five-valver, this small practical gain per stage does not matter much. In fact, a figure below the possible maximum is often aimed at intentionally in this type of set.

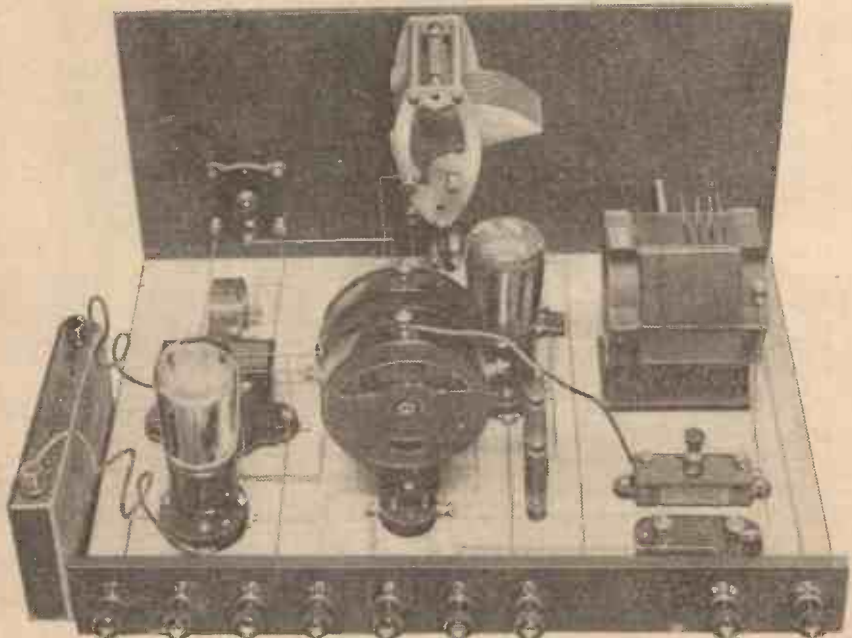
What We Need

On the contrary, with a small number of valves, such as two, it is necessary to obtain the utmost gain per stage that efficient design makes possible. For what is "lost on the roundabouts" cannot be "made up on the swings."

At the same time, we must not lose sight of the fact that the chief attractions of a two-valver are economy and simplicity. Neither of these must be lost sight of in an attempt to obtain super-efficiency.

The properties most needed in a two-valve set which is to work under modern conditions of reception are

PERFECT PROGRAMME - PROVIDER



Whether you are listening to the local, or to Continental broadcasts, the "Paratune" Two surpasses anything else of the same size in purity of reproduction and selectivity and sensitivity. It is a perfect programme-getter.

The "Paratune" Two—continued

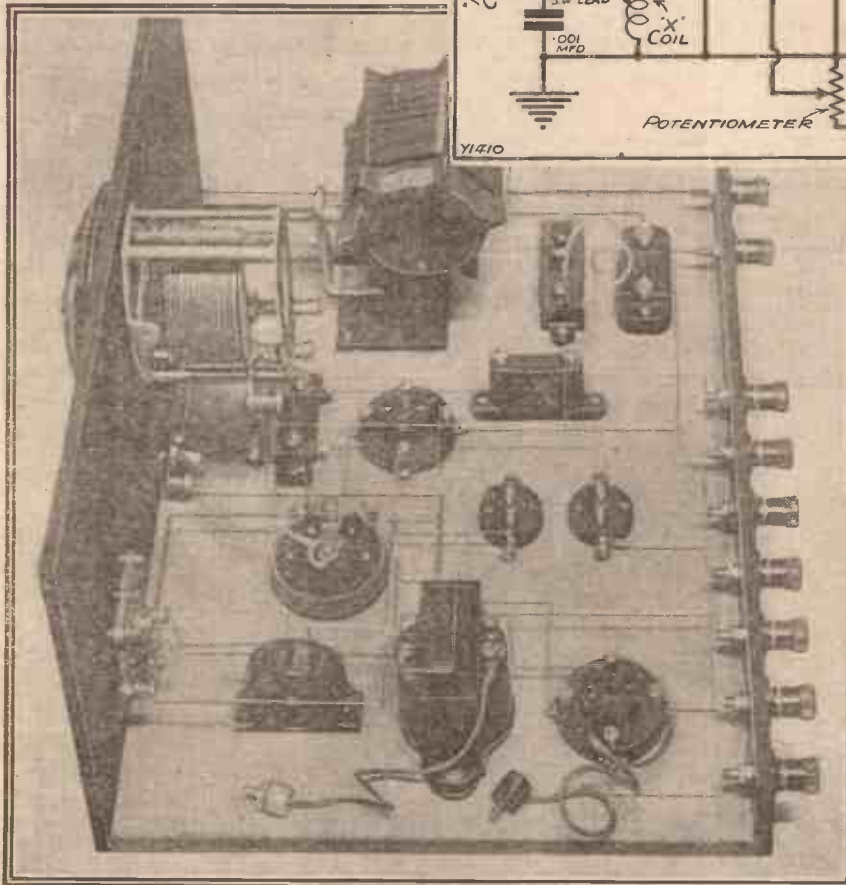
in the foregoing paragraphs. We say "more than meets" for it has a property very, very seldom found in modern sets, namely, that of preventing the interference which sometimes occurs on the long waves from medium-wave stations.

Purity and Punch

It is from the "Paratune" system of tuning that this attribute is obtained. This entirely new scheme, which also provides the remarkable selectivity of the set without causing any loss in sensitivity, was introduced a month or two ago by the WIRELESS CONSTRUCTOR.

It has been very fully dealt with in

SILKY CONTROL—



This photograph illustrates the extreme simplicity of the construction. The components are well spaced and the wiring will hold no terrors for any constructor. Above we have the theoretical diagram which shows at a glance the salient features of the set.

previous issues of this periodical, so we will not go further into its details here.

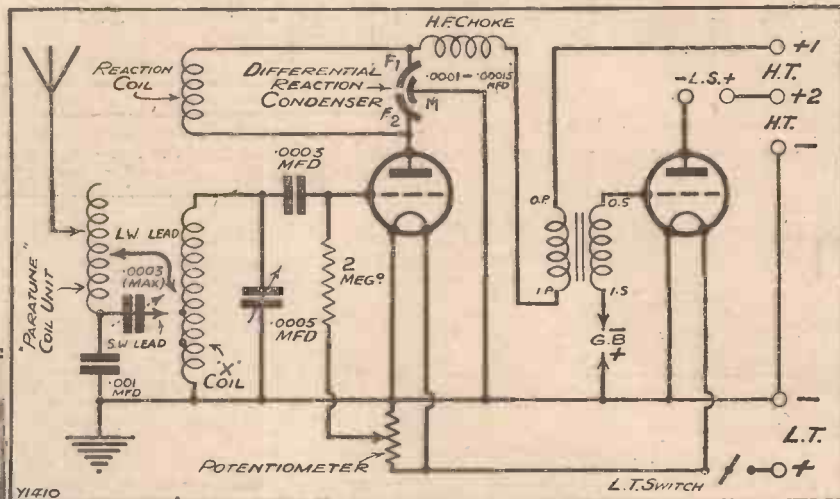
A powerful low-frequency stage gives the necessary "punch" to the set, and special attention has been

paid to the reaction control. In this connection you will see that besides the use of a differential reaction condenser, a potentiometer has been provided to adjust the detector grid

yet once it is set for a given detector valve and H.T. voltage does not have to be touched.

The use of two ordinary type tuning coils for the main inductances helps

—AN ASTOUNDING DISTANCE PIERCER



to keep the set really simple. Incidentally, there is one point in connection with the use of plug-in coils which gives them an advantage over the usual type of dual-range unit.

Usually the tuning range of the latter is limited to two definite wavebands with a gap of three or four hundred metres in between. A glance at a complete list of European broadcast stations will show you that there is no gap in the range covered by the stations' wave-lengths.

By the use of coils of suitable size it is therefore quite possible for some of the stations between the medium and long broadcast bands to be received on the "Paratune" Two.

None of Those Snags

You will appreciate by now that the "Paratune" Two is by no means an ordinary sort of two-valver. It is just the set for modern conditions, because it has all the advantages desirable and yet none of the "snags" which so often go hand in hand with selectivity, good volume and ease of control.

Having discussed whys and wherefores of the design of this efficient and interesting receiver, we can get down to the more practical considerations of the constructional details. There is nothing difficult

(Continued on page 200.)

bias to the best value for smooth reaction build-up and efficient detection.

This is a refinement which, as a rule, is to be found only on short-wavers. It is extremely effective, and

THOSE NEW SETS

The "Wireless Constructor" Ideas Committee discusses some vital questions that affect all constructors.



THE following questions were recently discussed by the WIRELESS CONSTRUCTOR Ideas Committee:—

How often should the amateur build a new set?

Should he do so at definite periods?

Is rebuilding an old set in accordance with a modern circuit an advisable practice?

To what extent should old components figure in new sets?

These questions had been advanced by Victor King, who, however, was unable to attend the meeting himself as he was enjoying a late vacation on the continent.

Another Query Raised

Mr. A. S. Clark made these observations:

"How often should the amateur build a new set? In order to arrive at an intelligent answer to this question I think we should first consider another one—Why does the amateur build his own sets?"

"Immediately it is obvious that there are several reasons, each one of which applies to a different type of constructor. One will build his own set simply from an economy point of view, another because he wants a really up-to-date set that will meet modern conditions, and the majority will construct sets because they are technically interested in the circuits and their relation to results.

"The first man will naturally only make a new set when improvements in radio technique and finance respectively make it desirable and possible. The second man will want to make a new set at fairly regular intervals, say every year, because design is always advancing and a set can soon become out of date.

"And the man who is technically

interested? Well, he is always making a new set; seldom are his pliers and soldering iron idle, and he gets a surprising amount of fun out of his hobby.

"There is no definite period for him. He should build a new set whenever the time is available.

"It will not prove expensive, for many components can be used over and over again in one set after another. This is a point where the reader of the WIRELESS CONSTRUCTOR has a great advantage, for all our sets are specially designed to use standard types of components, and many new and complicated coils and other components are avoided so far as is consistent with progress in design.

"I can see nothing against the pulling down of an old set and

making a new one with the same parts, with the possible addition of one or two new components. In this way the constructor can keep pace with radio development at a reasonable cost.

"Efficiency Must Come First"

"Naturally, the use of old components must not be carried too far, otherwise it will be like putting 'new wine into old bottles,' and something is bound to happen. As I have already said, since a compromise between advance and the use of standard parts is always made in WIRELESS CONSTRUCTOR sets, the constructor is guided along the right lines.

"No matter how often a new set is built, efficiency must come first, with economy possibly second. This

TWO-WAY TELEPHONY WITH 'PLANES



They are carrying out experiments in America with a view to establishing regular two-way telephony services with aeroplanes in flight. Above you see the trial apparatus installed at the Boston air terminus.

Those New Sets—continued

applies to designer and constructor alike."

In continuance of the debate, Mr. G. T. Kelsey said:

"Local" Listeners

"How often should a new set be built? Well, from the standpoint of a very large number of our readers I am quite sure that the answer would be as soon as one is published! In other words, every month or so!

"But, like Mr. Clark, I, too, think that our readers are divided into at least two, if not three, distinct classes.

"First there is the man who builds a set just from the point of view of what he will get out of it when the set is completed. This is the type of constructor who chooses the 'mainly local and simply-operated' design,

particular class that I disagree with Mr. Clark when he says that the man who is always building a new design is technically interested.

"I firmly believe that there are hundreds of our readers who are always building new sets, but who are completely at sea when it comes to the whys and wherefores for so doing.

"This type of reader, in my opinion, builds a new design mainly because of the fun he gets out of the constructional work, and perhaps to a lesser degree because subconsciously he finds it instructional to a greater extent than reading theoretical articles.

"But I certainly do not think that his decision to build a new set is governed by a technical consideration of what the set is or is not likely to do.

pletely to a modern arrangement, using as many as are permissible of the existing parts.

"It is, I feel, in this respect that our Query Department can be of great service to the undecided reader in rendering advice as to which of the existing parts can safely be used in a more modern design.

Causes Many Troubles

"It seems desirable rather to emphasise this question of components, because I feel convinced that more than half of the troubles which come to our notice are due to the use of unsuitable components of a more or less obsolete nature.

"Naturally, there is a number—in fact, one might say, the majority—which can safely be used over and over again. But, as we all know, it requires only one unsuitable part completely to upset the working of a finished design, and if this happens the task of finding the source of the trouble is no easy one."

Mr. Johnson-Randall then said:

"After hearing what Mr. Clark and Mr. Kelsey have said, I can only say that I think they have dealt with the whole question admirably.

"I am also of the opinion that the home-constructor falls into sharply divided classes.

Adding Refinements

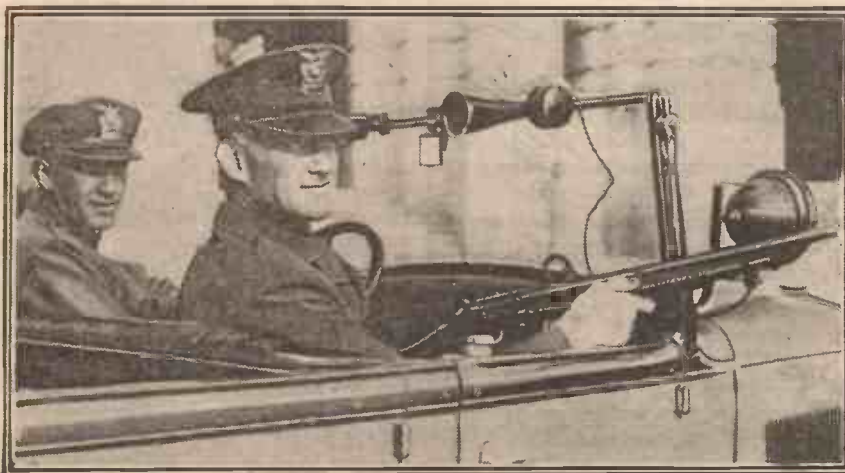
"There is the type who makes his own receivers for the sheer joy of the thing, and who likes to be absolutely up to date. Therefore, he follows the designs which are published in the WIRELESS CONSTRUCTOR, and is constantly improving his receiver. Not only does he build new sets at regular intervals, but he also adds refinements to his existing receivers, and is always right up to date with every phase of his hobby.

"Then there is another type, and he is the man with the very shallow pocket. He wants the best set that he can get, and he finds that if he makes up one of our designs he can save money. This type of constructor does not build very many sets.

"With regard to the question of rebuilding an old set in accordance with a modern circuit. I think this is quite all right in certain cases, provided the circuit is not a very old one. For instance, readers have

(Continued on page 203.)

RADIO FOR AMERICAN FLYING SQUADS



A Detroit police car fitted with the latest fixed-wave-length reception apparatus. The small loud speaker emits the messages sent by headquarters. Note the magazine rifle held in readiness by one of the officers—they want armament of this calibre to deal with the criminal gangs they encounter, for many of these are very well armed—they often have machine guns!

because primarily his entertainment consists of listening to the programmes provided by the B.B.C. with the minimum amount of inconvenience.

"And having found a design to satisfy his requirements, our friend the local listener probably remains quite contented until the day that he hears the better results given by his neighbour's set. Then, I imagine, the germ of dissatisfaction creeps in, and the fun begins all over again!

"My idea of the second class—certainly the major portion of our readers—includes the man to whom radio is a hobby. It is in this

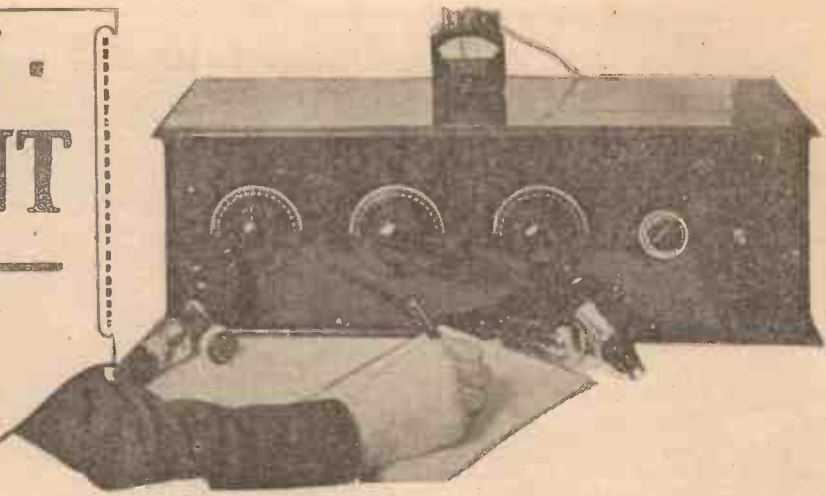
"Then about the question of old set reconstruction. Voicing the feelings of the Research Department, I'm afraid that only in exceptional cases do we feel happy about the alteration of an old set to a modern circuit.

Using Old Components

"The great difficulty is that present-day valves are so much more efficient than those of yesterday that when they are used in a modern circuit, built to an existing layout, there is always a danger of instability troubles.

"The feelings of the Research Department in this matter are that it is preferable to rebuild the set com-

FROM FILAMENT — TO — PLATE



ISN'T it wonderful what can be crowded between the filament and plate of the thermionic valve? The ordinary three-electrode valve has a grid—just a spiral of wire. It seems simple, but the spacing between the three electrodes must be exact if the characteristics of the valve are to be right.

The screened-grid valve has another grid squashed in, and the pentode

PACKED WITH POWER



A very good example of scientific "packing." This Mazda A.C. Pentode contains a wonderful amount of material inside its circular anode—heater, cathode, control grid, auxiliary grid, and "extra" grid. The result is the high magnification factor of somewhere round 95, and a remarkable power output.

has three "grids" in the comparatively small area between the filament and anode. All crowded into a space that measures, roughly, $1\frac{1}{4}$ in. by $\frac{3}{8}$ in. by $\frac{1}{2}$ in.

Economical Operation

Then there is the indirectly-heated A.C. valve. Here we have a thin filament which has been coated with porcelain—in one make by spraying—and then this is treated with a highly emissive metallic oxide. Outside this is a grid, or grids, and then the anode.

Indirectly-heated cathode valves have a definite pull over the ordinary valve, in that it is quite economical to use a 4-watt heating element. Four watts on an ordinary filament—even from an accumulator—would be a terrible amount of power; the usual state of affairs being about one-tenth as much.

Do you ever take your valves to pieces? Not the good ones, but old friends that have done their duty. It's worth having a look inside, especially if you happen to have a pentode or indirectly-heated A.C. valve. You will be surprised at the exactness and skill with which the electrodes have been assembled. And perfect assembly means maximum efficiency.

Some of the latest A.C. valves are dealt with in this article, in which it is shown how efficient these valves have become.

But with A.C. we can step-down the mains voltage and step-up the current very successfully, with the result that a greater wattage can be used, and yet the valve can be operated economically.

"That Little More—"

Take the case of the Mazda A.C./P. Here we have an indirectly-heated cathode valve which, with a "filament" consumption of 4 watts (1 amp. at 4 volts), gives a mutual conductance of nearly four. The impedance is 2,650 ohms, and the magnification factor is 10. Wonderful characteristics, though in fairness to the ordinary battery valve it must be recorded that the P.240 runs it close in slope with less filament wattage. But it does not quite reach the same high efficiency, and "that little more, how much it is!"

S.G. valves of the A.C. variety "have it" over battery valves, for

the Mullard S.4V.A. and the Mazda A.C./S.G. have very high magnification factors. The S.4V.A., for instance, has an amplification factor of 1,500 and an impedance of only just over 400,000 ohms. The Six-Sixty Super A.C. S.G. valve has characteristics that are very similar.

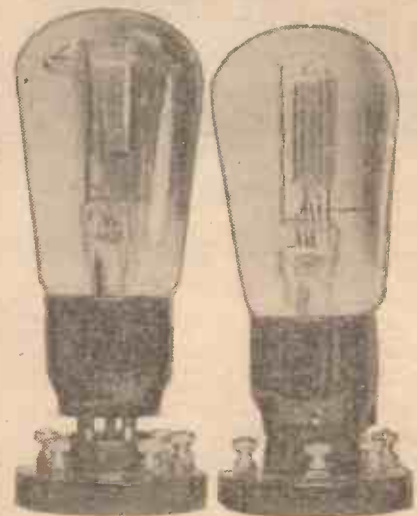
All along the line the A.C. valves show wonderful efficiency. They get more out of their filament-plate space than most other valves, and so it is small wonder that rapidly increasing numbers of people are taking up A.C.-operated receivers.

What a Mesh!

During the last few weeks we have had several of the latest A.C. valves in for test, and it may be interesting to many readers if brief reports are given here.

Taking them in alphabetical order,

INDIRECTLY HEATED



Two indirectly-heated cathode valves of the Marconi and Osram types. The M.H.L.4 (left) makes an excellent detector, and the M.H.L.A is a first-stage amplifier with valuable characteristics.

From Filament to Plate—continued

we have the Marconi, Mazda, and Osram valves to discuss.

Of the Marconi valves which have recently been improved, the ones we have tested are the M.S.4, M.H.L.4, M.H.4, and the M.L.4. As the initials denote, the first is the screened-grid A.C. valve having characteristics of 500,000 ohms impedance and a magnification factor of 550.

Marconi and Osram valves favour the wire-mesh plate, while the Mazda people evidently prefer the solid plate and, at the same time, close the heater and cathode in closer than do the other makers.

A Humming Valve

Whether this accounts for the fact that in the experiments we carried out less hum was experienced under certain conditions of test with the Mazda than the others we cannot say. It would seem that in the circuit (one of several used during the tests, and including one transformer-coupled stage) in which hum was evinced the hum was picked up by an L.F. transformer from the valve itself. Whether it came from the

But to get on. The S.G. Marconi (and the Osram), too, were perfectly well-behaved and gave every satisfaction. Screening, of course, had to be carefully carried out, or feedback became troublesome; but if ordinary care were taken the results were perfectly satisfactory.

Blue-Glow Surprise

As detector the M.H.4 (16,000 ohms and 35) gave excellent results, as it did as a first L.F. valve in a powerful set using three L.F. stages.

