BERNARD SHAW AND THE B.B.C.

MODERN WIRELESS

1/-

Vol. XIV. No. 44

August 1930

POWER FOR YOUR SET

SPECIAL SUPPLEMENT INSIDE

FOUR FINE SETS:

THE "VERSATILE" THREE
(For Batteries or A.C. or D.C Mains)

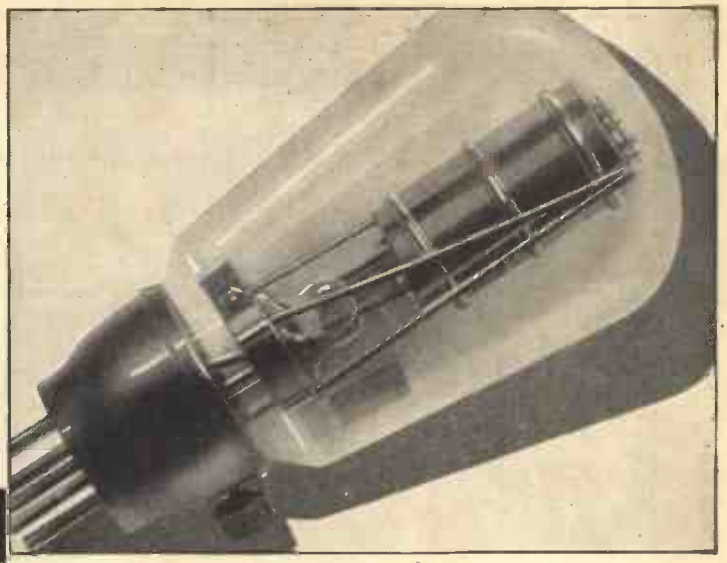
THE "CRYSTAPOWER"—THE "DUAL" AMPLIFIER

THE "TWO-RANGE" TWO

RADIO CONSULTANT-IN-CHIEF CAPT. P.P. ECKERSLEY M.I.E.E.

The first . .

INDIRECTLY HEATED PENTODE



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THIS new power output valve marks an important step in the history of Radio. The indirectly heated Cathode absolutely prevents hum, and the AC/Pen is the most sensitive pentode in existence.

With a grid swing of only ten volts it will give wonderful results when used with a good cone speaker, and is ideal for operating a moving coil speaker such as the R.K.

PRICE 30/-

CHARACTERISTICS

Filament volts	4.0
Filament amps (approx.)	1.0
Anode volts (max.)	250
Auxiliary Grid Volts (max.)	200
Mutual A.C. conductance (mA/V)	2.2

The Amazing

MAZDA RADIO VALVES

THE EDISON SWAN ELECTRIC CO., LTD.
Radio Division,
1a Newman Street, Oxford Street, W.1
Showrooms in all the Principal Towns

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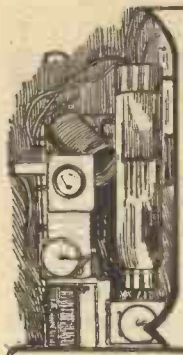
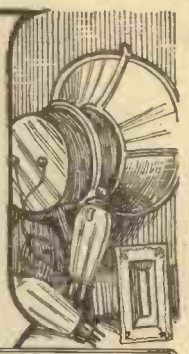


MODERN WIRELESS



Vol. XIV. No. 44. August, 1930.

This Month's Sets—Power for Your Set—Ramsay MacDonald and Radio—The Imperial League of Opera.

THE sets in this issue of " M.W." include : The " Versatile " Three, an up-to-date three-valver which can be used (by substitution of different valves) for either battery or A.C. operation. Designed and described by C. P. Allinson, it consists of a screened-grid H.F. stage, detector, and L.F. It is very carefully screened and capable of a very high standard of performance.

The " Two-Range " Two is a particularly neat design of screened-grid H.F. and detector wave-change set. Simple " X " coils are employed in all tuning circuits and switching enables long or short waves to be used at will. The set is ideal for long-distance reception and when coupled to the " Dual " Amplifier forms an exceedingly powerful loud-speaker receiver. It has been designed by the " M.W." Research Department.

Fine Four-Valver in Two Units

THE " Dual " Amplifier is a simple but very effective two-valve L.F. unit which can be coupled to any set. It is specially suitable for the " Two-Range " Two, and enables either one or two L.F. stages to be employed.

The first stage is resistance-capacity coupled, while the second is transformer-coupled, a pick-up jack enabling gramophone reproduction to be obtained.

Perfect volume controlling is also available, and an alternative terminal scheme allows a decoupling circuit to be included if desired. This unit has been designed and described by the " M.W." Research Department.

The " Crystapower " is the fourth " M.W." set, and consists of a neat little crystal set that is capable of giving extraordinarily powerful results. It has been specially designed for all listeners not in the " swamp " area of a powerful transmitter, and undoubtedly gives a phenomenal degree of signal strength.