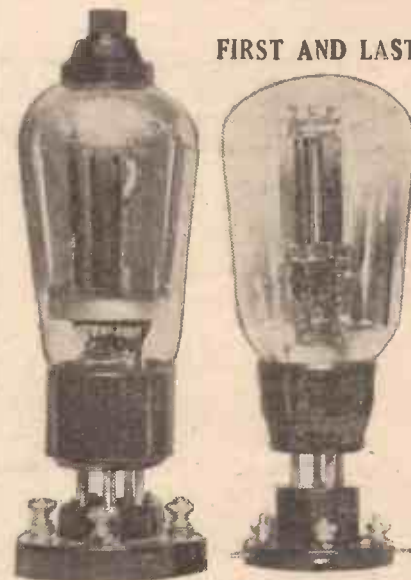
In ordinary working we preferred the M.H.L.4 as the valve after the detector (8,000 ohms and 20), and this followed by the M.L.4 as an output valve gave quite powerful enough loud-speaker reception for all ordinary purposes.

The M.L.4 (3,000 ohms and mag. of 9) seemed prone to blue glow a bit. We do not know whether it was a fault (for it happened with both the valves we were trying), but it did not seem to like things at first. After a time the blue glow worked off, and the valve appeared happier. It is not a valve, however, that

ordinary rectification in the average set probably the Marconi-Osram M.H.4 would be used.

The Mazda range of A.C. valves is rather different from the Marconi and

FIRST AND LAST



The Mullard S.4V.A. (left) is an S.G. valve of no uncertain merit, while the Mazda A.C.P.1 is a highly efficient output valve.

WHERE "BOTTLES" ARE BORN



Testing a Philips' 500-watt amplifier at the great valve works in Eindhoven. The valve requires a voltage of about 4,000 on the anode. On the right is seen a microphone of the same type as is used by the famous short-waver P.C.J., and by Hilversum.

heater or the pinch wiring, or from both, we should not like to say; but screening the valve cured it in the one case, while screening was unnecessary in the other.

From this we do not want readers to get the idea that the Marconi and Osram valves "hum." They do not when the set is properly designed, and we were deliberately "asking for it" to test out a little theory we held, and this effect came in as an incidental.

should be over-run as regards H.T. or milliamps., judging from our specimens, which may quite easily have been exceptional, for we have not noticed this phenomenon with this make of valve before.

For power-grid rectification the indirectly-heated cathode valve of the H.L. type is almost ideal, due to the equi-potential cathode. The A.C./H.L. Mazda, for instance, makes a fine power detector, as do the Marconi and Osram M.H.L.4, although for

Osram. For instance, there is no moderately low impedance valve. After the A.C./S.G., with its magnification factor of 1,200, we drop right down to 11,700 ohms, at which figure we find the H.L., with its amplification factor of 35. This is the "cousin" to the M.H.4, of course.

The Marconi M.H.L.4 has no counterpart in the Mazda range, for the next Mazda is the A.C./P., with an impedance of 2,650, and this corresponds more with the M.L.4. It has a maximum anode dissipation of about 5 watts.

The Star-Turn

But the Mazda go farther "down." We have the A.C./P.1, an output valve capable of delivering 6 watts. It has an impedance of 2,000 ohms, and a magnification factor of 5.

The star valve of the Mazda series is the A.C./Pen, a pentode valve having a magnification factor of round about 95. The grid swing is not very large—it takes a bias of about 10 volts—but the high magnification enables very good loud-speaker strength to be obtained.

A favourite output valve for small sets—two- or three-valvers—is the A.C.P., which has the remarkable
(Continued on page 200.)

THE "PYLON" THREE

Here is something quite different in set design. It is distinctive and attractive without being uselessly ornamental. Nothing of efficiency has been sacrificed for appearance, and the "Pylon" Three is the ideal household local receiver.

Designed and Described by G. T. KELSEY.

The little lamp at the top shows whether the set is on or not, and all batteries are kept in the foot of the pylon. But although it is so artistic in appearance, the receiver is just as easy to handle as the simplest and most conventional three-valver.

You have never seen anything quite like this before, have you? In fact, it is such a very striking break-away from all that you have previously been used to in the matter of set construction that it seems desirable to assure you right at the beginning that it is a wireless set!

But more than that, it is a thoroughly practical design for a set that will provide alternative programmes without any re-tuning bother; a complete three-valver, with batteries—in fact, everything, barring the loudspeaker, totally enclosed.

Practical Design

This, you see, is what comes of Ideas Committees!

At our last meeting—a full report of which is given elsewhere in this issue—one of the conclusions at which we arrived was that, very roughly, our set-constructing readers can be divided into two classes.

There are those to whom set con-

**HAS
ONLY
THREE
CONTROLS**

**A MONU-
MENTAL
MASTER-
PIECE**



struction is, in every sense of the word, a hobby. This is the type of reader who carefully scrutinises each design published, and who is never happy unless he is busy with the soldering iron on the construction of a new set.

Seldom a month goes by but what this man is catered for, either by one of Mr. Victor King's striking designs or by the Research Department.

A Real Break-Away

Then there is the other kind of constructor, the man who, perhaps for the sake of economy, builds his own receiver, not so much for the enjoyment derived in the constructional process, as for the enjoyment he will get out of it when it is completed.

The essential requirement of a receiver for those who fall into the second class is that it should give consistently good results from the local transmitters and with the minimum of inconvenience and trouble.

THE PARTS—

- 2 Single-coil mounts (Lotus, or Igranic, Wearite, Magnum, Lissen, Red Diamond, etc.).
- 2 .001 max. compression type condensers (R.I. Vari-cap, or Formo, Lissen, Loweos, Polar, etc.).
- 3 Sprung-type valve holders (Formo, or Clix, Telsen, Dario, Lissen, W.B., Bulgin, Junit, Igranic, Benjamin, Lotus, Magnum, Wearite, etc.).
- 1 Push-pull type single-pole change-over switch (Red Diamond, or Lissen, Bulgin, etc.).
- 1 2-megohm grid leak, with holder (Dubilier, or Lissen, Ready Radio, Igranic, Ferranti, Ediswan, Graham-Farish, Mullard, etc.).
- 1 .0003-mfd. fixed condenser (Formo, or similar small type, such as Telsen, Ready Radio, etc.).

- 1 150,000-ohm anode resistance with holder (Varley, or Igranic, Mullard, Dubilier, etc.).
- 1 .01-mfd. fixed condenser with mica dielectric (T.C.C., or Lissen, Igranic, Dubilier, Mullard, etc.).
- 1 1-megohm potentiometer (Varley, or Igranic, Lissen, Gambrell, Magnum, Wearite, etc.).
- 1 L.F. transformer of fairly low ratio (Varley Nicore 1, or other compact type, e.g. Igranic "J," R.I. "Hypermite," Lissen "Torax," etc.).
- 1 Set of Pylon cabinet parts (Foto

—YOU WANT

- Scott), or wood for same.
- 12-mfd. Mansbridge type condenser (Igranic, or Lissen, T.C.C., Dubilier, Ferranti, Formo, Hydra, Mullard, etc.).
- 1 L.F. output choke, 20 henries or thereabouts (Lissen, or Igranic, Varley, Magnum, R.I., etc.).
- 1 Indicator lamp and holder (Bulgin, or similar type).
- 1 L.T. switch (Bulgin, or Benjamin, Lissen, Igranic, Wearite, Junit, Goltone, Keystone, Red Diamond, Magnum, Ready Radio, Lotus, etc.).
- 2 No. 50 plug-in coils of well-known make.
- Small quantity of No. 26 D.C.C. or D.S.C. wire, wire for connection purposes, flex and, if required, 1 multi-way battery cable (Bulgin, etc.).

The "Pylon" Three—continued

And when one gets down to the question of an ideal set for those who require nothing but the local stations, how else can one regard the conventional tuning and reaction adjustments except as sources of inconvenience?

And if one can do away with the normal tuning controls, the orthodox panel and baseboard assembly can also be dispensed with, and thus we are left with scope for exercising all manner of ingenious ideas.

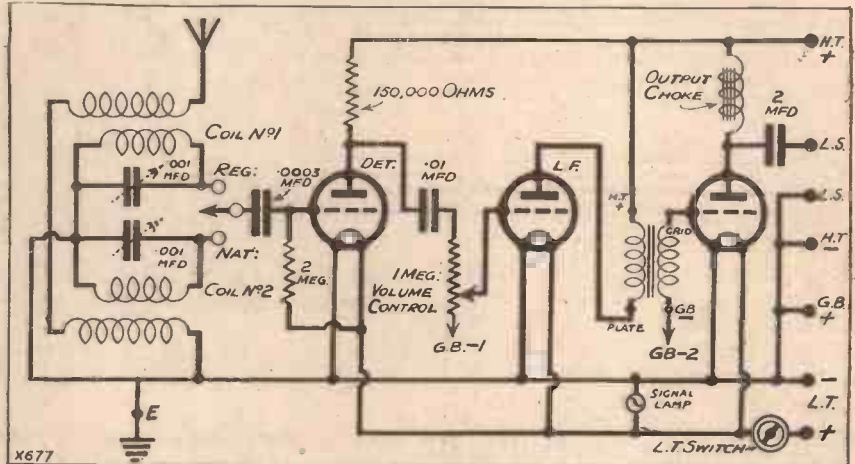
Completely Trouble-Free

This brings us to the "Pylon," which is unquestionably a very radical departure from all that is conventional in radio set design. It is a set in which efficiency has not been sacrificed for the sake of novelty, and it has been designed to meet the

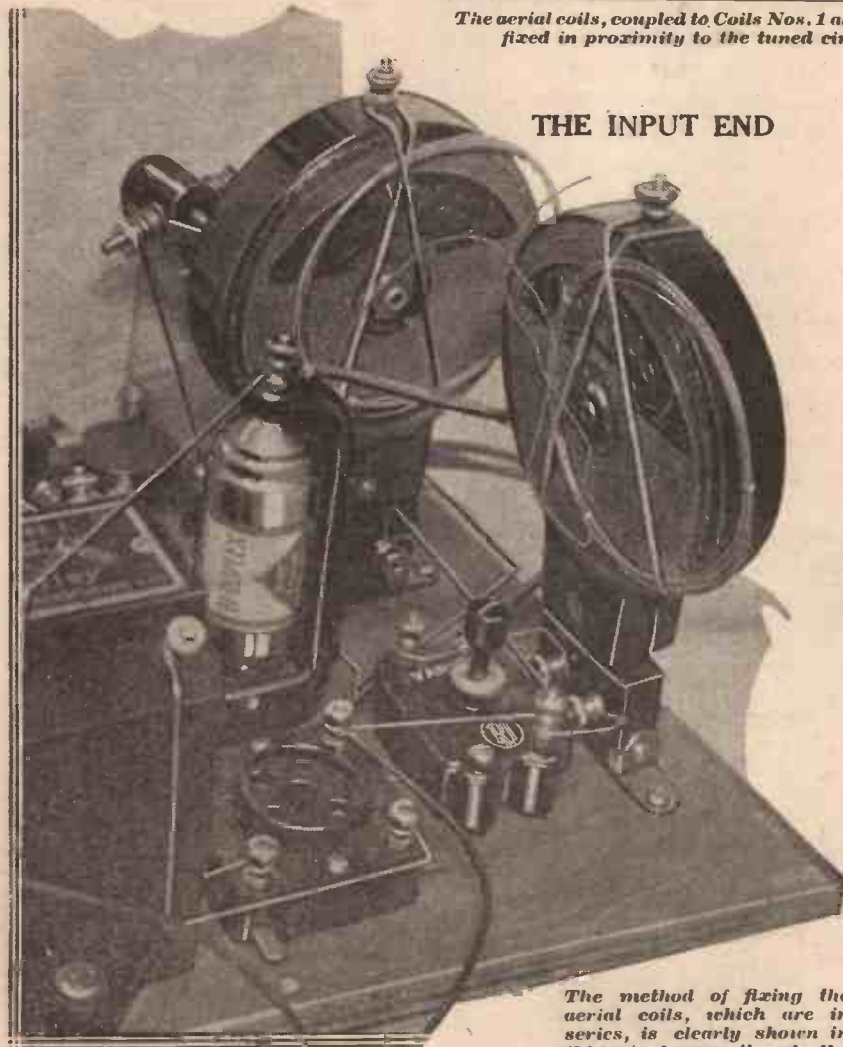
demands of all those who are concerned with trouble-free reception of the local stations.

It will *not* receive distant stations, because, for one thing, in the achievement of absolute simplicity—which,

A VERY SIMPLE CIRCUIT



The aerial coils, coupled to Coils Nos. 1 and 2 respectively, are just small hank windings fixed in proximity to the tuned circuits, as shown in the photograph below.



THE INPUT END

The method of fixing the aerial coils, which are in series, is clearly shown in this "close-up" of the end of the "baseboard."

after all, is vital in an ideal "home" receiver—reaction has been omitted altogether. But it can certainly be acclaimed as one of the most simply operated sets that has ever been designed.

No Tuning!

There are only three controls (if one can call them such), all of which are "automatic" in the sense that absolutely no technical knowledge is necessary to use them.

At the top there is the filament switch, which either puts the set on or off. And when the set is on there is a visible indication by means of a small pilot lamp, which is housed in the tiny compartment above the main cabinet.

Immediately below the L.T. switch is the control by which volume is regulated, and the only other control is the station-change switch which may be seen at the bottom of the instrument. This latter consists of an ordinary push-pull switch that gives you the National programme in one position and the Regional in the other.

The Battery Box

Can you imagine anything more simple?

While on the question of simplicity, it would perhaps be as well to make reference to the cabinet, the appear-

MEASURE THE PRICE OF YOUR BATTERY BY THE MONTHS OF ITS LIFE — THE QUALITY OF ITS CURRENT AND THE ABUNDANCE OF ITS POWER



When you get a high-tension battery for radio that lasts so long that you forget the date you bought it—when that battery delivers pure, clean current that will keep every note of music, every word of song so distinct and loud—when the power of that battery is so abundant that your loud speaker was never so loud before—and when the output from that battery is obtained at a cost acknowledged to be the lowest cost known per unit of output, can you expect to get more from any battery?

In a Lissen Battery you get the advantage of all this abundant power, all this clarity of tone in your loud speaker, and all this economy of current cost. No battery will do more for you than a Lissen Battery, and it will take a long search to find one that will do anything like so much.

100 volt 12'11

Also made in all sizes, all capacities, all voltages to suit your needs.

You can secure all the advantages of a Lissen Battery by asking by name for a "Lissen New Process Battery" and showing you are firm about it by the way you say "Lissen." Obtainable at 10,000 radio dealers.



IT PAYS TO BUY LISSEN—THE POWER THAT LASTS

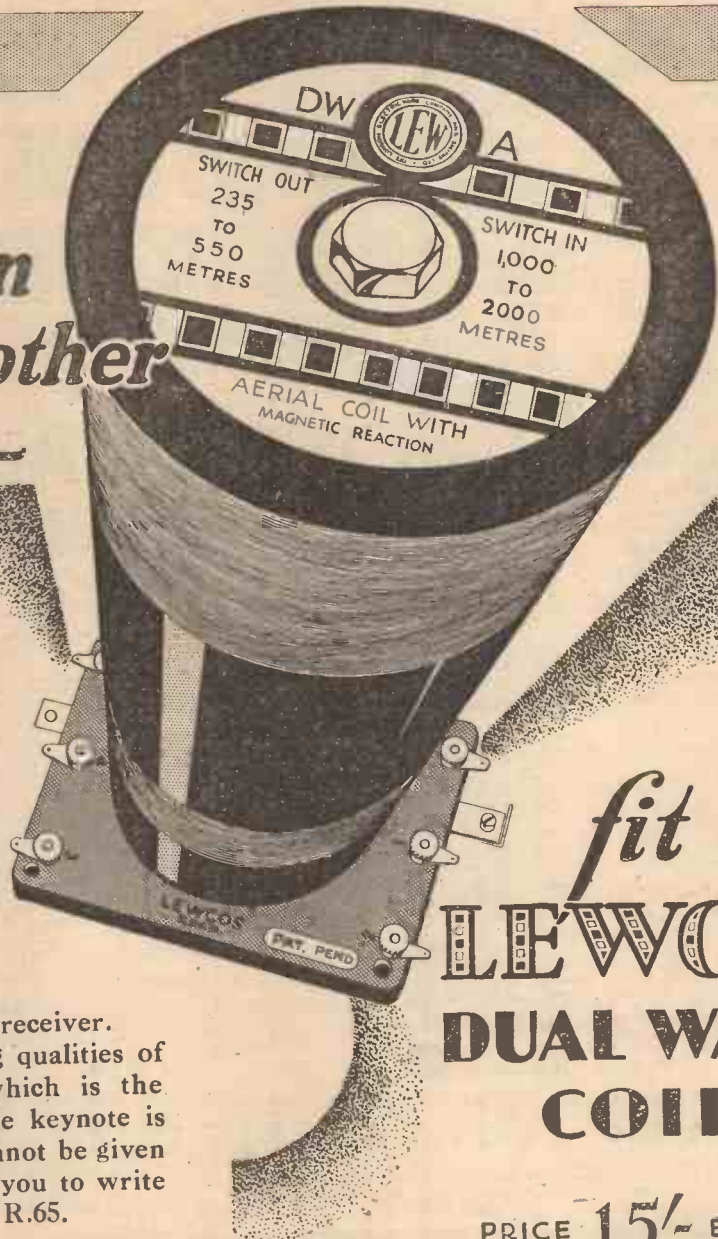
THE REASON FOR THE SUPERIORITY OF THE LISSEN BATTERY

Big cells—a process and chemical combination known only to Lissen, which packs those cells with the largest oxygen content found in any battery—giving a stamina and a resistance to volt drop over such prolonged periods of time that the battery seems everlasting, and yielding only pure power all the time.

LISSEN LIMITED, Worples Road, Isleworth, Middlesex.

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Valve —*

Because new conditions demanded it, "Lewcos" made this new Dual-Wave Coil to supply the need for a highly efficient, though selective, coil, covering both the medium, 235-550 m., and long, 1,000-2,000 m., wavebands. The waveband required is selected by a single operation of a push-pull rod arranged to protrude through the panel of the receiver. The remarkable range of sterling qualities of this new Lewcos component, which is the product of the factory where the keynote is "Perfection In Every Detail," cannot be given in this small space, but we invite you to write for a fully descriptive leaflet, Ref. R.65.



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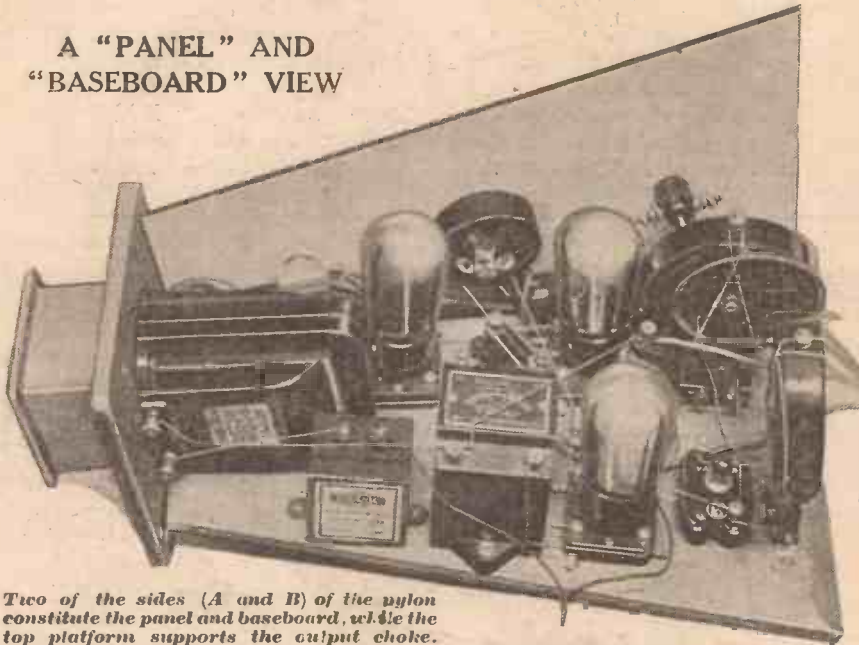
Lewcos Dual-Wave Coils
(Refs. DWA and DWG)
with ganging switch
mechanism (Ref. S.M.5.) are
specified for the "Vi-King"
Five receiver described in
this issue.



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The "Pylon" Three—continued

A "PANEL" AND "BASEBOARD" VIEW



Two of the sides (A and B) of the pylon constitute the panel and baseboard, while the top platform supports the output choke.

ance of which, at first sight, is apt to leave the impression that it is beyond the carpentering skill of most of us.

As a matter of fact, the whole thing can be obtained in kit form, that is to say, all cut to shape and ready for assembling, from Messrs. Peto Scott.

Full details of the battery box will be given in the next issue, but meanwhile there may be many of you who would prefer to make the set part alone, with a multi-battery cable for connection to the batteries, these being hidden away somewhere.

Skill Not Necessary

If you decide to buy the parts for your cabinet all ready for assembling, be sure to ask for the "Pylon" cabinet, and the "Pylon" battery box. If, on the other hand, you are fond of carpentry work, and would prefer to construct your own, then you will not be likely to go very far wrong if you carefully follow the detailed diagram provided.

It seems rather unnecessary to dwell upon the construction of the cabinet, because, without a doubt, it is much more helpful to work from a diagram when making anything in the cabinet line. It is in the actual assembly that care will have to be exercised, because you will not be able to fix the components and carry out the wiring with all the sides in position.

the piece of wood which forms the top of the main cabinet, fasten a piece of flex to each of the two contacts of the indicator lamp. These two wires have to be carried through into the main cabinet, and the hole for this purpose should be drilled so that the flex leads will not foul the filter output choke, the position of which can be seen in the wiring diagram.

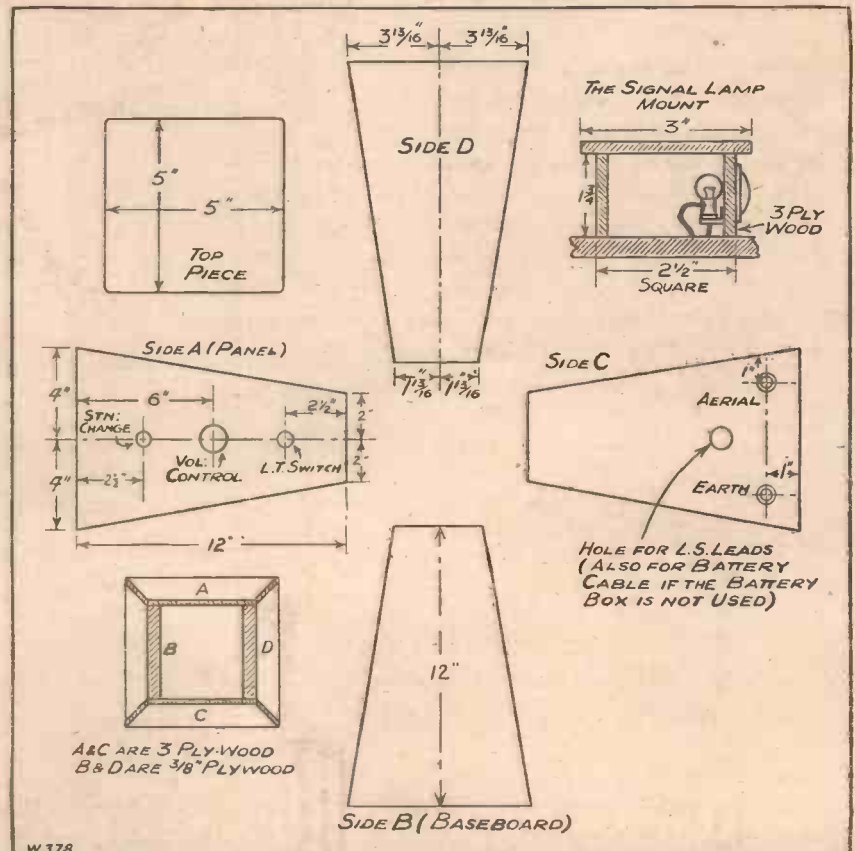
How to Assemble It

You can now proceed to fasten sides A and B together by means of small wood screws, after which these two sides should be secured to the top piece in such a way that side A (which is the one on which the controls are fitted) is in the same plane as the side of the upper box on which the pilot lamp is mounted. The other two sides can be secured together, but they will not be required to complete the cabinet until the set has been assembled and wired.

Following the usual WIRELESS

Start the assembling with the tiny compartment in which the pilot lamp is fitted, and before you secure it to

PARTS OF THE PYLON



W378

The dimensions of the various sections that go to make the pylon are given above. Note how the sides are assembled, as shown to the left.

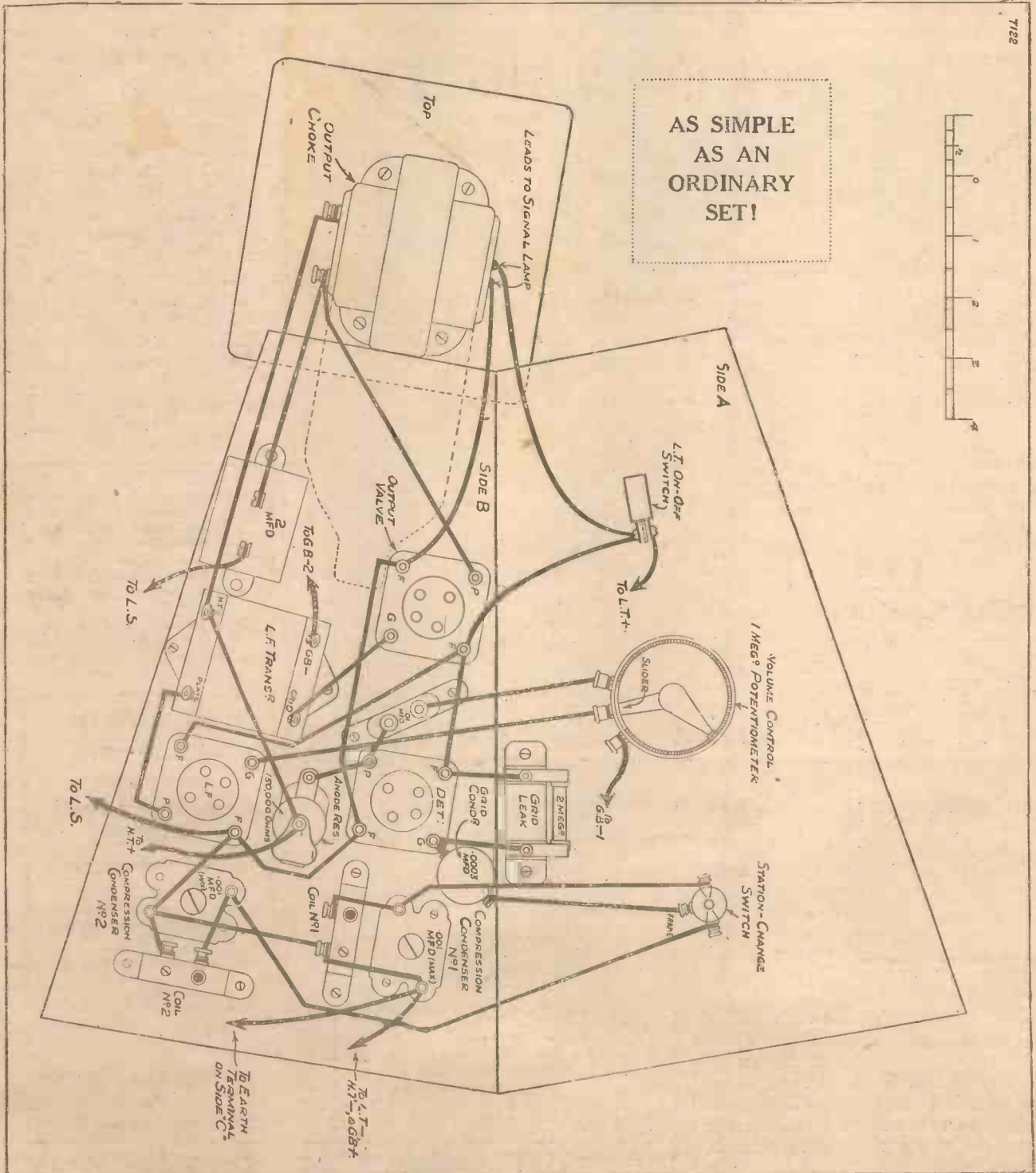
The "Pylon" Three—continued

CONSTRUCTOR practice, a complete list of the parts required with which to build the "Pylon" is given elsewhere in the article, and although you need not necessarily stick to the actual parts used in the original (mentioned in each case first), you

would be well advised to purchase only those of reliable makes, a representative range of which is given in the way of alternatives.

The mounting of components is not really a very difficult job, as the wiring diagram shows the position in which

each one should be fixed. There is one small point to which attention should be drawn, and that relates to the fixing of the grid-leak holder. Fasten the grid-leak holder to the appropriate position on side A before you secure any of the "baseboard"—





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**THE
"PYLON" THREE**

	£	s.	d.
2 ReadRad Single Coil Holders	1	8	
1 ReadRad Kit of Parts for Cabinet and Battery Box	1	0	0
2 Compression Type Condensers, .001 mfd. max.	3	0	
3 Telsen 4-pin Sprung Valve Holders	3	0	
1 Bulgin Single Pole Change-over Switch	2	0	
1 ReadRad 2-megohm Grid Leak and Holder	1	4	
1 ReadRad .0003 mfd. Fixed Condenser	10		
1 Varley 150,000-ohm Resistance and Holder	9	6	
1 Dubilier Type 620 Fixed Condenser, .01 mfd.	3	0	
1 Igranite Megostat, 1 megohm.	6	0	
1 Telsen "Radiogrand" 3-1 Transformer	12	6	
1 Dubilier 2 mfd. Fixed Condenser	3	6	
1 Varley 20 henry Output Choke	1	0	0
1 Bulgin Pilot Lamp and Holder	2	6	
1 Bulgin Toggle Switch On-Off	1	9	
2 Lewcos 50 OT Coils	7	0	
1 lb. Reel 25 g. D.C.C. Wire	1	3	6
3 Valves as to specification	1	7	6
1 Packet "Jiffilinks" for wiring Flex, Screws, Indicating Wander Plugs, etc.	2	2	
Total (inc. Valves & Cabinet)	£6	11	0

KIT A less valves and cabinet	£4:3:6
or 12 equal monthly payments of	7'8
KIT B with valves less cabinet	£5:11:0
or 12 equal monthly payments of	10'2
KIT C complete with valves and cabinet	£6:11:0
or 12 equal monthly payments of	12'-

**G.B.
REGULATOR**

	£	s.	d.
1 Ebonite Panel, 6 1/2" x 4 1/2" x 3/16"	1	8	
1 Solid Oak Cabinet, 4 1/2" deep (Box type)	6	0	
1 Complete 0-50 mfd. meter	1	0	
1 Weatco Rotary 18 contact switch	7	6	
1 Lissen 1-meg. Grid Leak with Terminals	1	3	
2 Belling-Lee "B" Terminals	1	0	
3 Chix Sockets	6		
11 Chix Wander Plugs	1	10	
Quantity Flex, Screws, etc.	1	3	
2 9-volt G.B. Batteries	3	0	
TOTAL	£2	5	0

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	£	s.	d.
1 Ebonite Panel, 21" x 7" x 3/16", drilled	7	0	
1 Table Model Hand-Polished Oak Cabinet, 10" Baseboard	1	12	6
3 ReadRad .0005 mfd. Variable Condensers	13	6	
3 ReadRad Duograph S.M. Dials	19	6	
1 ReadRad .00015 mfd. Differential Reaction Condenser	5	0	
1 ReadRad 30-ohm Filament Rheostat	2	0	
2 ReadRad On-Off Switches	1	8	
1 Bulgin Single Pole Change-over Switch	2	0	
2 Chix Panel Sockets and Plugs	8		
1 Lewcos D.W.A. Coil	15	0	
2 Lewcos D.W.G. Coils	1	10	0
1 Lewcos Complete Gang Switch Action S.M.5	2	6	
3 Telsen 4-pin Sprung Type Valve Holders	3	0	
2 Junit H.V. Valve Holders	3	6	
1 Bulgin B.M. Neutralising Condenser	4	9	
2 Dubilier 2 mfd. Fixed Condensers	7	0	
2 Dubilier 1 mfd. Fixed Condensers	5	0	
2 Dubilier .25 mfd. Fixed Condensers	4	6	
2 Dubilier .002 mfd. Fixed Condensers, Type 620	4	0	
1 ReadRad .0003 mfd. Fixed Condenser	10		
1 Dubilier .01 mfd. Fixed Condenser, Type 620 (Mica)	3	0	
1 Varley 20 henry Output Choke	1	0	0
1 Telsen Radiogrand L.F. Transformer, 3-1	12	6	
1 Varley 100,000-ohm Resistance and Holder	7	0	
1 ReadRad 2-meg. Grid Leak and Holder	1	4	
1 ReadRad 1-meg. Grid Leak and Holder	1	4	
1 Lissen .25-meg. Grid Leak (terminal type)	1	3	
1 Bulgin 50,000-ohm Link Resistance	1	9	
4 ReadRad 600-ohm Resistances	10	0	
1 ReadRad "Hilo" Choke	4	6	
1 Terminal Strip, 21" x 2" x 3/16", drilled	2	3	
11 Belling-Lee "B" Terminals	5	6	
2 ReadRad Standard 10" x 6" Screens for S.G. Valves	5	0	
1 Piece Copper Foil, 22" x 10"	3	6	
2 Siemens S.G. Cells	2	0	
5 Valves to specification (S.G., Det., L.F. and Super Power)	3	10	6
2 Packets Jiffilinks for wiring Flex, Wire, Screws, Plugs, etc.	5	0	
	2	2	
TOTAL (INCLUDING VALVES AND CABINET)	£16	2	6

KIT A less valves and cabinet **£10:19:6**

or 12 equal monthly payments of **£1:2:0**

KIT B less cabinet, with valves **£14:10:0**

or 12 equal monthly payments of **£1:6:6**

KIT C complete with valves and cabinet **£16:2:6**

or 12 equal monthly payments of **£1:9:7**

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**THE
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	£	s.	d.
1 Ebonite Panel, 14" x 7" x 3/16"	4	6	
1 Solid Oak Cabinet, with Baseboard 10" deep	1	3	6
1 ReadRad .0005 Variable Condenser	4	6	
1 ReadRad Duograph S.M. Dial	6	6	
1 ReadRad .00015 Differential Condenser	5	0	
1 ReadRad L.T. Filament Switch	10		
1 ReadRad Paratune Coil Unit	8	6	
2 Telsen Sprung Type Valve Holders	2	0	
1 Telsen Radiogrand L.T. Transformer, 3-1	12	6	
2 ReadRad Single Coil Holders	1	8	
2 Lewcos Coils, 60X and 250X	11	3	
2 Lewcos Coils, 50 C.T. and 150 C.T.	8	0	
1 ReadRad 400-ohm B.M. Potentiometer	2	8	
1 Compression Condenser, .0003 mfd. Max. type "J"	1	6	
1 ReadRad .001 mfd. Fixed Condenser	10		
1 ReadRad .0003 mfd. Fixed Condenser	10		
1 ReadRad "Hilo" Choke	4	6	
1 ReadRad 2-meg. Grid Leak and Holder	1	4	
1 Ebonite Drilled Terminal Strip, 14" x 2" x 3/16"	1	9	
9 Belling-Lee "B" Terminals	4	6	
1 Packet "Jiffilinks" for wiring	2	6	
2 Valves to specification (Detector and Power)	19	0	
Wander Plugs, Screws, Crocodile Clip, etc.	1	9	
Total (inc. Valves & Cabinet)	£6	10	0

KIT A less valves and cabinet **£4:7:6**

or 12 equal monthly payments of **8'2**

KIT B with valves, less cabinet **£5:6:6**

or 12 equal monthly payments of **9'9**

KIT C complete with valves and cabinet **£6:10:0**

or 12 equal monthly payments of **12'-**

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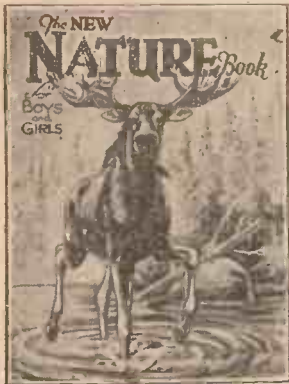
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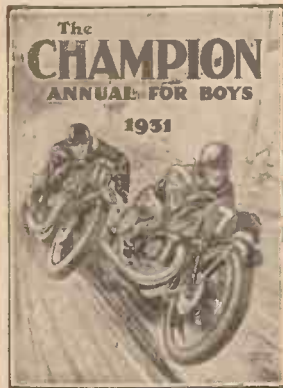
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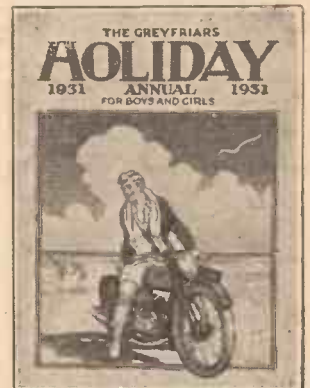


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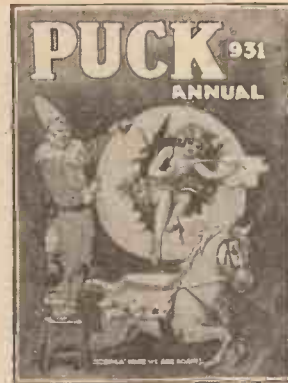
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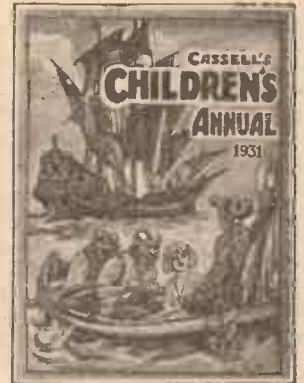
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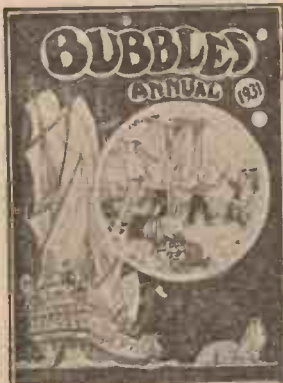
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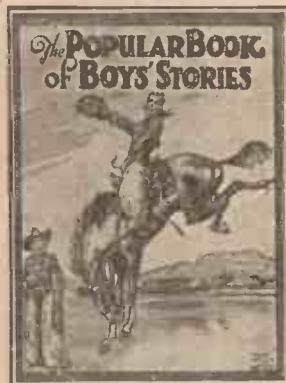
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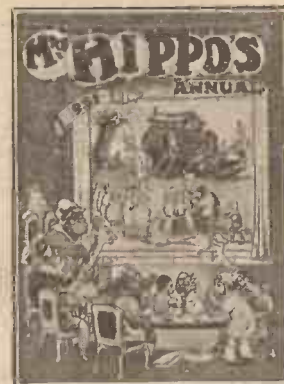
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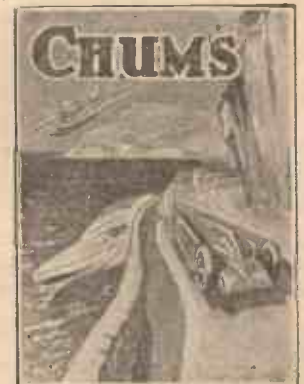
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832 pages of reading. Stories of school, sport, mystery and adventure. Splendid articles. Many pages of photographs and 12 colour plates. **12/6 net.**

The "Pylon" Three—continued

or side B—components, otherwise if it is left until later you will find it a little difficult to mount.

One great attraction in this set is the fact that no soldering is employed, so be careful to choose components on which terminals or screws are provided for connection purposes.

The Small Coils

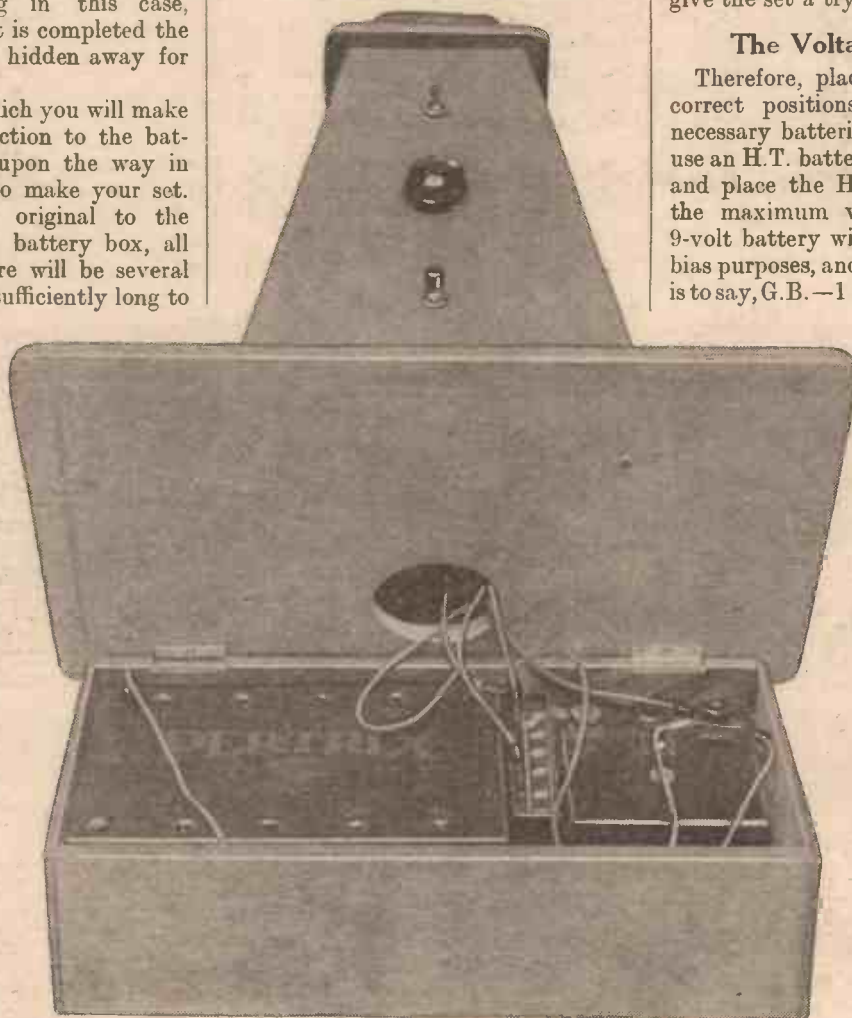
Admittedly the point-to-point method of wiring a set renders it rather more difficult to obtain a neat and tidy appearance. But as long as efficiency is not sacrificed, appearance counts for nothing in this case, because once the set is completed the "innards" will be hidden away for good.

The method in which you will make provision for connection to the batteries will depend upon the way in which you choose to make your set. If you follow the original to the extent of using the battery box, all that you will require will be several lengths of flex just sufficiently long to

make the connection to the batteries. Be careful not to bring the loud-speaker leads out too close to the battery cable as this might give rise to L.F. instability.

Now, before passing on to the operating details, let us first consider the small coils which are tied to the main tuning coils for aerial coupling purposes. The correct numbers of turns to use for these coils will have to be determined by experiment, because the figures will depend upon the district in which you are located.

DOWN BELOW



Here we have an illustration of the battery box which can be made to fit underneath the Pylon. The Pylon is screwed to the lid of the box by means of four screws passed from the underside of the lid into the sides of the Pylon. Details of a convenient box size will be given next month, but although it adds to the appearance of the set, the battery box is not a necessity as the batteries can be stowed away elsewhere, the leads being taken through the back of the set.

You will notice that an unspillable type of 2-v. accumulator is shown in the photograph, and this type was used advisedly. The battery shown is one of the many makes using "jelly" electrolyte and is completely unspillable. Note how the grid-bias battery packs in between the L.T. and H.T. and how the leads from the set are taken through the hole in the lid. By screwing the set to the latter, the lid can be raised without danger of the set being upset, or dragged about by the leads joining it to the batteries.

Pass through the hole in the lid of the battery box and to reach to the batteries inside. (The loud-speaker leads should be brought out separately through a hole in the back of the main set cabinet.)

If you build the set without the battery box, then you will require a multi-way battery cable with which to

You can make a start with five turns for each coil, and the turns should be wound to a diameter of approximately $2\frac{1}{2}$ inches.

The two coils should be wound with one continuous piece of wire; in other words, when you have wound one coil and secured the turns together by means of cotton or thread, leave about

three inches to spare and then carry straight on with the second coil without breaking the wire.

You may find it desirable to be able to alter the positions of these coils in relation to the coils against which they are secured, so the best method of securing them is by means of ordinary elastic bands.