Finally, " Power for Your Set " is the title of a special illustrated supplement in which all types of radio power supplies are discussed.

The supplement caters for all valve-set users, and gives detailed descriptions of the use of mains H.T. units, H.T. and L.T. batteries, rectifiers, trickle chargers, all-mains power supply units, etc. It is a comprehensive and extremely valuable contribution to MODERN WIRELESS, compiled by the technical staff under the general supervision of the Technical Editor.

MR. RAMSAY MACDONALD was the chief guest at a dinner at the City of London Guildhall recently, given by the Music Committee of the Corporation of the City of London to celebrate the jubilee of the Guildhall School of Music. The Prime Minister said he had enjoyed many Sunday afternoons listening to the broadcast of Bach's church cantatas from the school.

" I confess," he said, " that whether I am at home in my quiet, peaceful house in Hampstead, or down at Chequers, I make it a rule to issue an order — and I am not given to that very much—that there shall be no engagement, no interference, no business, but that my friends and I shall retire to a quiet corner and spend a very inspiring, comfortable, and peaceful half-hour listening to the broadcasts. To a weary man there is nothing more refreshing."

We wonder how many readers of " M.W." remember the " Premier " set, described by our contemporary, " Popular Wireless," some three or four years ago, and which was presented to Mr. MacDonald ? That was the Premier's first set, and was specially built for him. Mr. MacDonald's first set may still be going strong, for it was a very good one.

The B.B.C. and Opera

WHEN Sir Thomas Beecham launched his Imperial League of Opera scheme, some three years ago, he asked for 150,000 subscribers at ten shillings a year. But it was stated in the daily press the other day that, so far, only 50,000 subscribers had been enrolled, and consequently the future of the scheme is rather uncertain. A season of opera, sponsored by the League, may be given next year, but nothing at the moment of writing is definite.

Apropos of Sir Thomas' scheme, we find that some people hold the view that the B.B.C. should come to the rescue.

According to the Music Critic of the " Daily Mail," the B.B.C. has the key to the problem—the B.B.C. has simply to buy at a fair price the right of broadcasting the Beecham performances and " the trick is done."

The sooner that idea is eliminated the better, otherwise Savoy Hill will become a philanthropic institution instead of a Broadcasting Corporation. There is a limit.

The

WITH the development of the regional scheme the need for selective circuits becomes daily more urgent. It is also desirable from the point of view of economy that selectivity should be attained by simple methods involving little outlay on the one hand, and simplicity of operation on the other.

Whatever may be the real facts about side-bands, we do know that a band-pass filter means extra components, and if it is not ganged it means an extra control. If it is ganged, however, then it involves great care in matching of coils and in balancing out unequal loads on the tuning circuits

A Different Method

I have used a very different method for obtaining selectivity, and the success of the scheme I have enployed in this receiver is made possible by a fact that is universally acknowledged nowadays, viz., that a screened-grid valve is not always stable when very efficient coils are used.

The usual method of stabilising is to employ coils of medium efficiency, but by doing this we impair the selectivity of the circuits, and the usual S.G. amplifier is already sufficiently