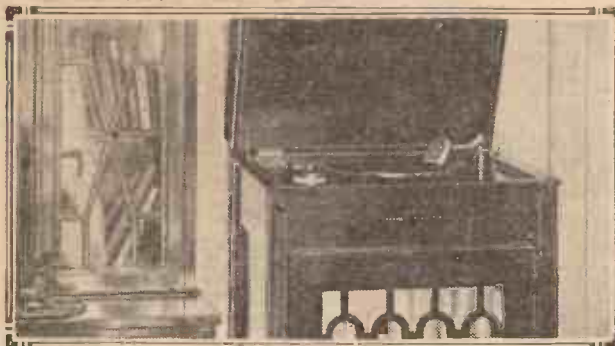
The way in which to connect the loose end of each of these coils is shown in the wiring diagram, but when the coils are in place, before you connect them up to the aerial and earth terminals, it will be advisable to give the set a try-out.

The Voltages Needed

Therefore, place the valves in the correct positions and join up the necessary batteries. For best results use an H.T. battery of 100 or 120 volts and place the H.T. positive plug in the maximum voltage tapping. A 9-volt battery will be ample for grid-bias purposes, and the two plugs—that is to say, G.B.—1 and G.B.—2—should

be plugged respectively into $1\frac{1}{2}$ and $7\frac{1}{2}$ volts, or as recommended by the valvemakers.

The voltage of your accumulator will naturally depend upon the voltage of the valves chosen. The set will work satisfactorily with two-, four- or six-volt valves, and further details will be given next month.



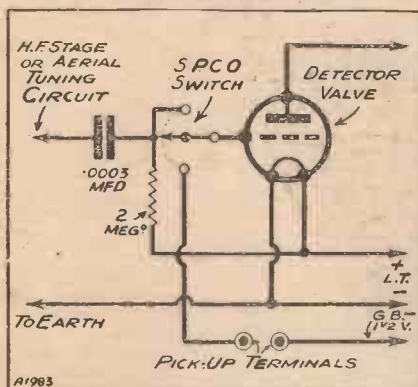
WITH PICK-UP AND SPEAKER

Two Switching Schemes—Jacks to Use—A Noisy Motor—Preventing "Motor-boating"—Resistance-coupling Values—Insufficient H.T.

Conducted by A. JOHNSON-RANDALL.

I HAVE frequently given the wiring in words for fitting a pick-up switch into the detector grid circuit of various WIRELESS CONSTRUCTOR designs. Many constructors prefer this method, but there are others who can work more readily

A SIMPLE SCHEME



This is a convenient method of switching a pick-up into circuit. A single-pole two-way switch is employed, the centre being joined to the grid of the valve.

from a sketch or theoretical diagram.

On this page are two simple schemes which I have found highly satisfactory. One of them makes use of a simple two-way switch of the push-pull type. These switches are very easy to obtain and you will find that most large dealers stock them.

The type I mean has two spring contacts, one long and one short. There are three connections—one of these goes to the spindle, and one each to the springs.

Very Simple Switching

You join the spindle to the grid of the detector valve, one of the springs to the grid condenser and grid leak, and the other to one of the pick-up terminals.

When the switch is pushed in the spindle makes contact with the long spring connection, and when it is pulled out the short spring is joined electrically to the spindle. Thus you have a simple change-over device and you can convert your set into a

radio-gram for about a couple of shillings.

There is also another method, and that is the scheme in which a plug and jack are used. Jacks are not quite so popular these days, but they are convenient and are just as reliable as a switch.

The particular jack I have shown in the diagram is a Lotus No. JK/2, but this is not the only type that can be employed. There is also the ordinary double-circuit-closed jack, which can also be adapted by ignoring one of the inner contacts.

Just Plug In

Thus you have, say, the lower inner contact joined to the grid condenser and leak. The spring tongue, with which it makes connection, to the grid, and the remaining tongue to grid bias negative.

When the plug is inserted in the jack the grid leak and grid condenser are disconnected from the grid of the detector valve, because the spring tongue is separated from the inner contact.

This is what happens in the Lotus jack, but, of course, in this case you have the exact number of contacts.

The plug has two connections and to these the ends of the pick-up leads are joined.

Increasing Popularity

The popularity of the pick-up seems to be steadily increasing. Constructors all over the country are writing in for diagrams and details of modifications enabling them to convert their sets into radio-gram outfits.

There are plenty of good pick-ups on the market at the present time, and the latest one sent to the WIRELESS CONSTRUCTOR for test is the Wates "Star."

It can be obtained with or without the tone-arm, which is a light tubular arm finished in oxidised copper. The arm is hinged to assist needle-changing, and has a circular hole about half-way along through which the flexible lead

from the pick-up can be taken. This lead continues along the arm and passes into the turntable cabinet via the tone-arm base.

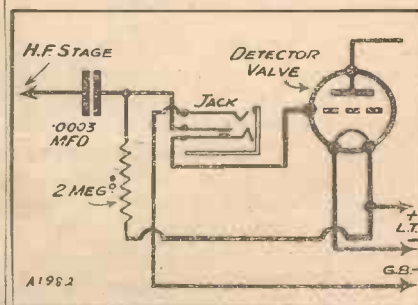
The pick-up itself is of the conventional magnetic type, and I found it to be very sensitive. Used in conjunction with a two-valve amplifier, it gave good volume on a moving-coil speaker.

A Super-Cabinet

A super-receiver deserves a super-cabinet. One of the nicest I have seen is the one made by Pickett Bros., of Bexleyheath, Kent. This firm has had years of experience in this class of work and their latest creation gives ample evidence of skilled craftsmanship.

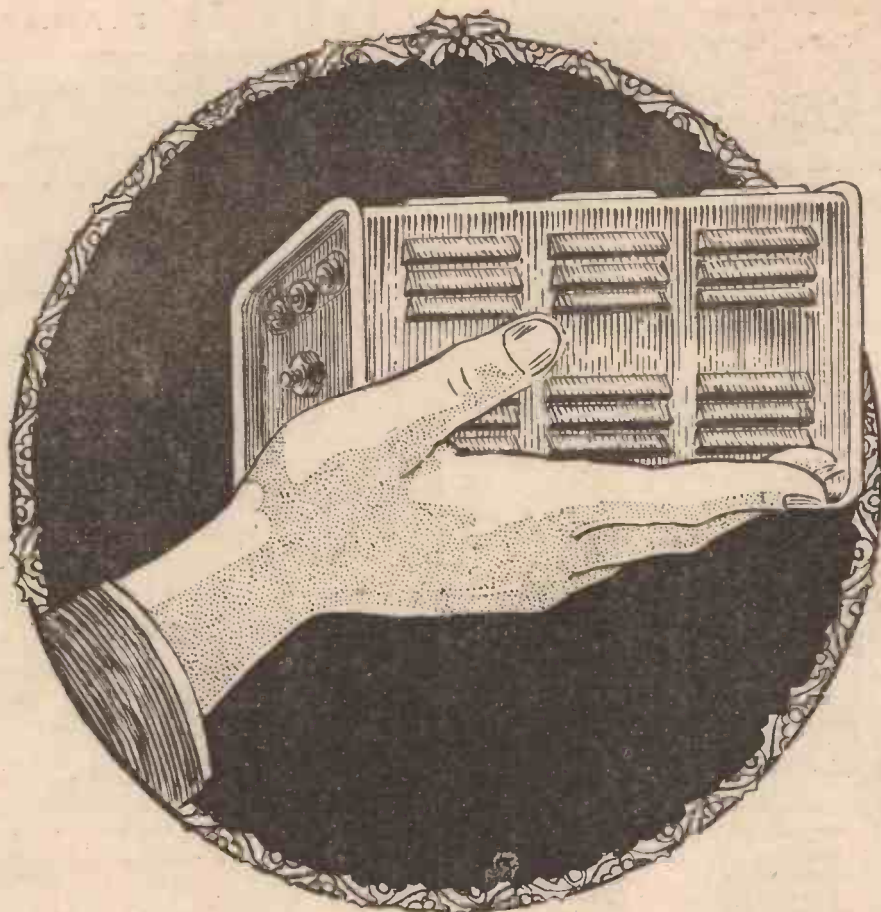
In the top portion beneath the lid is a turntable, together with a B.T.-H. pick-up and tone-arm, and underneath this is a space for the radio-gram receiver itself. The lower half of the cabinet is designed to take either a moving-coil or cone loud speaker, the front forming a baffle. Special

USING A JACK



Those who prefer a jack can use one in place of a switch, and the pick-up is simply plugged in. The jack shown is a Lotus JK/2.

arrangements have been made to prevent "boominess." There is also a space at the side of the turntable for spare gramophone records, and the turntable platform is hinged in order to give access to the set if desired. It is a beautifully finished job.



If he is going to build an A.C. mains receiver . . . or would like to run his set from the mains . . . give him a Westinghouse Metal Rectifier this Christmas

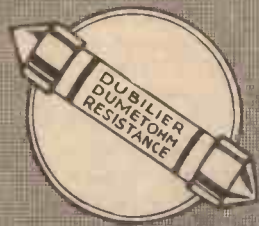
It will give permanent pleasure in better reception; it will save him money by requiring no replacements or renewals; and it will add to his leisure by needing no attention.

Obtainable from all good radio dealers. Prices from 15/-

Our forty-page booklet, "The All-Metal Way, 1931," will give you full information concerning the most suitable type of rectifier for any particular purpose. Send your request for a copy, together with 3d. in stamps, to:

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THESE EXCLUSIVE FEATURES ARE FOUND ONLY IN THE "WATES"

- 1. SCROLL-CUT CONE** This special joint in the chemically treated paper of the cone avoids a direct cut through the sound waves, thereby enabling the cone to respond freely and without distortion, resulting in a purity and fidelity to the original that has earned its reputation as the finest reproducer obtainable.
- 2. THE WATES UNIVERSAL BRACKET** is an ingenious plate cut to a special design enabling the chassis to be fitted to the following units without any adjustment or difficulty.
BLUE SPOT 66R, 66P, TRIOTRON, BROWN
ORMOND, BLUE SPOT VEE, AMPLION B.A.2,
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- 3. THE UNIQUE SUSPENSION** of the large cone is a feature exclusive to this chassis and is a vital contributor to the wonderful results obtained.
Do not be "put off" with spurious imitations—insist on the Wates and enjoy the remarkable reproduction that it achieves.

Obtainable from all Radio dealers. Fully descriptive leaflets on request from

THE STANDARD BATTERY CO.
(Dept. W.C.), 184/188, Shaftesbury Avenue, London, W.C.2.

With Pick-Up and Speaker—continued

Some Interesting Questions

Here are some interesting queries which I have received during the past month.

A Noisy Motor

P. N. C. (Lewisham).—"I have replaced my clockwork turntable motor with an electric one. Unfortunately, the conversion has not been entirely satisfactory. I now find that I get crackling noises which increase in strength as the pick-up nears the centre of the record. What can I do to stop this?"

This sounds like an induction-effect from the motor, and it is quite understandable that the extent of the trouble will vary according to the position of the pick-up on the record.

There is only one thing to do, and that is to place a screen between the motor and the turntable. This screen can be of tinned iron and it should be earthed. Also try earthing the frame of the motor itself.

If the screen does not remedy the trouble, I am afraid that you will have to enclose the motor in a metal box.

Preventing "Motor-boating"

H. K. R. (Welling).—"I have built a gramophone amplifier and would like to work it from an A.C. H.T. unit. The amplifier has three valves and two L.F. transformers. Two of the valves are of the L.F. medium impedance type, and the output valve is a super-power. What precautions shall I have to take against 'motor-boating' and what will be the approximate anode current required by the three valves?"

With regard to the precautions against "motor-boating," you should earth the cores of the transformers, and also take L.T. negative to earth. I also suggest the use of a de-coupling device in the anode circuit of the first valve. This can consist of a 30,000-ohm resistance and a 4-mfd. condenser.

Keep the pick-up and its leads right away from the speaker end of the amplifier. An output filter is useful and assists in obtaining stable operation of the amplifier.

Now about the anode current. Your two L.F. valves will need, roughly, 5 milliamps each if biased properly and assuming the H.T. voltage to be in the neighbourhood of 150.

The super-power valve will require 20 milliamps or more, so your eliminator must be capable of supplying at least 30 milliamps to be on the safe side.

Candidly, I think that it is wise in these cases to spend a little more money and obtain an H.T. unit which will give 50 milliamps or so. There is then no need to worry about the anode current consumption of the valves, and there is much less risk of "motor-boating."

Resistance Coupling Values

"ENTHUSIAST" (Leicester).—"Will you please give me suitable

A SUPER CABINET



An elaborate piece of cabinet-work by Messrs. Pickett Bros. The turntable is below the lid, underneath is a space for the radio-gram equipment and loud speaker. It is a very attractive job.

values for a two-stage resistance amplifier. I have a balanced-armature cone speaker, which is very sensitive and do not need a powerful amplifier to get adequate volume. These resistance stages are to be used with my existing H.F. and detector unit, and I shall switch the pick-up into the grid circuit of the detector valve."

These values will give excellent results with your particular loud speaker: Detector anode resistance, 100,000 ohms; and the second, 50,000 ohms. Coupling condensers, each .01 mfd., mica, and grid resistances

2 and 1 megohms respectively. The overall amplification will not be very great; but, then, both your pick-up and loud speaker are sensitive.

Not Enough Volume

L. M. (Northampton).—"I am using a pick-up which gives wonderfully good reproduction, but I am unable to obtain enough volume. My amplifier consists of a resistance-coupled stage, followed by a transformer, and since it forms part of the set I do not wish to make any alterations. Can I increase the volume without adding another valve?"

I suggest you insert a transformer between the pick-up and the input to the amplifier. Any transformer which you have on hand will do. I won't guarantee successful results, because some pick-ups strongly object to having inductive windings connected in parallel. Still, if your pick-up is not one of the critical kind you may get a useful step-up in volume without any noticeable change in quality. The transformer primary is joined across the pick-up terminals, and the secondary goes to grid and grid bias of the first amplifying valve.

Insufficient H.T.

"PUZZLED" (Weston).—"I am disappointed with the gramo-amplifier which I recently built. It consists of three valves, the first being resistance-coupled and the second transformer. The valves are two of the medium impedance variety (impedance 20,000 ohms) and one of the super-power type (impedance 3,000 ohms). I am applying 150 volts H.T. to the last valve and 60 volts to two others. The grid bias on the last valve is 18 volts, and on the second valve 3 volts. The pick-up is taken direct to L.T. — in the case of the first valve.

"My trouble is that the amplifier will only work when I take out the first grid-bias plug. If I leave this plug hanging free I get fair results, although the music seems to get distorted after a while, but directly I insert the plug in the 3-volt tapping there is silence."

Of course there is. Why supply the first two valves with only 60 volts H.T. when you are trying to get distortionless results? Put up your H.T. to 150 volts on all three valves.

POINTS FOR PURCHASERS

Some interesting items from the radio manufacturers and distributors about their latest lines.

Ediswan Radio

THE AMAZING MAZDA RADIO VALVES" is the title of a 58-page book received from The Edison Swan Electric Co., Ltd. As it deals with more than thirty different types of valve, including the screened-grid and indirectly-heated cathode valves, as well as pentodes, rectifiers and other such special valves, it can be well imagined that there is no difficulty in finding material to fill the book!

As a matter of fact, the curves for each type of valve are given, and much other useful information, including valve circuits, so that all WIRELESS CONSTRUCTOR valve set enthusiasts should make a point of applying for this book, which may be obtained direct from the makers. (Address: 123-5, Queen Victoria Street, London, W.C.4.)

In addition, a very interesting book on the Ediswan sound reproducing installations has been prepared. This deals with very large installations, hospital equipments, and similar big-volume apparatus.

"Benjamin Radio Products"

This is the title of an attractive book in which the various Benjamin lines have been described and presented, a valuable feature of the book being the very clear sketches illustrating the connections to the various Benjamin switches. There should be no difficulty in fitting these to sets, for each switch is described in detail, giving thickness of panel, size of clearance hole, radius from spindle to soldering tag, and projection from panel, etc., in addition to a note of the uses for which the switch is intended.

All the other Benjamin lines are shown, including the turntable which has proved so attractive in the past, and a copy of this book will be sent post free on request to Benjamin Electric, Ltd., Tarriff Road, Tottenham, London, N.17.

A Book for the Beginner*

Readers who would like to know more about the elements and principles of wireless, but who find it difficult to understand the too

technical books on the subject, will welcome the new "Bangay."

Well bound, of convenient size, and with over 250 pages closely packed with diagrams and very clear letterpress, this book begins right at the beginning and assumes that only elementary knowledge of electricity and mathematics is possessed by the reader.

*"The Elementary Principles of Wireless Telegraphy and Telephony," by R. D. Bangay, 3rd Edition, revised by O. F. Brown, published by Iliffe & Sons, Ltd., price 10s. 6d.

TESTED BY FIRE!



After a fire at his premises a radio dealer looked sadly at this Marconiphone portable, absent-mindedly switched it on, and, lo, it worked! Just as well as ever!

The eighth edition of "The Chronicle Wireless Annual," printed and published by Allied Newspapers, Ltd., Manchester, is an excellent sign of the times. A big book of nearly two hundred pages, packed with information for the home constructor and listener, fully illustrated with circuits, lists of societies and general compendium of information for the listener, it will be sure to find a wide welcome. The price of this "Chronicle Wireless Annual" is one shilling.

"Some" H.T. Battery

From Messrs. Tungstone Accumulator Co., Ltd., 3, St. Bride's House, Salisbury Square, London, E.C.4, we have received details of the special high-tension wireless battery in which the plates used are manufactured on the Tungstone principle. The makers claim that special features of the battery are its negligible internal

resistance; the absence of sulphation; three actual ampere-hours capacity, with plates only 2 in. square; each two-volt unit perfectly insulated by pure rubber bands round each container; unit in box on rubber mat, insulated and proof against vibration; no wood separators; negligible voltage drop over long periods; and no parasitical noises in the 'phones or loud speaker.

Celestion Speakers

If you have not been keeping in touch with the development of Celestion loud speakers you will be interested in the new coloured folder describing the whole range which the makers have now prepared. (Address: London Road, Kingston-on-Thames.)

This folder also shows the "Tiltatone" (by the addition of which to any electric gramophone both tone and volume can be controlled), and the Celestion-Woodruffe pick-up. The firm is also issuing a folder describing the new pick-up and dynamic loud speaker which any interested reader of the WIRELESS CONSTRUCTOR can obtain on application to the above address.

Concerning Condensers

If you have not yet received your new season's catalogue from the Dubilier Condenser Co. (1925), Ltd., a postcard to the Ducon Works, Victoria Road, North Acton, London, W.3, will bring you this attractive production containing details of all this firm's condensers and other radio products.

* * *

The British Ebonite Co., Ltd., of Nightingale Lane, Hanwell, W.7, inform us that Mr. Lewin, of Manchester, has now been appointed representative of the "Becol" Company for the sale of their products in the counties of Lancashire and Cheshire.

A Radio Diary

From Iliffe and Sons, Ltd., we have received a copy of "The Wireless Amateurs' and Experimenters' Diary and Note Book for 1931," which is now on sale at 1s. 6d.

It is of convenient pocket size, and contains much information, reference tables, and even circuit diagrams, together with the necessary notes. Of special interest to the experimenter is the summary of the regulations governing amateur transmitting licences, the valve data, and nationality prefixes. Well bound and printed, this new edition of the Diary will certainly find many admirers.

WORKING VOLTAGES OR TEST VOLTAGES?

AN
IMPORTANT
STATEMENT
BY THE
TELEGRAPH
CONDENSER
CO., LTD.

At the present time there is some confusion regarding the most suitable method of indicating Condenser voltages. Some manufacturers, including ourselves, mark their Condensers with their actual *working* voltages. Others adopt the more spectacular method of indicating *test* voltages.

Because test voltages are obviously much higher than actual working voltages, the Condenser buyer may be led to believe that the higher voltage indicates a more efficient and better insulated condenser. This is not necessarily the case.

In the past it has been fairly safe to assume that the continuous working voltage of a Condenser was half of its stated test voltage. Unfortunately, this method of grading Condensers can no longer be universally relied upon since it has been found that Condensers of similar capacity and size have been sold stamped with varying test voltages, but with no indication as to the working voltage. (This formed the subject of a statement issued by us earlier this year in reference to condensers of foreign manufacture).

We, therefore, recommend all users in their own interests to see that the Condensers they purchase are definitely marked with their maximum working voltage. This will always be found on "T.C.C." CONDENSERS.



TELEGRAPH CONDENSER CO. LTD., N. ACTON. W. 3

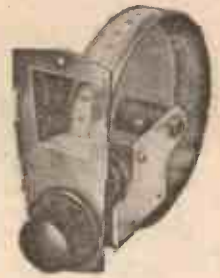
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GET BETTER TUNING WITH POLAR

Perfect control by a precision instrument built to withstand continuous work ensures maximum efficiency.

Polar condensers are designed and made to meet these demands in every respect.

Polar is dependable.

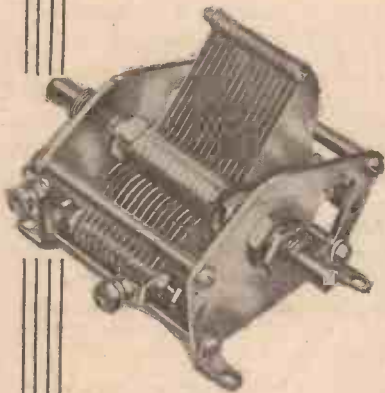


POLAR DRUM DRIVE

An improved slow-motion drum drive with smooth, yet precise, action. Clearly marked scale, 0-180. Suitable for single or ganged condensers mounted parallel to panel.

Price 8s. 6d.

24-PAGE CATALOGUE FREE ON REQUEST.

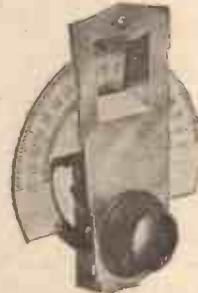


POLAR UNIVERSAL

A condenser specially designed for ganging. Fitted with detachable spindle—various lengths supplied. Baseboard mounting lugs ensure rigidity and accurate alignment. Locked rotor vanes. Screens easily fitted between units. May also be used as a single unit. Suitable for mounting to any type of S.M. drive.

- 0005 .. 7s. 6d.
- 0003 .. 7s. 0d.

Phosphor-bronze balls 3d. extra.



POLAR DISC DRIVE

A knob control slow-motion drive, with scale behind panel. Nice smooth action; easily read scale, 0-180 in recessed aperture. Metal escutcheon. Bronze finish.

Price 5s.



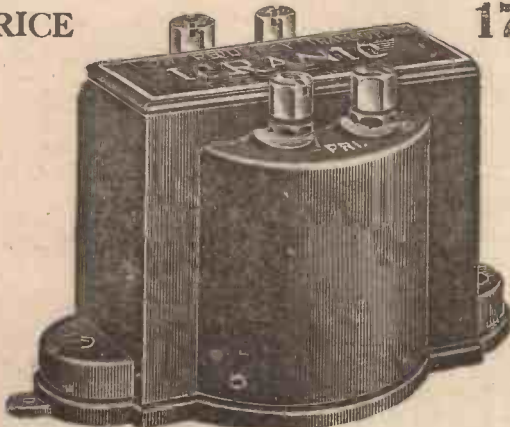
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188-9, STRAND, LONDON, W.C.2. POLAR WORKS, OLD SWAN, LIVERPOOL.

Specified for the "PARATUNE" TWO IGRANIC "J" Type Transformer

PRICE

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Small, neat and handsome, with a straight line performance and a purity and constancy of amplification far above any Transformer in its priced class. Obtainable in two ratios, 3-1 and 6-1.

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"PLUS-X" FOUR

is given away with the

SPECIAL DOUBLE XMAS NUMBER

of

"MODERN WIRELESS"

The "Plus-X" Four is something really startling in set design. It is a star of star-sets, and includes an ingenious arm-chair control.

Make sure of your copy of the December "M.W."

Now on Sale

Price 1/6

IN LIGHTER VEIN
PROF. GOOP'S
XMAS
PARTY
 By "WAYFARER"



"It's a positive scandal!" roared Professor Goop, as he and I came out through the front door of the "Microfarads" on Christmas Eve. "It's an absolute screaming disgrace, and I'm jolly well going to see that steps are taken."

They instantly were, though possibly not quite in the way that the professor had in mind. Myself, I have no objection to the ingestion of bananas by errand boys as they flash from place to place during their busy mornings, with never more than half an hour here and half an hour there to sit down to read of Gory George, the Blood-Stained Pirate of Dead Man's Isle. I have, as I say, not the faintest opposition to offer to their consumption of this rare and refreshing fruit, for as the old proverb has it:

*A banana an hour
 To the elbow gives power.*

The Goop Glide

But I don't think that they should leave the discarded outer garments of their bananas upon people's front-door steps. I mean all that I ask is that if they finish a banana at my door they should post the skin in Tootle's letterbox, whilst if the next

HE TOOK STEPS!



Professor Goop said he was going to "take steps"—and he did, fourteen of them!

one comes to an end at the professor's they should remember that Miss Worple's letter-box is as handy as handy can be.

As it was, owing to forgetfulness on the part of these otherwise efficient young fellers, Professor Goop instantly took steps, no less than fourteen of them—the first seven on the seat of his pants and the last seven on the bows of his waistcoat.

Gliding is, of course, becoming a fashionable hobby, literally by leaps

and bounds. I told the professor this, but he refused to be comforted until I popped into the mouth that he had opened wide for emission of the biggest cuss words yet, a jujube so large and so sticky that speech was cut off as suddenly and as completely as is that of the broadcasting topical talker when you and I, dear reader, though living miles apart, make simultaneous leaps for our filament switches.

The merry inhabitants of Mudbury Wallow enjoy themselves at the "Microfarads," where Prof. Goop's Xmas party develops into a very hectic affair.

When the professor had disposed of the jujube, after several kindly administrations of thumps upon the back by me, I inquired what it was that he had been getting so worked up about before he took his steps. My question set him off all over again, and his words followed one another with such rapidity that it was some little while before I could discover exactly what it was all about.

In the end I gathered that what was biting him was the frivolity of the B.B.C.'s Sunday programmes. "If you'll believe me," he bellowed, "I actually found them broadcasting light music at half-past nine the other Sunday night."

What We Want?

"To my mind, and I think to that of all right-thinking Englishmen, mindful of the traditions of their great country, the B.B.C. is failing lamentably in its duty. What everybody wants on Sunday is one long Symphony Concert, starting at 9 a.m. and continuing non-stop with relays of choirs and organists until 10.30 p.m., at which hour the Corporation very properly assumes that the whole country goes to bed."

With some little difficulty I-headed him off at last from the subject, for I was particularly anxious to learn what surprises he had in store for us at the wireless Christmas party for which he

had issued invitations to all the *élite* of Mudbury Wallow. But try as I would, I could get nothing out of him at all. In fact, as soon as I started questioning him he just shut up like an Aberdonian's purse.

"I won't tell you a word about it," he said, "except that you are going to get some surprises. I have taken steps—"

"What more steps?"

"I mean to say I've made all my preparations. Just you turn up, young fellow, when the time comes, and you'll see what you'll see."

"You said that I was to come to dinner."

"I didn't, still you can if you must. Seven-thirty sharp."

Kindly Assistance!

Owing to the incredibly bad performances of some of my most fancied gee-gees over the sticks I had been compelled to deposit my evening suit with an uncle of mine, so I suggested to the professor that it was not too late to make it a fancy dress show.

He fell in at once with the idea, particularly as I promised to telephone to all his guests for him. I was lucky

A VISIT TO UNCLE



"I am compelled to deposit my evening suit."

in finding Tootle out when I called, for it seemed to me that the twenty-four 'phone calls necessary might just as well go on his bill as on mine. Everyone was overjoyed with the proposal, and promised to come in something original.

Feeling too tired to think out any costume for myself, I resolved to call on various friends to enlist their help. They rose to the occasion manfully, if quite unconsciously.

In Lighter Vein—continued

I began by telephoning in a disguised voice to Captain Buckett, saying that Miss Worple would like to see him at once. Then I wandered round to his house and looked through his wardrobe.

The same procedure enabled me to pay little friendly calls on most of the best people. I returned home with a suitcase of Sir K. N. Pepper's and a hat box of Primpleson's positively crammed with likely-looking stuff.

In the end I decided to go as a tramp, and I think that my costume was a real success. I wrenched one of the tails off Captain Buckett's morning coat, hacked off one sleeve at the elbow, and generally messed the thing about a bit. The seat of Sir K. N. Pepper's loudest pair of plus-fours I removed with the tin-snips, replacing it with a piece of sacking.

Master Touches

A file card applied to the knees and other parts of the garment soon produced the desirable worn appearance. I had but to sit lightly upon Goshburton-Crump's topper to provide myself with the very hat for the job, and a little hard work with file and knife upon Tootle's shooting boots furnished the most appropriate footwear that could be desired. You see how simple such things are when master minds tackle the problem.

TOO PRACTICAL!



Goshburton's demonstration was a little too practical.

I knew that the dinner would be a success, for, punctual to the moment, I arrived with my Christmas present to the professor, a case of champagne which I had ordered on the previous day from Mr. Swipes, the wine merchant; putting it down, I need hardly say, to the professor.

Thanks to my forethought the dinner went with a bang—a dozen bangs, to be precise. It was a pity, of course, that Sir K. N. Pepper, who was also of the party, should have been hit by the cork resulting from one of them, but since he had come in the guise of a B.B.C. announcer

his black eye merely added local colour.

"Just tell them," I said, "that the microphone flew up and bit you when you tried to pronounce Slaithwaite in six different ways at once, according to the B.B.C. book of the words."

A Tactful Reply

The professor was garbed as a milliammeter, with a 0 to 25 scale traced across his shirt front, a pointer which could be moved by pulling a string (when he could find it), and a couple of terminals stuck on to his shoulders like epaulettes. Mrs. Goop, with a little aerial fixed to her headdress, was the Spirit of Wireless. Miss Worple's dress was all covered with question marks.

"What do you think I am?" she cooed.

"A broken-down loud speaker," I suggested; and, if you'll believe me, she wouldn't speak to me for the rest of the evening. I found out afterwards that she really represented a surprise item.

At nine o'clock the others began to turn up, and I gathered from snatches of their conversation overheard that all had suffered on the previous day from the attentions of a mysterious burglar. I felt glad that I had thoroughly disguised Sir K. N. Pepper's plus-fours with dressings of accumulator acid, loud-speaker dope, and the well-rubbed-in contents of the sacs of an old high-tension battery.

"And now," said the professor, peeling off a shoe and banging with its heel upon the table for silence, "I propose to offer you a little entertainment. First of all, you shall hear a loud speaker working through human leads."

He ranged them in two lines holding hands, and directed those at the outer end of each line to touch the terminals of the loud speaker. Those at the other end were told to touch the terminals of the set.

A Startling Experiment

"Mr. Wayfarer will now switch on," he said, "and you'll be surprised."

It struck me that they required a little galvanising, so to speak, into life, so whilst the professor was doing his arranging I was busy coupling a few hundred extra volts on to the output valve. The switching on was a wild success. The loud speaker

worked all right, but everybody's face suddenly screwed up. The professor saw that something was wrong.

"Let go!" he yelled.

"We can't," they bleated.

He thrust himself between Miss Worple and Captain Buckett, forcing them apart. Next moment he was firmly attached to each hand. When I thought they had had enough I switched off.

It was some little time before the professor could get any volunteers for his next jolly demonstration, so to fill up time I did one or two little stunts, such as emptying an accumulator on to the carpet and showing

A SURPRISE ITEM!



"What do you think I am?" she cooed.

how the effects of the acid can be neutralised by the application of washing soda.

This turn would have gone much better if only Mrs. Goop had not been so long in finding the soda. Then I showed them the folly of wiring H.T. — to L.T. + in the receiving set.

Roars of Laughter!

"You have merely," I explained, "to bring these two wires here together and, as you will observe, all five valves go up in blue flames, Everybody, including the professor, thoroughly enjoyed this item, and no one laughed more heartily than Primpleson, until he learnt that the five valves which had given the firework display were those that he sent round on the previous afternoon for test.

The professor now took over again, announcing that he was about to let us see what his latest and most wonderful invention could do.

"This," he said, "pointing to a large box, above which was a kind of screen affair, is my latest television receiver. In two minutes there will be a relay of a boxing match from America, and you will be able to follow every movement."

The lights having been switched off, the screen showed up illuminated

(Continued on page 199.)

MAKING A NEON TESTER



An easy-to-make device with which you can test all kinds of radio components and circuits. It works on D.C. mains only.

By H. R. JONES.

THE little tester I am going to tell you how to make not only tests circuits for continuity, but can also be used to test condensers of the higher capacities for their actual capacity, and will also give an indication on lower values that all is well.

As well as this it can be used to check up high resistances of the order of 100,000 ohms and upwards.

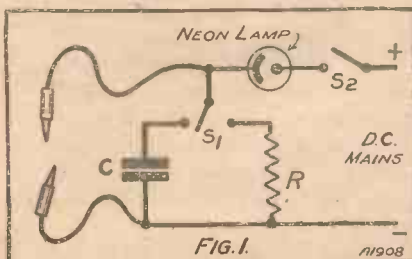
First of all, I had better tell you that you need to have a D.C. mains supply of not less than 200 volts, or else some form of supply that enables you to get 200 volts D.C. Since the basis of this test set is the neon lamp, you will see why this voltage is needed, and, since it only takes a few milliamps, an A.C. H.T. eliminator or even an H.T. battery can be used if D.C. mains are not available.

The Main Components

The theoretical circuit (if you can call it such) of the unit is shown in Fig. 1. A neon lamp is connected to two test leads as shown, and by means of a switch, a high resistance R or a large condenser C can be put in parallel with the test leads.

The construction of the unit is a simple matter. A batten lamp holder is fixed to a small wooden base of some kind. A 9 in. by 6 in. teak block, as used by electricians, is useful.

A SIMPLE CIRCUIT

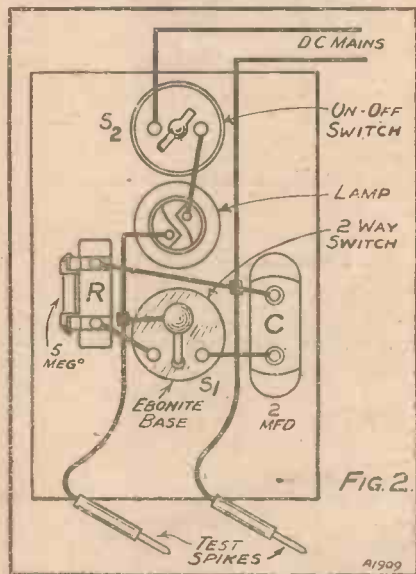


As you can see, it is a very straightforward hook-up.

The switches and other components are mounted as shown. Be sure to mount the switch S_1 on ebonite, and cut away the wood beneath, for the lower insulation of the wood might upset the correct working of the test set.

For the resistance a high-value leak should be used, say, 5 megohms;

QUICK CONNECTIONS



The two spikes enable very quick test connections to be made.

for the higher the value of the leak the lower the value of the condenser that you can check.

The fixed condenser should be 2 mfd. for average work, and both these components should preferably be new, unless you know someone who can be relied on to make an accurate test of them.

A Timing Test

The principle on which this tester operates when used to test high resistances and large condensers is interesting and simple. It is based

upon the simple expression $t = RC$, where, if R and C are given in ohms and farads, the time "t" is given in seconds—i.e. a resistance and condenser connected as in Fig. 3 have a definite time period "t."

When a neon lamp is connected in series with a resistance and a condenser connected in parallel, as shown in Fig. 3, the condenser will charge up and discharge through the lamp according to the above expression, and by timing the flashes of the lamp when one of the values R or C is known the other can be determined.

Suppose, for instance, you know that $R = 5$ meg., and that you get two flashes per second, then the value of C is 1 mfd.

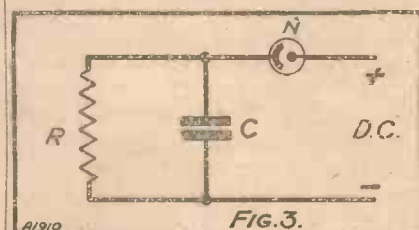
How It is Used

In the same way, if you know the value of the condenser to be 2 mfd., and you get one flash every four seconds when it is connected in parallel with a high resistance, you work out that the value of the resistance is 2 megohms.

The only real bit of work in making this unit is making the test spikes. If you have a look through your junk box you will probably find something you can use to simplify this work.

I had a look through mine and found a couple of handles from some old single-plate condensers that used to be used for neutralising or balancing-up gang condensers. These handles were made of ebonite tube and fitted with a 2 B.A. brass nut at one end, and if you have a couple of these you will find them handy.

TELL-TALE FLASHES



When the condenser and resistance are connected up like this, the lamp flashes a definite number of times per second.

Making a Neon Tester—continued

Then get a couple of short lengths of $\frac{3}{16}$ -in. brass rod—about 3 in. will do—and thread about $\frac{1}{2}$ in. at one end with a 2 B.A. thread. If you have not got the necessary die, any electrician should do the threading for you for a few pence. File the other end down to a point—it need not be very sharp. (See Fig. 4.)

“A Couple of Corks”

Then a couple of corks which will just fit the ebonite tube are needed.

Now solder a length of flex to the threaded end of the brass rod. Do this carefully, so that the solder does not bulge over and interfere with the nut. Pull the flex through the nut in the end of the ebonite tube and screw the rod tightly into the nut. If desired, a lock-nut may be put on the end of the rod beforehand.

Now make a hole in the cork and thread the flex through it, making a knot in the flex so that any pull will be taken by the cork and not by the soldered joint. Drive the cork well home in the tube and black it over.

To use the tester, proceed as follows. Insert the neon lamp, plug into a lamp holder, and switch on. Place the two test spikes into salt water and note which gives off the most bubbles. This is the negative

main lead. If your main has the negative lead earthed* connect the unit so that the neon lamp is in the positive lead, and vice versa.

The neon lamp should be inserted in the holder in the position in which it glows the brighter.

To test any circuit for continuity, have the small switch in the centre position where neither resistance nor capacity are in circuit.

To test a condenser for capacity, put the switch so that the resistance is in parallel with the condenser to be tested. Time the flashes with a watch over a fairly long period, say a minute if they are far apart, and find the time period.

The condenser should also be tested for insulation by connecting the neon lamp across it without the resistance being in circuit, and if the condenser is big you will get one flash as it is connected, and no more.

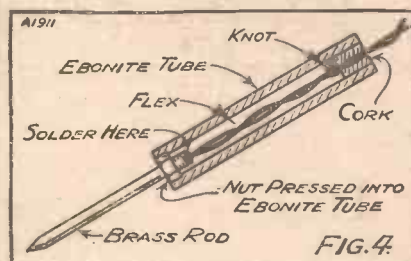
When the Glow Shifts

Very small condensers which are O.K. for insulation will show a small

*You can easily find out which lead is earthed as follows. Connect two wires to a lamp holder and insert a lamp in it. Now join one wire to earth (the radio earth will do nicely) and touch the other wire on one of the main connections. If the bulb lights, the other main connection is earthed, while if the bulb does not light up, the wire you are using is earthed.

glow when the resistance is connected in circuit, and this is an indication that the time period circuit is operating only provided that the character of the glow is different from that given by the resistance alone.

THE TEST SPIKES



This shows how the test spikes are made.

With the resistance alone you will get a very small glow, say at the top or to one side of the element in the bulb. When connected in parallel with the small condenser the glow may shift round the element and get a little brighter, and that tells you that the condenser is O.K. The lowest limit (using a 10-meg. resistance) you are likely to get any indication with is about .002 mfd.

For testing resistances you turn the switch to the right, which connects the condenser into circuit.

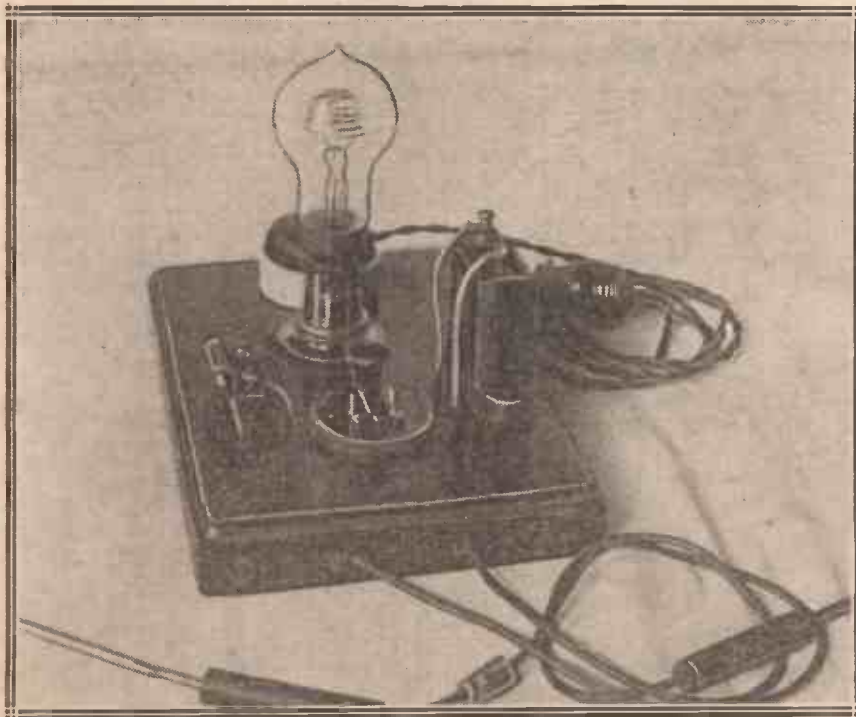
Remember when working out your answer to $t = RC$ that C is in microfarads and must therefore be divided by 1,000,000, or 10^6 , as it is more conveniently written. Also, since R is usually in megohms, which is ohms multiplied by 10^6 , the two 10^6 's cancel out, and you can work out the answer direct from the figures. In this case 100,000 ohms will be written as .1 megohm and 250,000 ohms as .25 megohm.

Many Other Uses

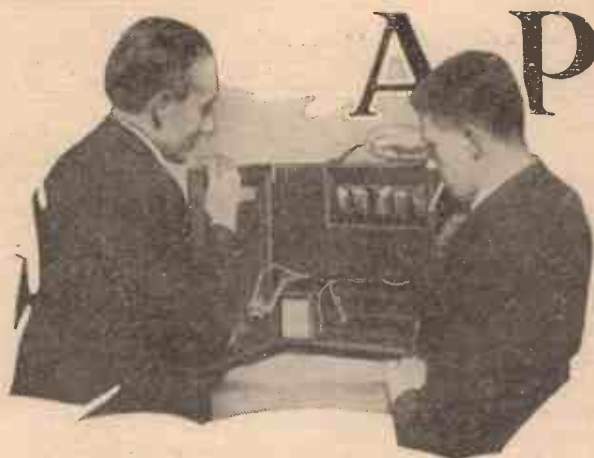
You will also find that it has numerous other uses. As well as testing circuits for continuity, condensers and resistances for value, it is a useful tester for insulation. Put the condenser into circuit and if the insulation is not up to par you will get flashes at long intervals, probably only one or two a minute.

To reduce the time period (which would otherwise be big) when checking up high resistances reduce the size of the condenser. To increase the time period when measuring small capacities increase the value of resistance.

INVALUABLE FOR EXPERIMENTING AMATEURS



The complete tester all ready for the very useful work of checking condensers, etc.



A PRACTICAL MAN'S CORNER

Some valuable hints for the home-constructor.

By R. W. HALLOWS.

LAST month I showed how a simple frame aerial might be constructed at home, but space prevented me from doing more than merely allude to methods of pivoting the frame upon a stand. This time I want to show you how very simple and inexpensive a really good kind of pivot mounting is to make.

After trying a good many, the mounting that I like best myself is that which is made with the help of a plug and jack.

Now everyone knows what a bother it is if the leads from a frame aerial

A STURDY JACK

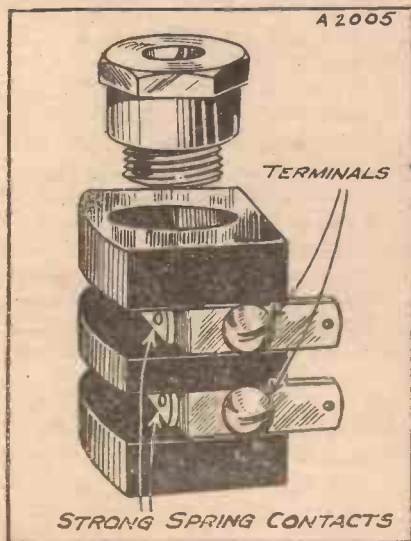


Fig. 1. Many good features in design are evident in this Igranic jack.

are attached directly to terminals mounted upon a little panel on the upright member. As you rotate the frame the leads twist round it, and generally get in the way. Another point of no small importance is that in order to allow the frame to turn on its pivot you have to make the leads rather long, and this is always undesirable for many reasons.