COMPONENTS AND MATERIALS YOU WILL NEED

1 Ebonite panel, 26 in. × 7 in. (Resiston, or Goltone. Lissen, Trolite, Paxolin, etc.).
2 ·0005-mfd. slow-motion condensers (C_1 and C_5). (Gecophone, or Lissen, Lotus, J.B., Igranic, Utility, Formo, Ready Radio Ormond, Dubilier, Polar, etc.)
1 ·0001-mfd. differential reaction condenser (C_7). (Keystone, or Lotus, Lissen, Formo, Ready Radio, Utility, Ormond, Magnum, Polar, Burton, etc.)
2 Six-pin coil bases (Colvern, or Lewcos, Magnum, etc.).
2 C.A.C. and C.S.P. coils for 200–500 and 1,000–2,000 metres respectively (Lewcos).
1 H.F. choke suitable for shunt feed (L_3). (Wearite, or R.I., Dubilier, Varley, Lewcos, Keystone, Lissen Astatic, Ready Radio, etc.)
1 H.F. choke (L_6). (Lissen, or other good make.)
2 ·0003 fixed condensers (C_4 and C_6). (Dubilier, or Lissen, Graham-Farish, Atlas, T.C.C., Igranic, Mullard, Ferranti, etc.)
1 Grid leak (R_2) and vertical clips (for value see text). (Dubilier, or T.C.C., Goltone, Lissen, Mullard, Igranic, Atlas, Graham-Farish, etc.)
1 400-ohm variable resistance (R_1) (actually a potentiometer). (Igranic, or Lissen, Wearite, etc.)
2 ·1-mfd. Mansbridge type fixed condensers (C_2 and C_3). (T.C.C., or Lissen. Dubilier. Mullard, Hydra, etc.)
1 L.F. transformer (T_1). (Ferranti A.F.5, or R.I., Lissen, Lotus, Igranic, Varley, Telsen, Mullard, Cossor, Lewcos, etc.)
1 Universal output transformer (T_2). (NOTE.—The author used one of the universal type here, such as the R.I. "Variable Ratio," so permitting either a pentode or ordinary power valve to be used. The actual transformer seen in the photos was used in his first tests, but has since been withdrawn from the market. The one mentioned is equally suitable.)
2 Wire-wound resistances (R_4 and R_5) (for values see text). (Varley, or Lissen, Igranic, R.I., Dubilier, Ferranti, Mullard, Graham-Farish, Ready Radio, etc.)
1 "Centralab" heavy-duty potentiometer (R_3), 50,000 ohms (Rothermel, or equivalent Varley component).
1 Variable resistance (R_8). (Harlie Universal, or equiv. Rotorohm, etc.)
1 400- or 200-ohm baseboard-mounting potentiometer (R_7). (Igranic, or Lissen, Wearite, Ready Radio, etc.)
3 2-mfd. Mansbridge type fixed condensers (C_8, C_9 and C_{10}). (T.C.C. and Dubilier, or Lissen, Ferranti, Hydra, Mullard, Loewe, etc.)
1 Single open jack (Jack No. 2). (Igranic, or Lotus, Bulgin, etc.)
1 Single closed jack (Jack No. 1). (Igranic, or Lotus, Ormond, etc)
3 5-pin valve holders (Wearite, or Lotus, W.B., Junit, Bulgin, etc.)
2 Aluminium screening boxes, type S.5 (Wearite, or Magnum, Paroussi, Ready Radio, etc.).
13 Indicating terminals (Belling-Lee, or Igranic, Eelex, Clix, etc.).
1 Cabinet with 12-in. deep baseboard (Pickett, or Camco, Osborn, Gilbert, etc.).
Strips of ebonite for terminal strips, screws, Glazite, flex, etc.

For the Eliminator you will want :
1 Iron can, 8½ in. × 6 in. × 5¾ in., with baseboard (Magnum, or Paroussi, Wearite, etc.).
1 Mains transformer, input according to your mains, output : 250–0–250 volts, 2·5–0–2·5 (or 2–0–2) volts, 4 volts and/or ·8 volts (R.I., or equivalent type).
1 Double-wound smoothing choke (Magnum, or other compact type).
1 6-mfd. fixed condenser (C_{11}). (Hydra, or Dubilier, Lissen, T.C.C., Ferranti, Loewe, Mullard, etc.) (N.B.—If larger makes than Hydra be used a different layout may be needed in the eliminator.)
1 4-mfd. fixed condenser (C_{12}). (Hydra, etc.)
1 Sprung valve holder (Pye, or Lotus, Igranic, Benjamin, W.B., etc.).
Flex, adaptor plug, switch, etc.

"Versatile" Three

A magnificent A.C. mains receiver that can easily be adapted for either D.C. mains or batteries. It uses an S.G. valve and has an exceptionally high degree of selectivity and enormous power.

Designed and Described by
C. P. ALLINSON, A.M.I.E.E., F.Inst.P.Inc.

unselective without using damped coils.

The circuit incorporated in the receiver I have designed allows the use of efficient coils with their naturally higher selectivity, and the means used to obtain stability still further increases the selectivity of the system. It is suitable for A.C. as well as battery valves, and can be made as selective as you want it.

With only two tuning controls, the Brookmans Park programmes are separated so as to leave a large gap between them at a distance of from 7 to 8 miles.

Suits Any Supply

In building this set I have further made it up to date by designing it for use on A.C. mains, so that with the exception of a grid-bias battery it is entirely fed from the mains, making it a " plug-in and switch-on " set.

I realised, however, that many listeners have D.C. mains or no mains at all. I have therefore so arranged the design of the receiver that it can easily be adapted for D.C. mains (as regards the H.T. supply, of course) or else for battery operation, and the modifications from the detailed design are only very slight.

The set can further be used with different types of output valves even when worked from A.C. mains, and this valve can be either an indirectly-heated cathode valve, an ordinary power valve, a super-power valve, or a pentode. In the latter case a slight change in the wiring needs to be made if a five-pin pentode is used, but this point is dealt with later.

Here, then, are the particular advantages of the " Versatile " Three receiver, and a careful consideration of them will show you to what extent this set fills your needs.

1. A highly selective circuit, yet using only the usual number of controls, while the use of an S.G. valve gives you the greatest range and power for long-distance reception.

2. Primarily designed for use with A.C. mains, this set can nevertheless easily be adapted for use with D.C. mains or batteries.

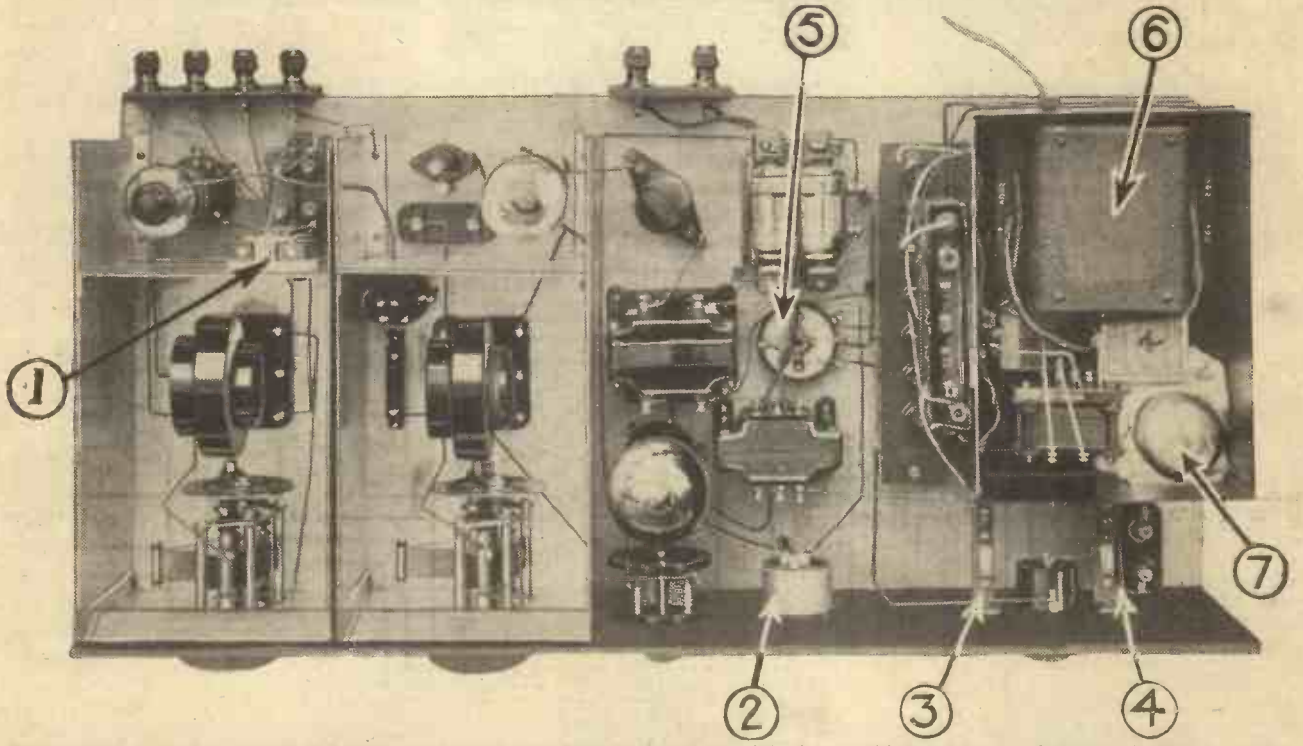
Special Smoothing

3. Different types of output valve can be used according to your personal preference or the depth of your purse, and even when using a pentode, with its heavy anode current, your loud speaker is protected from damage, since a special output transformer is used.

4. The set can be used on the local station without having to detune, as a pre-detector volume control has been incorporated.

5. When used on A.C. mains, a silent background is obtained by means of special smoothing arrangements in the eliminator.

STABLE AND SELECTIVE WITH SILENT BACKGROUND



Very special screening arrangements of a straightforward character and an original smoothing system are features of this set. (1) is R_1, the H.F. valve biasing resistance ; (2) R_3, acts as a " pre-detector " volume control ; (3) is the milliammeter jack ; (4) the voltage jack; (5) R_7, the potentiometer; (6) mains transformer ; and (7) the rectifying valve.

6. A voltage control is fitted so that when using valves not suited to high voltages the H.T. voltage may be adjusted to any required value. This is a very desirable feature when using D.C. mains having too high a voltage for your particular valves, or, if you wish to prolong their life, by working them at a low voltage.

In practice I have found that better results are obtained by using a smaller coil for L_2 and a larger one for L_4, rather than the reverse.

When using I.H.C. valves the S.G. valve is self-biased by means of the resistance R_1 connected in the cathode return. This resistance is made variable so that the bias may be adjusted to give the best results, and it is shunted by a fixed condenser C_2.

Leaky-grid condenser rectification is employed with the detector valve, the grid-bias battery being used to give the necessary positive potential. This also makes it possible to use anode bend if desired, but I have not found this satisfactory with transformer coupling unless a very low-impedance valve is used for detector, and then, of course, there is a loss of amplification. The resistance R_2 will vary with different makes of I.H.C. valve. In some cases it should not be more than ·5 megohm, in others 2 megohms can safely be used.