Not the least of these is that long

leads, especially if made of twin flex, introduce an appreciable amount of capacity into the circuit. Hence since this capacity is fixed it limits amongst other things the range which the frame will cover.

A Better Scheme

Plug and jack mounting gets over all these disadvantages. If there are only two leads to the aerial, then the sleeve of the plug takes charge of one and its tip of the other. There are then no wires to move or to wind up as the frame is turned.

In the case of a centre-tapped aerial, one lead must be connected to a terminal on the upright, but one wire that moves with the frame is a long way better than three. The ordinary wireless plugs have only two contacts, the sleeve and the point, but those used for land-line telephone work have sometimes four or more.

I have not yet discovered whether these are obtainable, but I expect they are, and I will make inquiries on the point. If so, it would be easy to adapt plug and jack mounting, not only to the centre-tapped frame, but also to one arranged with two sets of windings to cover both the medium and long wave-bands.

Meantime the ordinary two-contact plug answers very well, and readers who mount their frames in the way that I am going to describe will not find much cause for dissatisfaction.

Suitable Components

But don't imagine that any jack will do. In the past I gave up plug and jack mounting as a bad job because the ordinary jacks obtainable did not allow a sufficiently firm contact to be made.

They were not intended, of course, for any such job, and their long and rather weak springs made for rather chancy contact as the frame was

turned, for a certain amount of wobble was found to take place. Lately I have come across a little jack which is ideal for the purpose.

This is the Igranic Midget, which is illustrated in Fig. 1. It is a very small affair, the body measuring only an inch from top to bottom and $\frac{3}{8}$ in. from side to side, or from front to rear.

Its great advantage is that the two contacts with the point and the sleeve of the plug are made by short, stiff horizontal springs which hold the plug quite firmly. Even if there is a little wobble on the frame contact remains always good.

As regards plugs, almost any type can be adapted for frame mounting, but personally I find the Igranic pattern most convenient. The reason is that the body of this plug is flat, and that it is just $\frac{1}{2}$ in. in width.

FITTING THE FRAME

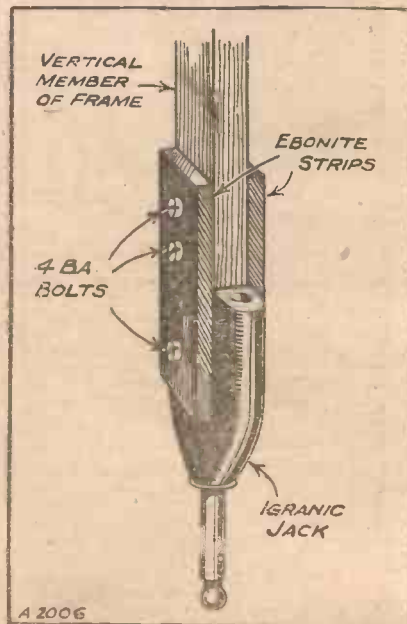


Fig. 2. Showing how the frame aer support is fixed to the plug.

A Practical Man's Corner—continued

It can therefore, as I will describe in a moment, be fitted in a manner with the greatest of ease to the vertical member of the frame made from stripwood of $\frac{1}{2}$ -in. section.

Fixing the Plug

Fig. 2 shows the way in which the plug is attached to the upright. The ebonite body of the plug is in two parts, held together by a bolt passing through them.

This bolt is removed. Instead, another threaded 4 B.A. and $1\frac{1}{4}$ in. in length clamps together both the two halves of the plug body and the two ebonite strips which secure it to the upright of the frame.

Making the Fixing

The ebonite strips in question are $\frac{1}{2}$ in. or $\frac{5}{8}$ in. in width, 3 or 4 in. in length, according to the frame, and $\frac{3}{16}$ in. in thickness.

Having cut them out, clamp them together and drill a 4 B.A. clearance hole through them about $\frac{1}{2}$ in. from one end. This is for the bolt passing through them and the plug.

Two other 4 B.A. clearance holes are made in suitable positions for the bolts which will clamp the ebonite pieces to the upright of the frame. Next fix the ebonite pieces to the

NEAT AND "NATTY"

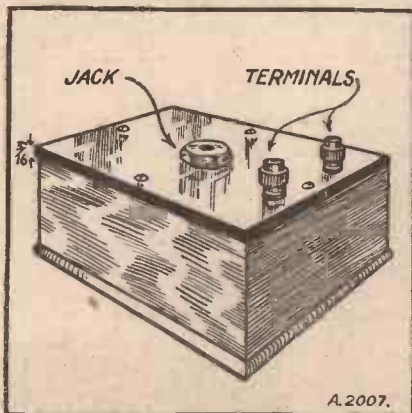


Fig. 3. A particularly convenient type of frame aerial base.

plug by means of the bolt, and press the upright of the frame down between them so that the bottom of it rests on the top of the plug.

Drill through the wood to make holes for the bolts securing the ebonite pieces to the upright. Two more $1\frac{1}{4}$ -in. bolts will be needed.

Pass them through so that their

heads are on the same side as that which goes through the plug. Now lay the frame on the table with the heads of the bolts downwards. Remove the nuts and lift off the ebonite piece beneath them.

Remove also the side of the plug body that is uppermost. This done, you will have no difficulty in taking the wires from the ends of the frame windings down the channels provided in the plug body and connecting them to the contacts.

Replace the second half of the plug body, put on the ebonite strip, tighten the nuts firmly down and the plug is securely mounted.

The Stand

Fig. 3 illustrates the method of making the stand for the frame. A small box 5 or 6 in. square is needed, with an inside depth of not less than about $1\frac{1}{4}$ in. This must have a $\frac{3}{16}$ -in. ebonite top.

In the middle of the top mount an Igranic Midget jack and place two terminals near one edge. Beneath the panel connect each of the jack terminals to one of those on the panel. Fix down the ebonite top with screws, and the job is done.

Another Advantage

Another advantage of this kind of mounting is that it becomes easy to use one frame for the "broadcast" band and a second for the long waves. It is merely a matter of seconds to plug-out one frame and plug-in the other when you want to go over from the medium to the long waves.

By using separate frames you get the highest efficiency, since at no time are there any idle turns. Also, you may find it desirable to use a comparatively small frame for the medium band and a larger one for the long waves.

Why? Well, because for the medium waves a comparatively small amount of wire is needed, and a frame of modest size will contain it easily. My own broadcast band frame has 16-in. sides and contains eleven turns.

This just nicely covers the band. For the long waves, though, you need a good deal more wire, and unless you make the sides rather large the number of turns may be embarrassing when constructional work is in progress. The long-wave frame may conveniently have 24-in. sides and contain 44 turns of wire.

Insulating a Screwdriver

Some time ago I suggested a method of insulating the blades of screwdrivers by means of rubber tubing. This method was satisfactory up to a point, but it had its drawbacks. To begin with, it is no light task to work rubber tubing over the blade and shank of a long screwdriver—and readers will remember my predilection for tools of this kind.

STOPPING SHORTS

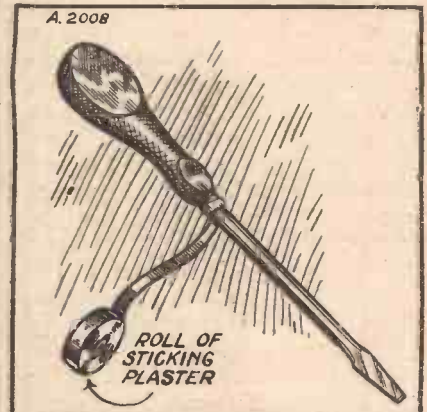


Fig. 4. An insulated screwdriver may save the life of many a good valve.

If you don't already use a long screwdriver with a round handle get one without delay, and you will be surprised how much easier it makes your wireless jobs. Secondly, the rubber tubing might cover the shank of the screwdriver well and truly, but there was no means of getting it over the metal ferrule at the top.

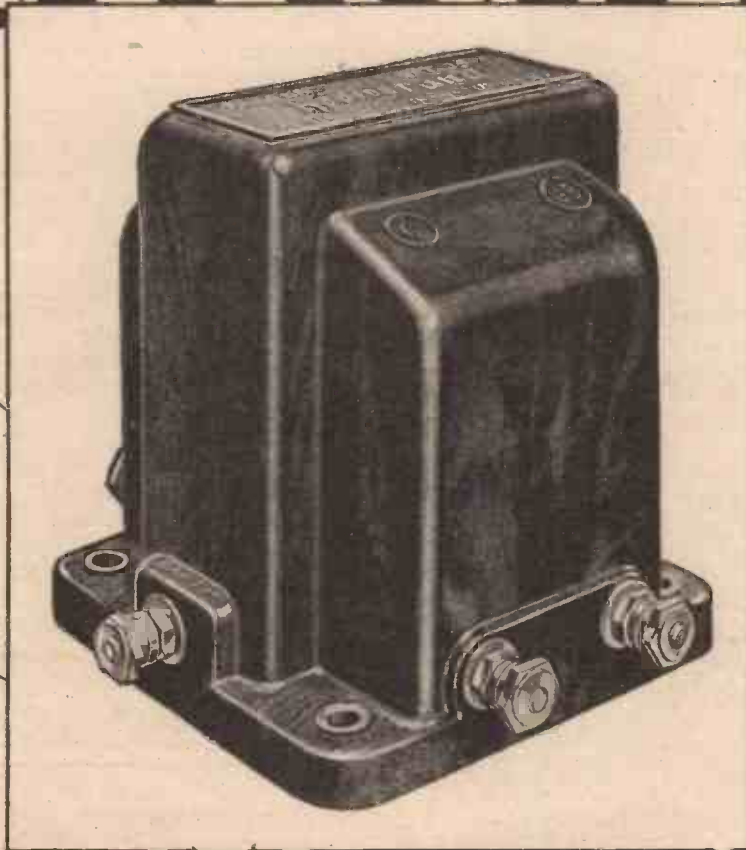
If you are working on the innards of a set where the H.T. voltage is considerable, it is as well to insulate as much as possible of the screwdriver, for unless this is done even the most careful can have one of those little accidents which occupy no more than a split-second of time and yet do so much expensive damage.

The Best Method

The best method of rendering any screwdriver innocuous is, I think, that illustrated in Fig. 4. Not the least of its advantages is that it is delightfully easy to carry out and that its cost is small.

All that is required is a reel of $\frac{1}{2}$ -in. sticking plaster such as can be obtained from any chemist. Start at the top by covering the ferrule with plaster, and then continue to wind it on all down the shank to within half an inch of the edge of the blade.

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TELSEN TRANSFORMERS

HUNTING DOWN HUM



With all-mains sets it is often very difficult to trace the source of humming when it occurs. Users of this type of set, whether A.C. or D.C., will therefore find these experiences of an expert who has concentrated on such circuits of great interest.

By C. P. ALLINSON, A.M.I.R.E., A.M.I.E.E.

I AM going to deal with certain difficulties which I have experienced in mains-operated receivers (especially A.C.), and tell you of some of the cures I have found for certain difficulties.

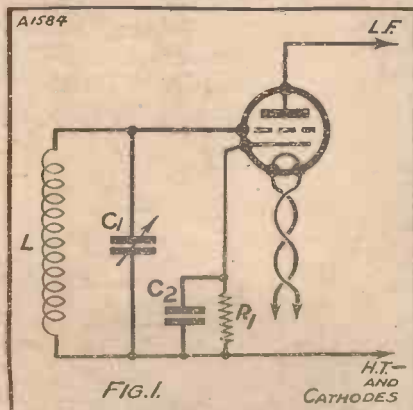
Many designers will say : " Oh, yes, it's much easier to work a set from A.C. mains than it is from D.C.," but that is perfectly true only up to a point.

Types of Valves

The first question I expect you would like going to ask with regard building to a set for use with A.C. mains is : " What valves am I going to use ? "

First of all, in my opinion, which is

AUTOMATIC BIAS



Although quite a common method of obtaining grid bias, this is one which the author does not advise on the detector, with a common winding for all heaters.

based on tests not only of the old but of the new types of 8 valves, the only valves which are of any serious use or any real value are the indirectly-heated filament valves for H.F., detector, and first L.F., and for the second L.F. either indirectly-heated valves or " battery " valves which have a fairly heavy filament, taking $\frac{1}{4}$ or $\frac{1}{2}$ an ampere, or even more.

Now, you will probably find that if you start trying to use a couple of stages of L.F. amplification with A.C. mains you get a lot of hum. Mind you, this will depend to a very large extent how close to the set your

" So I cut out the H.T. eliminator entirely, and fed the set from dry batteries, but the hum continued."

Read what the cause of the trouble was.

eliminator is, what kind of supply you have got, on the design of your power transformer and eliminator, and your smoothing circuits, and so on, but sometimes one comes across hum conditions which are very difficult to cure.

A little while ago, for instance, I had a set which was giving a very bad hum, and I thought that it might be due to the H.T. So I cut out the H.T. eliminator entirely, and fed the set from a dry battery, but the hum continued. Granted that it wasn't so strong, but it was still there, though I doubt if the difference was more than about 10 or 15 per cent.

A Combined Effect

So then I put the H.T. eliminator back and thought : " I'll try feeding the valve-heaters off an accumulator instead of off A.C.," so I switched over the filaments and tried that, and the hum was still there ; but, as in the previous case, it was again reduced by about 15 per cent of its previous value.

So I came to the conclusion that the hum was being produced by a combination of H.T. and heater, and unfortunately it proved to be a hum that could not be cured by ordinary methods, and the final solution to my problem resulted in the use of a freak circuit.

One thing which was rather curious I did find while I was experimenting

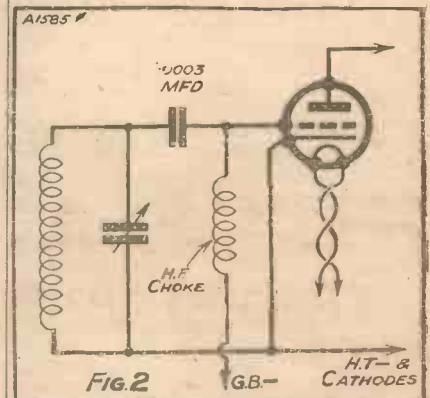
with this set, and that was that the hum was very definitely influenced by the sense in which the heater for the detector filament was connected. If it were connected one way round then the hum was very much worse than if it were reversed.

Separate Filament Windings

In some cases hum in an A.C.-operated set can be considerably reduced by using separate windings for the filaments of valves in different parts of the receiver. Whilst one winding will supply the H.F. filament, a separate winding will supply the detector, and yet another separate winding will supply the L.F. filament. In cases where ordinary battery-heated valves are used for the output stage, then another winding again will be provided.

A scheme of which I am very much in favour is to use a couple of 6-volt

FOR ANODE-BEND



By using a fixed condenser and H.F. choke it is possible to keep the moving vanes of the tuning condenser at earth potential when anode-bend detection is employed.

super-power or similar valves in the output stage (whether parallel or push-pull according to requirements), and the H.T. voltage available from



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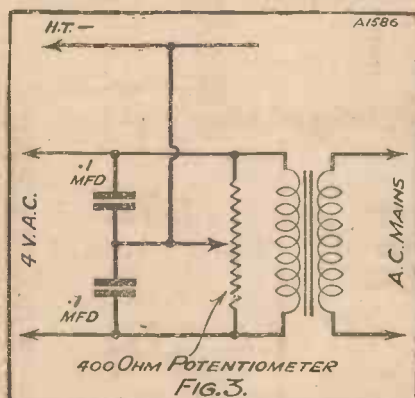
C.H.S.

Hunting Down Hum—continued

the eliminator, and run the filaments off a separate 6-volt winding.

By doing this it is also a simple matter to get automatic grid bias for the last two valves by themselves, and, indeed, if automatic bias is to be given to valves then they should all have separate filament windings, since otherwise trouble from interaction will almost certainly result.

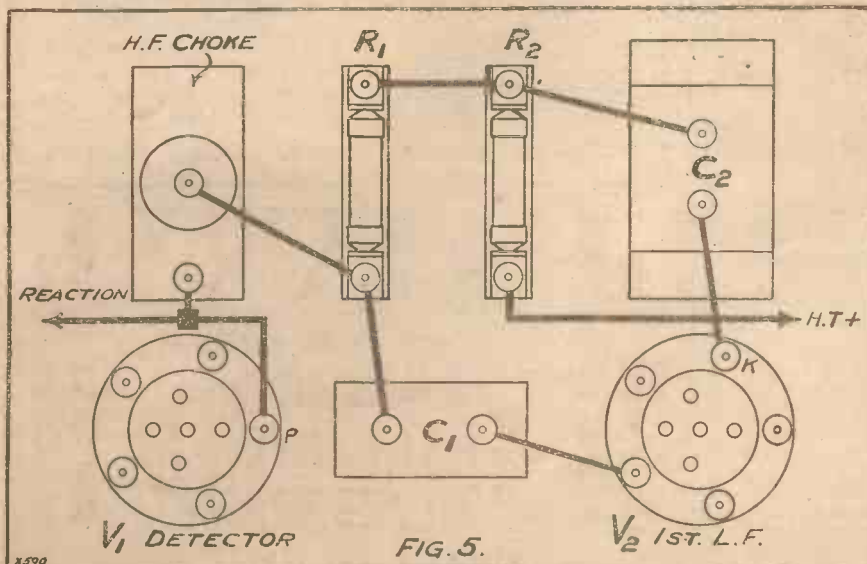
CENTRE-TAP EFFECT



The best method of obtaining an artificial centre-tap (when a tap is not provided on the transformer) is a combination of potentiometer and fixed condensers.

I have seen a number of diagrams showing how automatic bias is given to valves being worked off common filament windings, and I often wonder if the originators of these diagrams have ever tried the arrangements they advise.

HUM CAUSED BY INTERACTION OF RESISTANCES



This diagram represents the layout of some of the components of a set in which a mysterious hum was present. By moving the de-coupling resistance R_2 , together with the by-pass condenser C_2 , away from R_1 , the hum was cured.

I would like to state here as a warning and as advice to fellow-experimenters that in the dozens of A.C. sets which I have had through my hands not one would work with automatic bias on the detector on the lines of the circuit shown in Fig. 1, and that in every case the inclusion of automatic bias on these lines in order to give anode-bend rectification resulted in a terrible howl developing.

In many cases the hum that originates in an A.C.-operated receiver starts on the grid of the detector valve. It is very often found convenient to use a grid condenser and choke for anode-bend rectification, since this enables all coils and condensers to be earthed. (See Fig. 2.)

Use of H.F. Choke

With a grid leak it is very easy for L.F. potentials to be generated across the resistance, since it offers a high impedance to L.F. currents as well as H.F. By substituting an H.F. choke, therefore, for this leak it prevents practically a short-circuit path for all low-frequency potentials while still offering a high impedance to high-frequency currents.

It therefore not only enables us to prevent hum from originating on the grid of the detector valve, but it also ensures that true anode-bend rectification will be obtained, since, owing to its low D.C. resistance, no grid condenser charge will be built up,

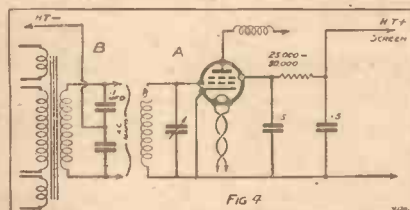
tending to give us something which is a cross between cumulative grid rectification and anode-bend rectification.

Now there is another point that I should like to touch on, and that is the question of centre-tap windings for your filaments. I have noticed that there are one or two commercial transformers available on the market which do not centre-tap the four-volt winding for the indirectly-heated valves.

An Artificial Tap

It is quite possible that my experience does not tally with that of everybody else, but I have found during my work with A.C.-operated sets that a centre-tap or its equivalent, to which your H.T. negative return is connected, must be provided if it is intended to use more than one stage of low-frequency amplification.

TWO HUM STOPPERS



Sometimes hum is only heard when receiving the local station. In such cases the above schemes should be tried.

If your winding has not got a centre-tap, then I find that the best way of providing one is to put a couple of 1-mfd. condensers in series across the winding, their common point being taken to cathode and H.T. negative.

This is O.K. providing that no H.T. has to flow through the heater winding, but in the case where battery-heated valves are being used in an output stage (i.e. a P.625 or a pentode) then an ordinary potentiometer must be employed, the slider being moved to the point at which the least hum is heard.

For Silent Working

Personally, I have found that a potentiometer is not always sufficiently satisfactory and may give rise to quite a lot of noise, and I therefore prefer to use a combination of the condenser and potentiometer (see Fig. 3) and so make sure of silent operation.

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Hunting Down Hum—continued

Having covered some of the more important points with regard to the sources of hum in an A.C.-operated set, we now come to something which to the beginner using this type of receiver is exceedingly difficult to

OBTAINING GRID BIAS

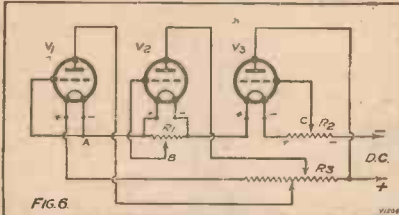


FIG. 6
This figure illustrates three different methods, which may be employed in a D.C. set, of obtaining grid bias.

trace, and that is the case where a carrier brings hum in with it.

Imposed Hum

The set is perfectly silent under normal operating conditions, and when tuned in to a fairly weak signal from a station a fair distance away the quality is quite nice, but as soon as the local station or other powerful transmission is tuned in then a very bad gurgle, ripple or hum (call it what you like) seems to be imposed on top of the signal, which makes it absolutely impossible to listen to it with any measure of enjoyment.

This kind of trouble is sometimes extremely difficult to deal with. Luckily, I have found that in probably about nine cases out of ten it originates in one of two positions.

S.G. De-coupling

It either comes from the screening grid of the screen-grid valve (if such is being used), because the screening grid is modulating the signal with a small ripple, or it is due to some obscure effect in the eliminator which can be cured by connecting a 1-mfd. condenser between H.T. negative and one side of the A.C. mains.