TESTING THE SET WHILE IT IS WORKING

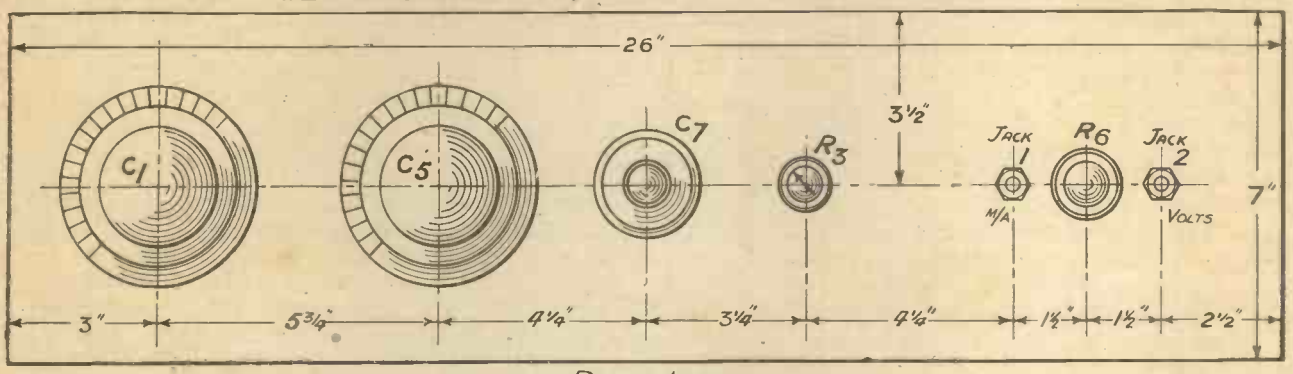


Fig. 1.—Here you have the panel dimensions. Note the two jacks which enable you to take anode current and voltage readings without reference to the interior of the set.

Before starting any work on this set I would advise you to have a careful look through the theoretical circuit, so as to impress its salient features on your mind.

Stability and selectivity are obtained in the H.F. stage by reducing the input and output coupling. Thus instead of connecting the grid and cathode of the H.F. valve across the whole of the tuned circuit L_1, C_1, they are connected across a coil L_2 which is coupled to this circuit.

Varying Selectivity

In the same way, instead of using full tuned-anode, transformer coupling is used (with shunt-feed) as shown. By suitably proportioning the windings L_2 and L_4 any desired degree of selectivity can be obtained.

SUB-BASEBOARD WIRING

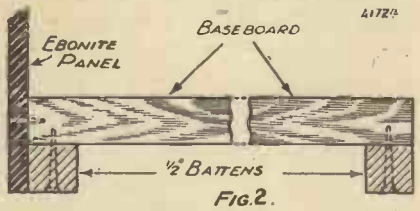


FIG. 2.

The baseboard is raised by battens to enable some of the wiring to be accommodated underneath.

Capacity reaction is provided, and a differential reaction condenser C_7 is, of course, used. Since only one stage of L.F. is used, it is most desirable to employ a high-class L.F. transformer T_1, so that the utmost possible amplification may be obtained.

The Output Transformer

The output transformer T_2, connected in the plate circuit of the last valve V_3, not only protects the loud-speaker windings, but also enables you to get the right ratios for use with different speakers and different output valves.

H.F. and detector valves are decoupled by means of the resistances R_4 and R_5. R_6 is the voltage control for the whole set, and R_3 controls the

A CIRCUIT WELL WORTH WHILE STUDYING

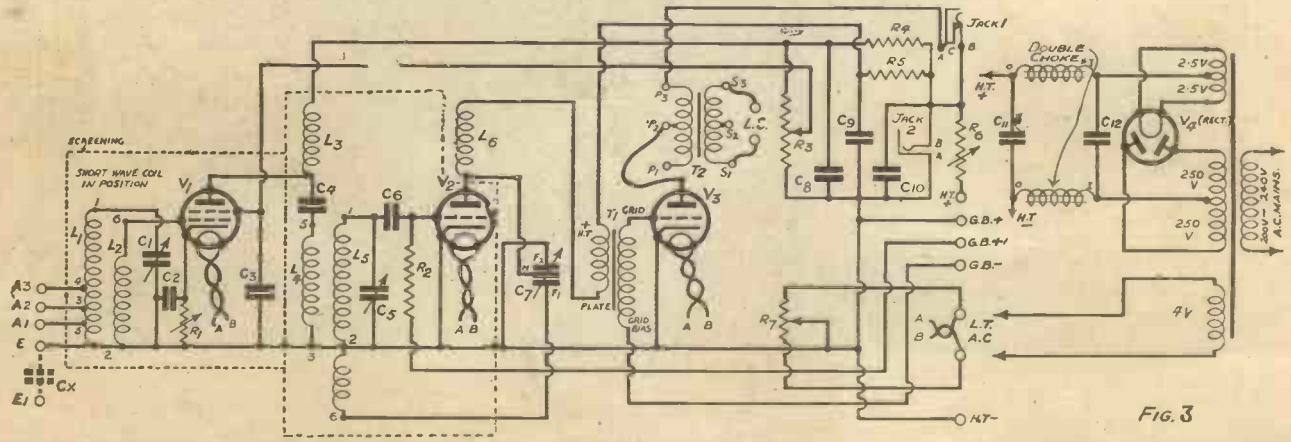


FIG. 3

The mains rectifying and H.T. smoothing is carried out by the gear diagrammatised at the right of this figure. The actual radio part leaves off at the output transformer in the anode circuit of the third valve. The relative positions of the H.F. screening boxes are indicated by dotted lines.

This Set Uses Those Remarkable A.C. Valves

screening-grid voltage and thus acts as a pre-detector volume control.

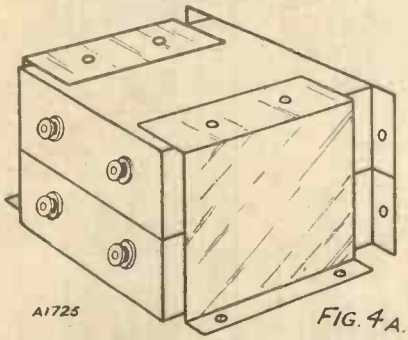
The two jacks enable the H.T. current and voltage to be checked up by plugging in meters (a more satisfactory method than building the meters into the set, where they would be tied up indefinitely) a procedure to be recommended if you would get the best performance and longest life from your valves.

Directly-Heated Valves

You will no doubt have noticed when examining the diagrams relating to this set that the mains transformer is provided with a winding suitable for use with ·8 A.C. valves. This makes it possible, of course, to use this type of valve in the set, and if you already have a set of these valves it will be interesting to make comparisons between these and other types.

If, however, you are going to purchase a set of valves for use in this receiver with A.C. mains, I think you

SAVING SPACE



The brackets for the condensers C_8 and C_9.

will be more satisfied if you get the indirectly-heated-cathode types.

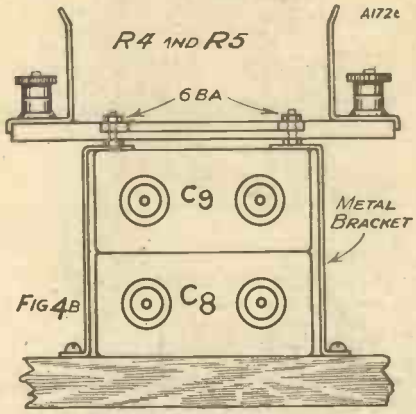
With regard to the list of components for building this set, in many cases alternatives are given, but certain components, such as the coils and the special smoothing choke used in the eliminator, need to be of a certain make. and where one name only is given for a component you will be wise to use that make only.

Baseboard Supports

The first step in constructing this receiver is to examine the wiring diagram with great care, so as to get a good idea of the layout and general run of the wires carefully fixed in your mind, and also look over the photographs taken of the receiver.

As some of the wiring is carried out under the baseboard you will have

IN POSITION



The de-coupling resistances are fixed to the top of the condenser clips.

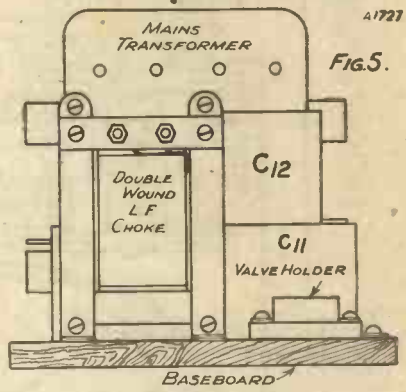
to fix two lengths of batten underneath preparatory to mounting the panel, as shown in Fig. 2. Before actually mounting the panel, however, drill the holes in the panel according to the dimensioned panel layout in Fig. 1.

The Screening Boxes

The fixing holes for C_1 and C_5 are $\frac{3}{8}$ in., for C_7 some makes of condenser need only $\frac{5}{16}$ in., R_3 and R_6 need $\frac{3}{8}$ in., while most jacks need $\frac{7}{16}$ in. Then drill the holes for the fixing screws along the lower edge and mount the panel along the front edge of the baseboard, making sure that this is dead square, otherwise the panel will not be vertical.

Now place the two aluminium cans in position, allowing a space of $\frac{1}{4}$ in. between them so that the lids do not jam each other, and mark the positions of the holes for the condensers on to the aluminium from the front of the panel, and then drill them, The screws which fix the six-pin coil-bases also fix the cans to the baseboard, so these will be drilled next.