Since one cannot always tell beforehand to which side of the mains it should be connected, the simplest thing is to connect two of these condensers in series across the mains and take the centre point to H.T. negative. We can then plug the set in either way round, and it will be correctly connected.

If the hum comes from the screened-grid valve it can easily be cured by de-coupling it by means of a fixed

resistance having a value of about 30,000 ohms. This method is shown in Fig. 4 at A, while the connection of condensers across the mains is shown in the same Fig. at B.

Another thing I have found that may give rise to hum in a set, both D.C. and A.C. operated, is the proximity of any of the de-coupling resistances to a grid or grid lead.

In one case the trouble originated in the plate circuit of the detector valve, which, incidentally, I have found to be nearly as sensitive to picking up interference as the grid. The layout of the de-coupling resistance and condenser relative to the L.F. coupling resistance was as shown in Fig. 5.

Moving Components

This particular set was giving trouble with hum which I had not been successful in tracing, and finally, quite by chance, I found that by

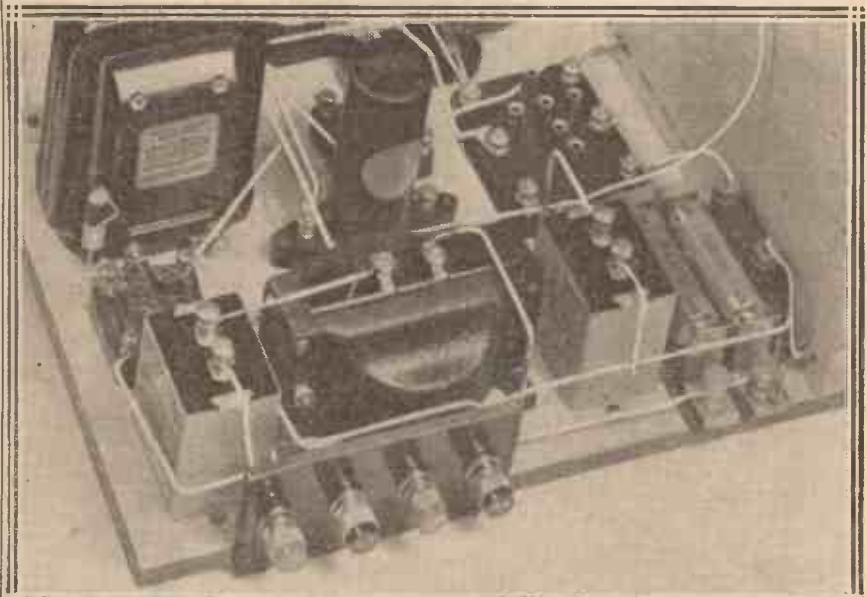
In all cases by-pass condensers must be taken direct to the negative filament of the valve concerned, while the choice of a suitable filament choke has an important bearing on the subject.

One useful method of taking G.B. and H.T. taps is shown in Fig. 6, and by shifting valves around freedom from hum may very often be obtained. This only applies if the filaments are run in series, as they usually are when driven from D.C. mains.

With a four-valve set, with the filaments in series, the first might be the detector filament, then the H.F., then the last L.F., and then the first L.F.

The three methods of getting G.B. shown in Fig. 6 are as follows: (A) The grid of V_1 is at zero potential, since the grid return is connected to the negative filament of the valve. A positive bias equal to the voltage drop across the valve fila-

POSITIONS OF DE-COUPLING RESISTANCES



With all-mains receivers, layout must be studied carefully. For instance, de-coupling resistances should be kept well away from the grid leads, and the by-pass condensers should be joined to the filaments of the valves concerned.

moving the coupling resistance R_1 away from the de-coupling resistance R_2 , together with the by-pass condenser C_2 , no further trouble from hum was experienced.

The most prolific source of hum in a D.C. mains-operated receiver, if it is entirely mains-operated, is the filaments of the valves, and this is a problem that has to be solved more or less on its merits.

ment could be obtained by connecting it to the positive leg of the filament.

At B is shown a method of getting a variable positive potential by connecting a potentiometer of a sufficiently high resistance across the filament and connecting the grid return to the slider.

The method at C is by means of a series potentiometer.

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Still Mounting!

THE B.B.C. estimates that about 121,000 new licences were issued in England during August, while the total number of current wireless licences on September 30th was 3,205,633; 19,351 licences were issued from London—the largest number of any area. Yorkshire had 16,666, and Lancashire 14,444, Warwick 4,710, Surrey 4,611, and Hampshire 4,140.

Glamorgan was the highest in Wales with 2,232.

A Famous Invention

A good deal of space was devoted in the daily press to the Eighth Anniversary of Broadcasting, and among the many interesting features was an interview with Sir Oliver Lodge in the "Daily Telegraph."

"I am told," said Sir Oliver, in the interview, "that the ether is getting overcrowded, not with British stations, but with foreign stations. The possibility of selecting and isolating any one station depends upon a process of tuning."

"I introduced tuning in 1897, and the principle then introduced has been applied with great skill by all the workers, but there is some overlapping, and there will be more as the stations increase."

Problem of Selectivity

"Many people are trying to make selection more definite," continued Sir Oliver, "and the problem—not an easy one—has already been attacked with some success and the promise of more. It will be an important day when that is achieved, but even then I do not see how clearness and articulation and the transmission of music

can be improved beyond what the B.B.C. has now achieved."

Britain's Unique Position

Captain Eckersley was also interviewed—and, by the way, remember, only interviewed; for Captain Eckersley writes exclusively for the "Big Three" in radio—this journal and its contemporaries, "Modern Wireless" and "Popular Wireless." In the interview, Captain Eckersley said that the autocracy of the B.B.C. was entirely a matter of technical facilities.

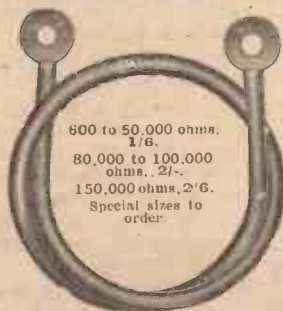
"The Regional Scheme put Britain in the unique position of being able to transmit two programmes at a time from a single station, but the ultimate ideal must be an infinite variety of choice. Remove the disability of lack of technical facilities," continued Captain Eckersley, "and the need for so much superior control will also be removed."

More Alternatives?

"When we get over these difficulties of limiting the number of stations—and I think a solution will be found within the next ten years—we shall begin a new era," continued Captain Eckersley. "Every listener should be

(Continued on page 194.)

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2 Dubilier .25 mfd. Condensers ...	4	0	0	0
2 Magnum .002 Condensers ...	4	0	0	0
1 Magnum .0005 Condenser ...	2	1	6	0
1 Magnum .01 Condenser ...	2	0	0	0
1 Lewcos Gang Switch Action ...	2	0	0	0
1 Magnum Output Choke ...	15	0	0	0
1 Ferranti A.F.3 Transformer ...	1	5	0	0
1 Magnum Spaghetti Resistance, 100,000 ohms ...	1	2	0	0
1 Lissen 2-meg. Leak and Holder ...	1	1	0	0
1 Lissen 1-meg. Leak and Holder ...	1	1	0	0
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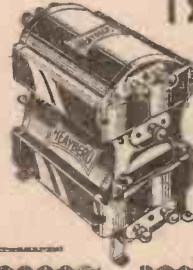
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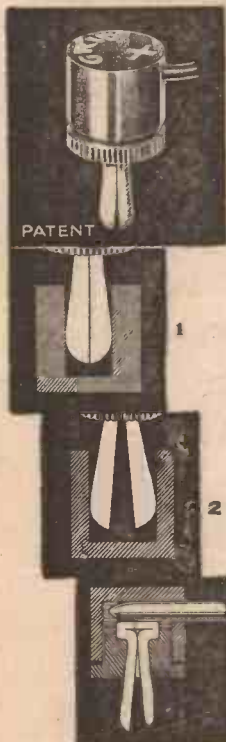
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OUR NEWS BULLETIN

—continued from page 192

able to select at will whether he shall hear a Parliamentary debate, a lecture, a concert, or opera, the proceedings at some important function, or a sermon.

Radio "Laid On"

"Possibly," he went on, "we shall see in the future wireless laid on to people's houses instead of being received through individual sets requiring technical maintenance and skill. In the next decade, households will have buttons to press and a wider choice of programmes."

Sir Ambrose Fleming

The "Daily Express" also published an interesting article by Sir Ambrose Fleming, to celebrate the Eighth Anniversary of Broadcasting. Sir Ambrose believes in the Stenode Radiostat system invented by Dr. James Robinson.

He is of opinion that the invention, if adopted on a large scale, would mean that many more transmitting stations could be set to work without clashing, and that the invention would also

have a very great bearing on television transmission.

The Stenode

Sir Ambrose points out in his article that at present the broadcasting carrier wave-lengths in use have to be set apart by at least nine thousand cycles, but with the Stenode Radiostat receivers they could be set only ninety cycles apart.

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VICTOR KING

Only the Beginning

Sir Ambrose concludes on a serious note: "We are only at the beginning of a world-wide development in wireless telegraphy and telephony if the way is not blocked by mistaken Government policy or too much State control."

Broadcast Propaganda

While we have been celebrating the Eighth Anniversary of Broadcasting, the Russian wireless stations have been celebrating the Thirteenth Anniversary of the Bolshevik Revolution, and no doubt many of our readers have heard the broadcast propaganda in various languages.

The joke is that when the Moscow station began to broadcast in Polish a lot of undesirable propaganda, the Warsaw transmitter did its best to jam the Moscow station; but unfortunately Moscow won. It increased its power and eventually succeeded in drowning the attempted interference from the Polish station.

Radio in America

Figures are always interesting, and they are certainly staggering in connection with radio. To be brief, there were 13,478,600 wireless sets in use in the United States of America on July 1st, 1930. This works out at about one set to every ten persons.

New York had the largest number with 1,752,000, while California came second with 1,470,000 sets.

Important Patent Decision

Another piece of news from America is that the United States Circuit

(Continued on page 196.)

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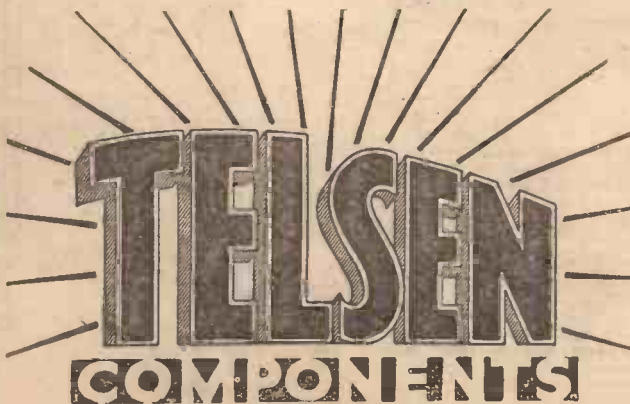
Their unique features enable constructors to get the maximum results, and efficiency, in every section of their circuit.



TELSEN VALVE HOLDERS, Pro. Pat. No. 20286/30. An entirely new design in Valve Holders, embodying patent metal spring contacts, which are designed to provide the most efficient contact with the valve legs, whether split or NON-SPLIT. Low-capacity, self-heating, supplied with patent soldering lugs, and hexagon terminal nuts. Fitted with nickel-silver shock-absorbing spring contacts. Price 1/- each.



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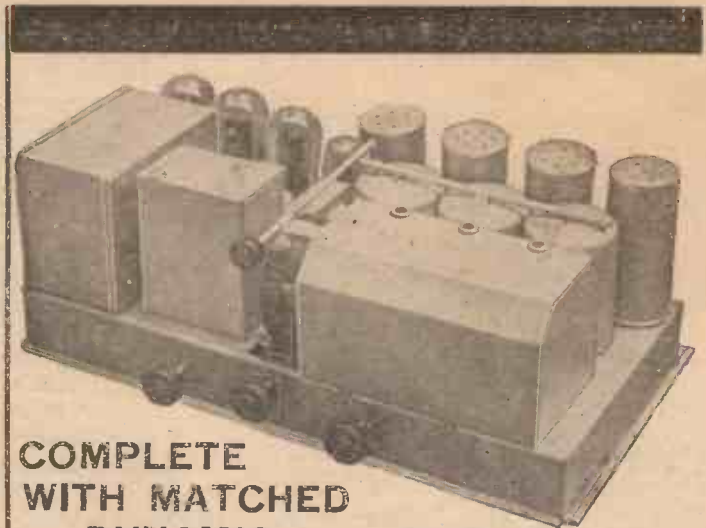
Advt. of Telsen Electric Co., Ltd., Birmingham.

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The new Peerless Screen Grid 8 is undoubtedly the finest value in A.C. operated radio sets. The design and performance of the Peerless is unchallenged and embodies improvements which are years in advance of all other types of radio receivers. Consider the following outstanding merits of the Peerless 8 and consider the marvellous value which you receive.

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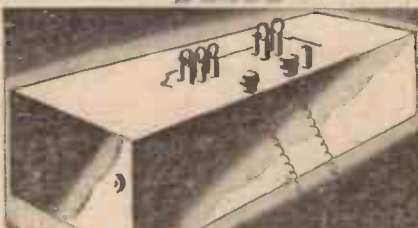
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Insert Name and Address below.

OUR NEWS BULLETIN

—continued from page 194

Court at Philadelphia recently gave an important decision when it reversed a ruling made a year ago that the patents regarding wireless valves owned by the General Electric Company were invalid.

This decision gives the General Electric Company an absolute monopoly in this type of valve for the last twelve years, to the exclusion of the plaintiffs, the De Forrest Radio Company. The matter will, of course, go before the Determining Court, but if the decision is upheld the General Electric Company will be able to recover enormous sums in royalties from manufacturers who have been making the valves for the last five years.

Station Movements

News reaches us that the French Cabinet have sanctioned the removal of two private broadcasting stations, Radio Paris and Radio Petit-Parisien, from their Paris sites to new positions in the Seine-et-Oise Department, in order that mutual interference shall be reduced.

Listeners who notice any difference in the broadcast transmissions from these stations will know the reason why.

Radio Pirates

One hears little about pirates these days, so it was interesting to note in the "Glasgow Herald" recently that it is estimated there are about a quarter of a million pirates still going strong in this country.

It seems that quite a number of portable-set owners think they are immune from the wireless licence fee. It doesn't seem to be widely known, even now, that the penalty for keeping an unlicensed wireless set is usually about £5.

Scotland's Broadcasting House

The new B.B.C. Scottish headquarters is situated in a building in Queen Street, Edinburgh. Once upon a time it was a dancing club. It was opened recently by Mr. William Adamson, M.P., Secretary of State for Scotland. The Duke of Atholl presided. Mrs. Whitson, wife of the Lord Provost, presented a key of the building to Mr. Adamson.

Mrs. Philip Snowden (who is a director of the B.B.C.), Sir John Reith, Countess Haig, and a number of other well-known people were present.

Our Largest Orchestra

The studio is described as being the largest in the country, and is particularly well suited to broadcasting. There is a large stage from which plays can be broadcast in an atmosphere which is just right for the artistes performing. There are three galleries for members of the public.

Those Sunday Programmes

Paris doesn't like our Sunday evenings. Listeners there prefer the Toulouse programmes, which are, of course, specially provided for this country.

One of the Paris newspapers, commenting on this, said: "Everyone who has been in England must have noticed how bored the poor English are on Sundays."

B.B.C., please note!

New German Stations

The Muhlacker 75-kw. broadcasting station is the first of a series of high-powered transmitters to be built in Germany. The other two will be one at Heilsberg and the other at Langenberg. Listeners have already heard Muhlacker, and it has certainly had enough publicity, for it has been almost a nuisance!



Super Tonatrols
by **Electrad**

- No. 1. 25,000-ohm Potentiometer - each 8/6
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- No. 3. 50,000 ohm Rheostat - 8/6
- No. 4. 10,000-ohm Rheostat - 8/6
- No. 5. 100,000-ohm Potentiometer - 8/6
- No. 6. 25,000-ohm Volume Control - 8/6
- No. 7. 50,000-ohm Fourth Terminal Fader Volume Control - 17/6

These new Electrad Super Tonatrol variable non-inductive high resistances will safely dissipate 5 watts at any position of the contact with one-tenth or more of the resistance element in circuit. The all-metal construction with the graphite resistance element fused to an enamel base obviates the necessity for using either a low-current paper element or fine wire. The action is amazingly smooth, long lived, and both mechanically and electrically perfect.

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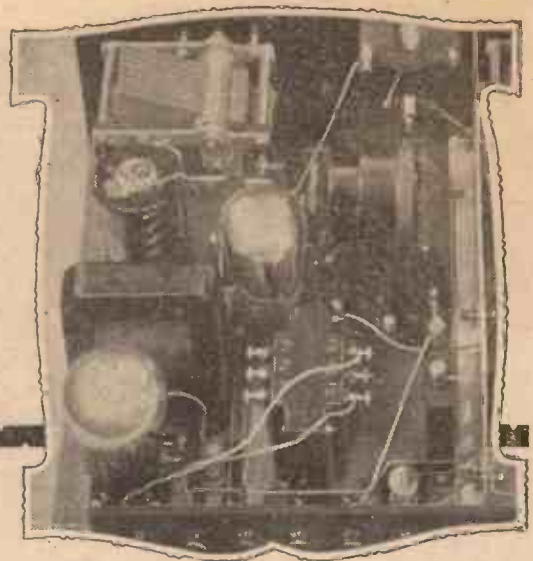
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CHOOSING OUTPUT VALVES

By L.E.T. Branch B.Sc



Overloading in the output stage of a set is a very common cause of poor reproduction. In this article our contributor explains how this can best be avoided, and yet maximum output be maintained.

MOVING-COIL loud speakers, especially those of home assembly, are becoming exceedingly popular, and it is therefore opportune for us to discuss the question of obtaining from this type of speaker the absolute maximum of quality.

LIMITED GRID SWING

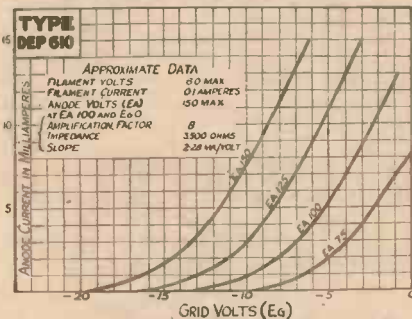


Fig. 1. A typical power valve of 3,500 ohms impedance.

Now, one of the chief and most general causes of poor quality is the overloading of the output valve. In fact, a very slight amount of overloading is both more noticeable and much more irritating than a slight loss of high notes or a slight loss of low notes.

The Best Way

The surest way of minimising the possibility of overloading is to use an output valve which is capable of delivering the maximum power possible before overloading commences. In this way you can be sure of having the greatest available latitude and so the risk of overloading on loud passages is slight. You may say that you are not one of those whose one object is to obtain enormous power.

This, however, does not really alter the position materially, for when a loud speaker is operated at quite mild strength with a "small" valve there is still the risk of obtaining an irritating overloading on occasional extra loud parts which mars what would otherwise be exceedingly good and pleasing reproduction.

Now, we have said that this minimising of the possibility of overloading is accomplished by choosing as the output valve one which can give the maximum power output without overloading. This, of course, immediately leads us to the question of how to make this choice.

Output Impedance

To do this we have to take into full consideration the type of moving coil in use and the type of output coupling—this latter being either a simple choke condenser or a transformer.

The first thing we have to know is the effective impedance of the moving coil. This will not be a difficult matter if it has been made to suit a definite output valve.

For those who have difficulty in finding the impedance of their coils I recommend them to measure its resistance and take the impedance as being four times the resistance. Where an output transformer of ratio other than 1:1 is used, the impedance of the coil must be multiplied by the square of the output ratio in order to find the effective impedance. For example, if a coil of impedance 5 ohms is used with an output transformer of ratio 25:1, the effective impedance required is $5 \times 25^2 = 3,125$ ohms.

The reader will at this stage remark—and very naturally, too—that he

designed his coil to give the best results for a certain valve, and he is not clear how he can satisfactorily use the coil for any other valve. This is certainly justified.

Many Valves Available

We must not forget, however, that there are many different makes of valves from which one may choose in order to match any given coil impedance.

For example, if one had to choose a valve of 3,500 ohms impedance or thereabouts, we could take any one of the following:

Mazda P. 220, Mazda P.P. 3/425, Marconi-Osram P.610, Marconi-Osram

A "LARGER" VALVE

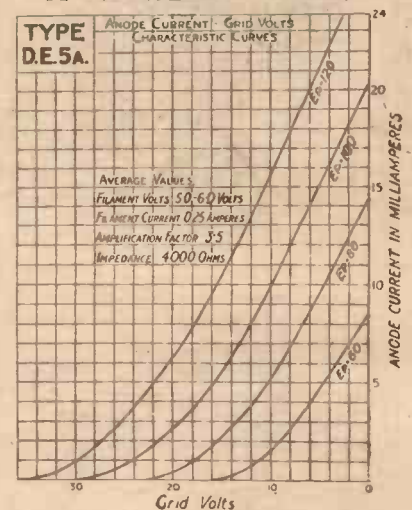


Fig. 2. In this case the valve will take 18 volts negative bias.

D.E.5A, Marconi-Osram M.L.4, Cosson 610P., 410P., Cosson 220P., Mullard P.M.6. The characteristics of these valves are clearly set out in the table.

Choosing Output Valves—continued

We will use this series of valves as an example by which to illustrate the method we should adopt in order to find which will give the result we are looking for.

Now, as I explained in the *CONSTRUCTOR* for April, 1929, any of these valves could be satisfactorily used with a moving coil having an impedance of approximately 4,000 ohms.

The First Test

First let us consider the Marconi-Osram P.610, the makers' characteristic curves of which are shown in Fig. 1. At 150 volts H.T., being the maximum permissible for this valve, it should be operated with a grid bias of 9 volts negative, so that the maximum grid swing allowable in this case will be 9 volts each way if distortion is to be absent. This is to say, the voltage on the grid may swing from 9 to 0 or 9 to 18 volts, and no farther, if overloading is to be avoided.

In other words, the voltage on the grid may be allowed to alter by a maximum amount of 9 volts either way. When this occurs there will be a corresponding alteration on the plate of the valve of 9×8 volts = 72 volts (8 being the amplification factor of the valve).