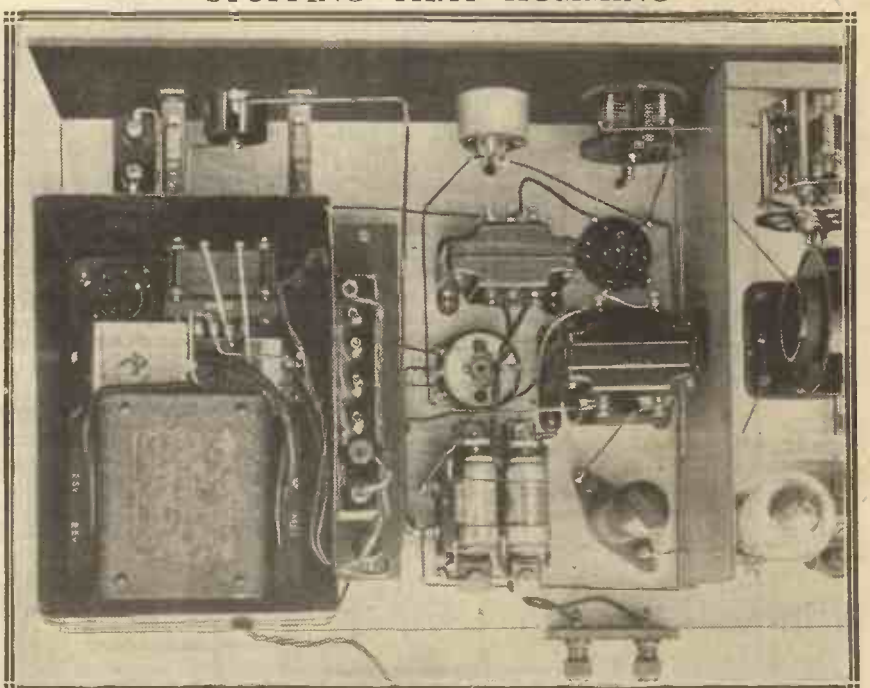
THE "ELIMINATOR"



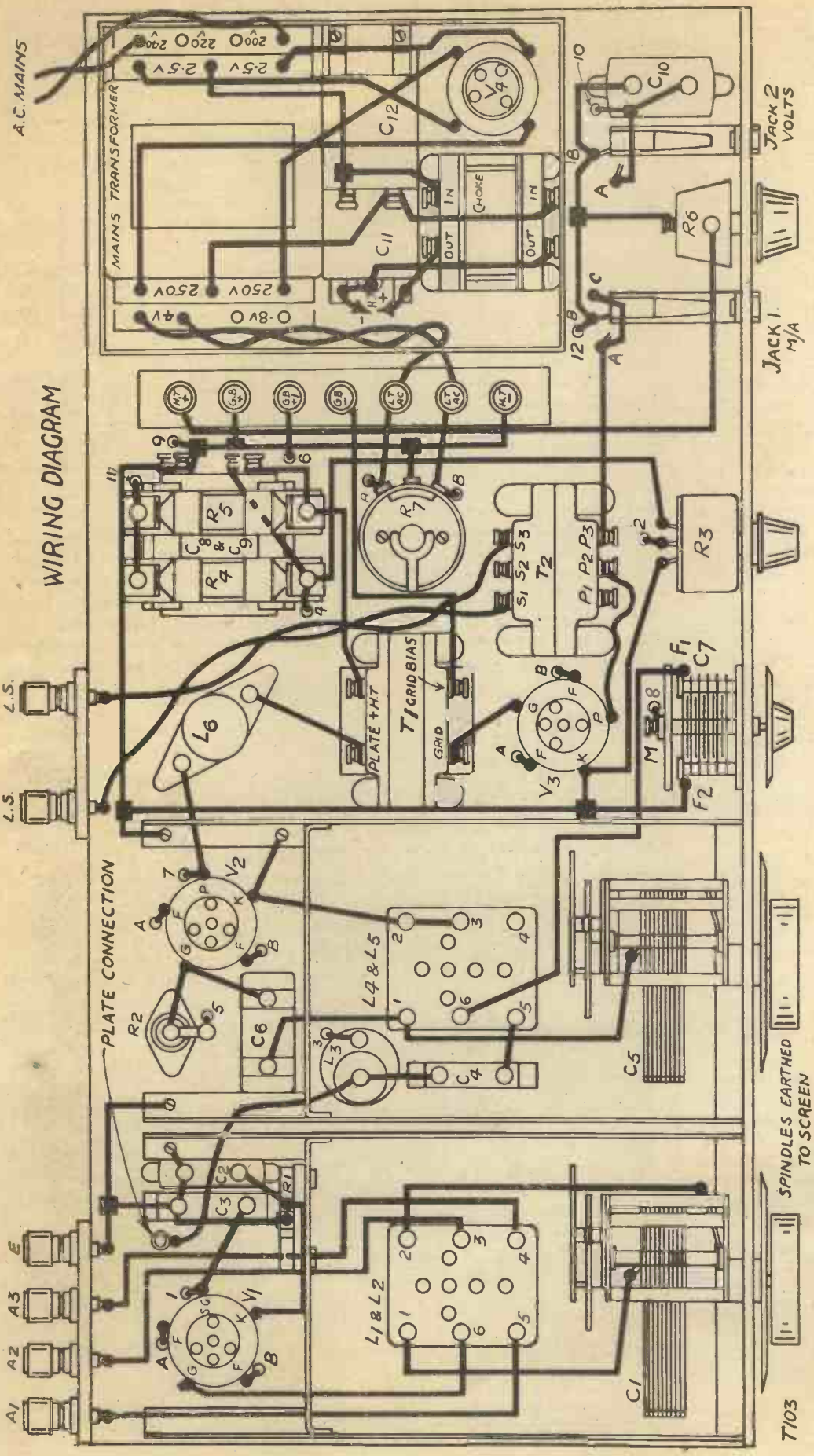
A drawing in elevation of the rectifier and smoothing part of the set.