Now, this 72 volts on the plate is the electro-motive force which drives a current through the valve and through the moving coil. The resistance of the choke condenser or

through the coil and the valve. We can thus find easily the value of this current. The total impedance of the valve and coil can be taken as the sum of their separate impedances. This is sufficiently accurate for our present purpose, and is 3,500 ohms + 4,000 ohms = 7,500 ohms. The A.C. which will flow through the circuit, including the valve, is simply obtained by multiplying 72 by 1,000 and dividing by 7,500—that is,

$$\frac{72 \times 1,000}{7,500} \text{ milliamperes} \\ = 9.5 \text{ milliamperes approx.}$$

Let us compare this current with that which we shall obtain from another valve, because it should be quite clear that it is the current and not the voltage which drives the coil. Hence, the greater the current the greater will be power which can be obtained, and so the risk of overloading will be less.

"Not So Good"

For example, the grid bias for a Marconi-Osram D.E.5A (Fig. 2) is -18 (at 120 volts H.T.). Hence the grid can swing a maximum of 18 volts either way. Since the amplification factor of the valve is 3.5, the voltage produced on the plate will be $18 \times 3.5 = 63$ volts.

Now, the impedance of the D.E.5A valve is 4,000 ohms, so that the total effective impedance of coil and valve is $4,000 + 4,000 = 8,000$ ohms. Since the plate voltage, 63 volts, has to

This is less than the $9\frac{1}{2}$ milliamperes obtained in the case of the P.610. Therefore, the P.610 is the better proposition.

Again, let us consider the Marconi-Osram M.L.4 (Fig. 3) at 200 volts. This should be biased to 22 volts negative. This, then, is the maximum permissible grid voltage swing each way, and corresponding to this the plate voltage developed will be

ONE OF THE I.H.C. VALVES

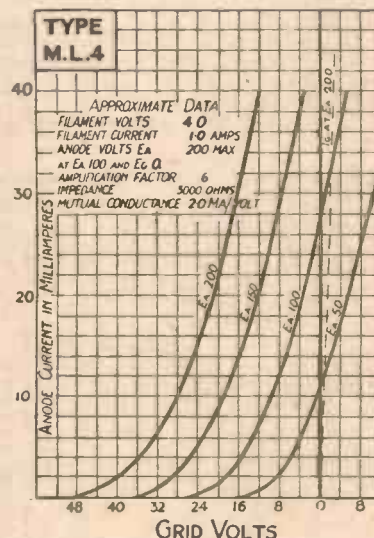


Fig. 3. The Marconi and Osram indirectly-heated cathode power valve.

$22 \times 6 = 132$ volts (6 is the amplification factor of this valve).

Now, since the impedance of this valve is 3,000 ohms, the total impedance of valve and coil is $3,000 + 4,000 = 7,000$ ohms. Calculating the current as before, we obtain a value in this case of

$$\frac{132 \times 1,000}{7,000} = 19 \text{ milliamperes.}$$

This is considerably more than that obtained either for the P.610 or the D.E.5A. Thus the M.L.4 is by far the best valve we have tested.

Quite an Easy Method

From these examples the reader should have no difficulty in calculating for himself his own particular case, and if he finds that there are other valves suitable for his coil and yet will give a greater maximum current, he will know that by using the better valve he can eliminate those irritating little jarring noises which occasionally occur in the loud speaker due to overloading on the extra-loud passages.

USEFUL OUTPUT VALVES TO CHOOSE FROM

Valve	Impedance	Amplification factor	Bias at the maximum H.T.	Maximum H.T. permissible
Mazda P.220	3,700	12.5	6	150
„ P.P.3/425	2,900	2.85	6.5	425
Marconi P.610	3,500	8.0	9	150
„ D.E.5A	4,000	3.5	18	120
„ M.L.4	3,000	6.0	22½	200
Cossor 610P.	3,500	8.0	7.5	150
„ 410P.	4,000	8.0	9	150
„ 220P.	4,000	8.0	9	150
Mullard P.M.6	3,550	8.0	9	150

output transformer can be neglected without any serious inaccuracy occurring.

We now have arrived at the fact that there can be a maximum of 72 volts for driving the current

drive the current through a total resistance of 8,000 ohms, the current will be calculated as before, and is

$$\frac{63 \times 1,000}{8,000} = 8 \text{ milliamperes.}$$

IN LIGHTER VEIN

—continued from page 180

with a kind of ghostly greenish light. The professor moved towards his box and began to twiddle the knobs. In a few seconds blurry dark patches appeared on the screen, and when fine adjustments had been made these resolved themselves into a boxing ring and a crowd of spectators without it.

The "Fun" Commences

From the loud speaker a voice announced in the Bowery accents with which the talkies have familiarised us that Killer Jake was about to meet Outlaw Jim.

Next minute the combatants were hard at it. The audience rapidly became worked up.

"Sock him!" cried Tootle.

"Idiot!" yelled Captain Bucket.

"Feint and go for the mark."

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"By Jove, that was a good 'un!" said Sir K. N. Pepper.

"It wasn't!" screamed Goshburton-Crump. "It was absolutely rotten. He ought to have uppercut."

"How could you uppercut, you fool?"

"Why, like this."

A "Good" Layout

Goshburton-Crump's demonstration was, I think, a little too practical, and anyhow I hate to see the president of a wireless club laid out. I promptly delivered a left hook to the jaw, but Tootle, shouting, "Hit someone your own size," made a swing at me which missed and got the professor on the ear.

Within sixty seconds the professor's drawing-room was a positive shambles, and it required the ambulances of both Mudbury Wallow and Sloshton-Parva to take all the guests to their respective homes.

"I don't think," I said to the professor next time I saw him, "that I really want one of your television receivers in my home until you can provide me also with a teledoctor.



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Make **The DAILY SKETCH** YOUR Picture Paper

FROM FILAMENT TO PLATE

—continued from page 162

magnification factor of 10, and will deal successfully with a grid swing of 30 volts when 200 volts are applied on the anode.

We mentioned previously that "blue glow" was noticed in one of the valves we have been testing.

This should not be accompanied by fizzing noises or be too strong, but a small amount of "blue glow" is often noticed in some A.C. valves, due to the high intensity of the space current. It is not deleterious, and often decreases or disappears.

Useful Literature

With the Mazda valves quite a lot of useful information is given; details of cathode and heater connections, bias and H.T. voltages, and a typical circuit is shown. This is a little peculiar in the position of the earth lead, but otherwise quite orthodox.

Another valuable section of the large leaflet is devoted to "Hum," its causes and cures. This is particularly useful, and deals with some of the more frequent causes of that annoying phenomenon. Valve manufacturers are gradually waking up to the fact that it is to their advantage to tell the consumer all they can about the product.

The Marconi Co. have published a useful book in which their valves are grouped according to their purposes.

This method of making their products better known to the public is to be encouraged, and we hope that further details will be provided, and that with the further information a still closer standardisation of characteristic will be developed.

We say this because it is still a fact that if one blows a valve—especially one of the S.G. variety—one cannot be dead certain of getting another to take its place in every respect. The second valve may be more efficient, or it may give less magnification.

Valve Variations

True, the variations are not over very wide limits, but they are troublesome, especially where bought sets are concerned. This appears to be due to what would seem to be the practice of certain valve firms to give of their absolute best to set manufacturers, the more ordinary products going into the open market.

The result is that if a man with a bought set burns out a valve he may not find it easy to get another quite as

efficient—unless he can get it from the firm that made the set.

We may be wrong in this last statement (we can but judge from the reports of readers and set builders both in and out of the trade), but, if not, we hope that the valve manufacturers will look into the matter, for it is surely a very unsatisfactory state of affairs, and must eventually lead to a distrust that should never have arisen.

Valves should be of one standard, a standard having narrow limits so that "second class" valves are impossibilities. If a set is "hotted up" before it is sold, it should be possible, by the mere purchase of the same kind of valve, to keep the set in its "hotted up" condition. New valves should not mean the possibility of a drop in efficiency.

THE "PARATUNE" TWO

—continued from page 158

about it, and so we will not follow the too-often-seen formula of "first drill the panel in accordance, etc."

Instead we will make special comments on the few points that call for a little more explanation than is provided by the usual comprehensive diagrams and photographs.

First of all, take a look at the theoretical circuit diagram, and you will note that from the "X" coil onwards it follows more or less conventional lines. The three components preceding the coil form the "Paratune" system, and they are used in a different manner on long waves from that employed on medium waves.

For the Long Waves

The .0003 max. compression type fixed condenser is employed on medium waves only, and, like the potentiometer, does not have to be touched once it is adjusted for a given set of circumstances. It controls the degree of selectivity, the smaller its capacity the greater the sharpness of the resonance of the set.

When working on long waves the lead attached to a tap on the "Paratune" coil is connected up to the "X" coil instead of the lead from the .0003 condenser.

The slider of the "Paratune" coil is moved, on medium waves, in conjunction with the tuning condenser, so that the two are kept in step so far as wave-length is concerned. On long waves it is adjusted so that any medium-wave interference is wiped

(Continued on page 201.)

THE "PARATUNE" TWO

—continued from page 209

out. If there is no such interference it may be left almost anywhere.

The "Paratune" coil may be purchased ready-made or constructed at home, according to choice. If you intend to make your own you will find all the necessary information in last month's issue of the WIRELESS CONSTRUCTOR. (The information was also given in the last October issue.)

All the other components required are quite ordinary ones, and they are set down in the special list.

Those Coil Holders

When mounting the coil holders and connecting them up, follow the wiring diagram very carefully. It is imperative that the pin of the "X" coil holder should be joined to the wire which goes to H.T. —, L.T. —, earth, etc.

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NEXT MONTH

By VICTOR KING.

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If this coil holder is wired up the opposite way round the taps on the "X" coil will be at the grid end, with the result that selectivity will all "go to pot." If the reaction coil is the wrong way round you will not get any reaction effects and consequently no distant stations.

Don't forget the flex lead for long waves, which runs from one of the taps on the "X" coil to one of the tapping points on the "Paratune" coil. The end which goes to the latter has to be provided with a spring clip to enable it to be tried on different tapping points.

The grid-bias battery will stand on the left-hand end of the baseboard (looking at the set from the back). You will see that there is ample room for it, providing the L.F. transformer is in its right position.

On the Medium Waves

When you have completed the set, connect up the necessary accessories to it. You will find full details about valves, voltages, coils, etc., in the operating panel, together with the vital points about operation.

However, we will go more fully into the details about how the set is used. First, we will assume it to be used on medium waves.

Start off by putting the slider of the potentiometer round to the positive end of the potentiometer; that is, as near as it will go towards the potentiometer terminal that is nearest to the panel. Screw the knob of the compression type condenser right down so that this component is set at its maximum capacity.

Now tune-in a local transmission or your most easily received station by adjusting the tuning condenser and the slider on the "Paratune" coil. If you need reaction this can be obtained in the normal way by means of the reaction condenser.

The tuning condenser also works in just the same way as that of an ordinary two-valver. The only extra control is the "Paratune" slider, and you simply adjust this so that the aerial circuit is kept in step with the grid circuit.

Smooth Reaction

You will soon be able to tell when they are properly in step for reception will then be at its loudest, and you will also need a little more reaction to bring the set to its most sensitive point.

If you find reaction is a bit fierce or ploppy, move the slider of the potentiometer towards the negative end until a smooth control is obtained. The capacity of the compression type .0003 condenser can be reduced if sufficient selectivity is not obtained with the lower tap on the "X" coil.

On the long waves operation will be just the same, except for the "Paratune" coil. If you do not experience on long waves interference due to a medium-wave station, put the spring clip on any one of the taps on the "Paratune" coil and turn the slider so that it is making contact with approximately the same turn as that at which the tap is made.

The "Paratune" Clip

If you do get interference, adjust the slider until the interference vanishes. The position for the slider will be somewhere between the tap in use and the connected end of the "Paratune" coil.

It will be necessary to try the clip on different taps to ascertain which gives the best results so far as removing interference is concerned.

For working on wave-lengths between the medium and long broadcast waves, ordinary centre-tapped coils are employed instead of "X" coils.

Use the flex lead which you would normally employ for long waves. The tuned coils will vary from a No. 75 to a No. 200, and suitable reaction coils will be needed.

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RE-WINDING MADE EASY

A really practical scheme for the constructor.

By J. BOND.

RE-WINDING a loud speaker is not a task an amateur undertakes with any degree of enthusiasm, and in view of the competitive price of such work in the open market it is hardly an economical proposition. Yet the supreme sense of accomplishment resulting from a successful venture at such a job well repays the amount of time devoted to it, and it's easy!

Let us suppose that you have a loud speaker that requires re-winding—and an evening to spare. As a wireless enthusiast, you will doubtless have several "burnt-out" L.F. transformers knocking about the house.

Dismantling the Speaker

Strip one of these down to the wound core. The secondary winding will provide the necessary wire, conveniently "rolled up," although perhaps not quite the correct gauge—near enough, though!

Most loud speakers are built-up nowadays and not cast, so it will be possible to dismantle the L.S. unit and remove both bobbins each mounted on its own pole-piece. With a scriber mark the way each bobbin is wound, and then strip off all the old wire—cutting it away is usually quickest.

So much for the destruction; and now for construction. Mount a small drilling machine horizontally in a bench-vice with the driving-wheel conveniently placed for turning; while, at the same time, the whole is held rigid (see sketch).

Then, with screws or a temporary strap, mount one of the L.S. bobbins in the chuck. It is impossible to give definite directions for this, as these fittings differ so much in construction.

Winding the Wire

Anyway, wireless enthusiasts are always gifted with a fair amount of common sense, and that will always find a way. Screws, string, or even sealing-wax will do a pinch.

Having successfully fixed this up, it should be possible to rotate the bobbin at a comparatively high speed. The rest is easy.

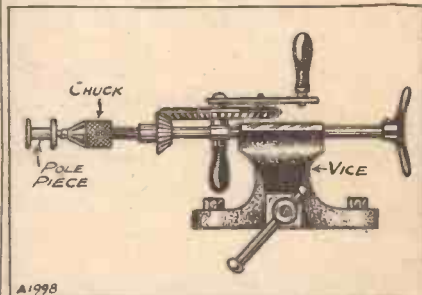
One end of the wire is secured in place, suitably insulated, of course;

and after the first few turns have been fed on slowly in order to give the wire a grip, the remainder can be put on at any old speed. The fine wire can be guided quite easily with the fingers, and if the transformer from which you are unwinding the wire be mounted on a pair of pivots or a roller, it is really surprising how fast you can work.

Steady Does It!

Make sure you put the wire on in the same direction as you took it off. Don't start racing once you get your hand in, because if the wire *does* snap, some perverse fate always buries the end right underneath those layers already on, which you will have to cut off, and start over again.

EASILY IMPROVISED



As you can see it is very simple to make up this winder.

In any case, the whole time of re-winding each bobbin only takes about fifteen minutes, so where's the gain?

Suppose we allow fifteen minutes for the preliminary work, i.e. mounting the drilling machine, stripping the transformer, etc., then another fifteen for dismantling the loud speaker, marking bobbins, and cutting off old wire, fifteen minutes for winding each pole-piece, and half an hour for re-assembling the speaker—that's one-and-a-half hours.

Throw in an extra half an hour in order to let you finish soldering that joint which won't solder—and the whole job takes just two hours.

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THOSE NEW SETS

—continued from page 160

written in to me asking if they can use components out of a 1924 or 1925 design in one of our latest receivers.

“Now, in the last few years components have been vastly improved, and progress is still being made very rapidly. Transformers these days are far in advance of anything that was available even a year or two ago, and so those people who are keen on using up their old components cannot hope to turn out a design in keeping with modern standards.

Old Panels

“On the other hand, the man who is always building new receivers naturally possesses a large number of up-to-date parts, and there is no reason whatever why he should not use these in his latest effort.

“There is also the question of using old panels and cabinets which are sometimes not of the correct size for the particular design which the constructor desires to build.

“The layout of a receiver can be rather critical, especially if it employs one or more H.F. stages, and if the components are cramped up on a smaller baseboard in order to get them into a stock cabinet it is quite possible that the results will be unsatisfactory.

To Our Correspondents

“Such a procedure is not fair to the designer of the set, and can only cause the constructor a large amount of trouble and dissatisfaction. Those constructors who want to use up old components or cabinets, etc., should take Mr. Kelsey’s advice and write in to the WIRELESS CONSTRUCTOR Query Department, which will always be willing to help them.”

In conclusion, we must thank those many readers who are following so closely the proceedings of the meetings and who write giving us their views. We cannot always reply individually, but our correspondents can rest assured their letters are read with the keenest of interest and that all suggestions are very carefully considered.

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A CONFIRMED
"EXPLORER" FAN

Sir,—Following my letter regarding the "Explorer" Three, it now gives me great pleasure to write in praise of its big brother, the "Explorer" Four.

I have had the Four in use for about three weeks, and during that time have logged, I should think, about fifty stations at full strength on an average aerial, many of these coming in without the use of the somewhat superfluous reaction control. The medium waves provide a station at nearly every degree of the dial, but it is on the long waves that the full beauty of the set is realised. At any time of the day one can tune-in Kalundborg or Huizen, Oslo or Radio Paris, at full strength, and with excellent quality. It would nearly be worth while to build a set of this type to tune over the long-wave range only.

The Low-Loss Coils

The actual construction of the set proved rather a teaser, since I had to build it to fit the cabinet—a large, self-contained affair. This meant that the baseboard must be an inch or two less than the original, which left me rather cramped for space, since I have mounted all the components and done all the wiring above the baseboard. By re-arranging the L.F. end, however, and by mounting the de-coupling condenser and resistance behind the wooden panel, a very compact design resulted, though some intricate wiring problems cropped up.

I made both coils from the ordinary ribbed former at an approximate cost of five shillings for the pair, and find that they remain in step over all but the first few degrees of the dial. The first dial is slightly behind on the long waves, since I took off two or three

turns from the aperiodic winding of the aerial coil. This, however, is no disadvantage. In view of the fact that the North Regional will soon be trying to blot me out, I have one or two ideas for gaining knife-edge selectivity with these coils, and will let you know if they work.

A Gem on Short Waves

As regards the short waves, the "Explorer" Four is a gem. Hand-capacity, threshold howl, blind spots and other bugbears are entirely absent, while the use of a .0003 instead of the .0005 mfd. in series with the tuning condenser is a big improvement. As a matter of fact,

PLACE A
REGULAR ORDER
 FOR THE
"WIRELESS
CONSTRUCTOR"

I used the former value in my "Explorer" Three, since it reduces the capacity of the tuning condenser to somewhere about .00018, I think.

In conclusion, I might say that a certain young lady who was rather jealous of the time I spent with the Three was so delighted with the Four that she proceeded to tune in Ljubljana, Budapest, Vienna, Milan, Rome, etc., with the greatest ease, and even went so far as to listen intently—and intelligently—while I explained the theoretical circuit. She is now a confirmed "Explorer" fan.

Yours enthusiastically,
L. PITCHFORD.

Yorkshire.

A BAFFLE IS
NECESSARY

Sir,—We are writing to draw the attention of your readers to a point in connection with the demonstration of moving-coil speakers which, although one would expect it to be widely known, yet experience indicates that such is not the case. We refer to the employment of a baffle-board or suitable cabinet when demonstrating moving-coil loud speakers.

The theory of operation of such speakers indicates that a baffle is essential if the bass notes are to be produced, and this fact is fairly well known amongst experimenters. A considerable number of cases have, however, been brought to our attention where dealers have demonstrated moving-coil speakers without the use of a baffle with consequently very poor results.

Sound Separation

This procedure is excused on the grounds that other speakers with which comparison is made have been tested under similar conditions, but obviously a moving-coil speaker of any make, if operated without a baffle or suitable cabinet to isolate the sound emitted from the front of the diaphragm from that emitted from the back, can give only a caricature of the results of which it is capable when normally used.

It may seem extraordinary at this date that such misuse of speakers could be possible, but the fact remains that it is, and we hope, therefore, that you will give such publicity to the question as is apparently desirable.

Yours faithfully,
FERRANTI, LTD.

Hollinwood,
 Lancashire.

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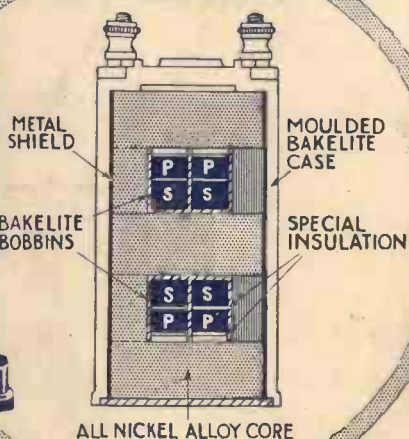
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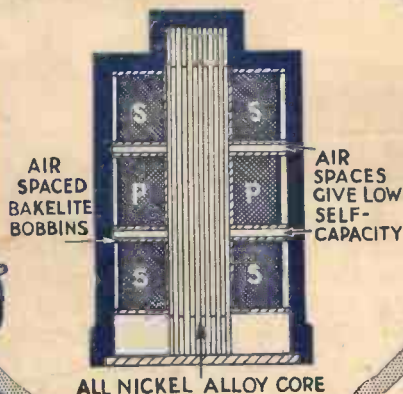
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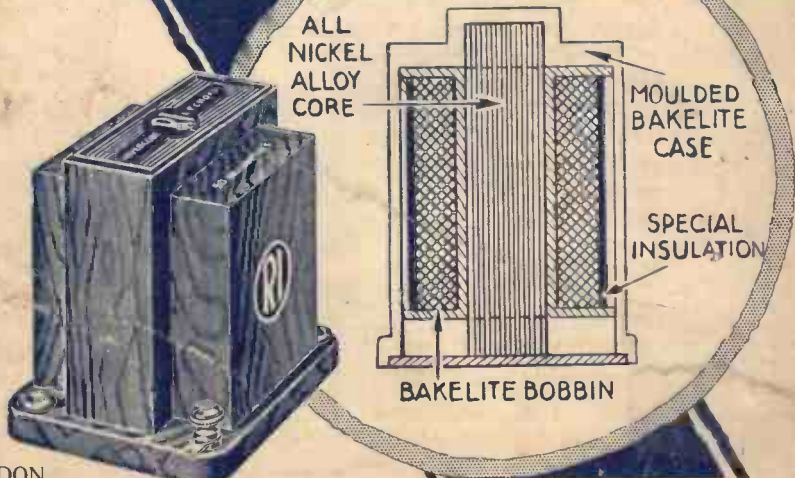
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