Note also the holes drilled through the bottom of can No. 2 for the H.T. lead from L_3, the fixing screws for

STOPPING THAT HUMMING



By careful screening and smoothing, particularly at the "mains end" of the receiver, silence of background is assured. Note the skilful "compacting" and isolation of this section of the set.



L_3 and C_4, and a hole in the side of this same can for the reaction lead from C_7 to pin No. 6 of the coil base. Two holes are also needed for the anode lead from the S.G. valve.

Note that the Wearite cans I have used are built so that the lids do not overlap the can between the panel and the front of the can, so that no spacing washers need be fixed between the can and the panel, as may have to be done with some boxes.

TABLE OF COILS THAT MAY BE USED:

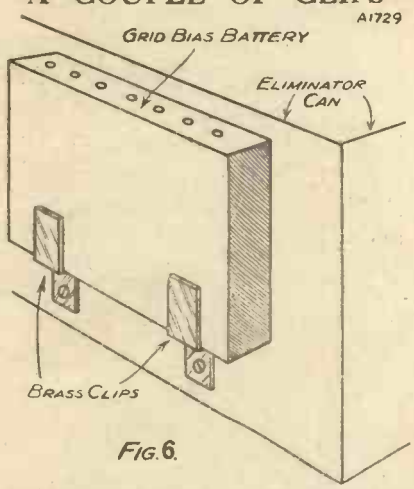
Wave-band		L_2	L_1
200–500	High selectivity ..	P.4	P.6
200–500	Good selectivity ..	P.6	P.8
200–500	Average selectivity	P.8	P.10
200–500	Low selectivity and high magnification	P.12	P.14
1,000–2,000	High selectivity ..	P.16	P.18 (smaller sizes reduce magnification).
1,000–2,000	Average selectivity	P.22	P.22 (larger coils are not available, otherwise they could be used in many cases to get more H.F. amplification).

Now fix the condensers in position within the cans, not fixing them too tightly at first. Then place the coil bases inside the cans and screw them down, then tighten up the condensers. Next screw down L_3 and C_4, after which the remaining components can be fixed to the baseboard and mounted on the panel.

In order to economise in space, the two de-coupling resistances R_4 and R_5 have been mounted on top of the associated condensers C_8 and C_9, and the method of doing this is shown in further detail in Fig. 4 at "A" and "B." "A" shows the two metal brackets, and how they hold the condensers down on the baseboard. The four holes on the top are the fixing holes which register with the holes in the resistance clips.

The finished assembly is shown in front elevation at "B." The metal brackets, after bending and drilling, are fixed to the resistance clips with small 6 B.A. screws and nuts. They are then placed over the two condensers C_8 and C_9, and screwed down on to the baseboard. If you also examine the wiring diagram and compare it with the Fig. 4 sketches the method of fixing these resistances and condensers will be quite clear.

A COUPLE OF CLIPS



The grid-bias battery is neatly disposed of in this manner

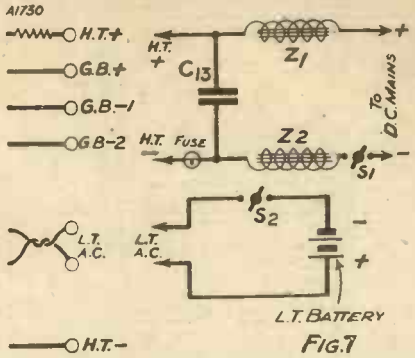
Next you will make up the three terminal strips and fix them in position. The horizontal strip which carries the H.T., G.B., and heater terminals should be mounted on short ebonite pillars—short lengths of ¼ in. tubing will do the trick—and it is a good idea to fix short pieces of tinned copper wire to the terminals before fixing the strip down, so that the various connections can be soldered on to them afterwards.

Wiring the Set

Alternatively, the leads to the terminals can all be of rubber-covered flex, so that the strip can be fixed after the various connections have been completed. This is the method that I have used.

The wires which run under the baseboard are certain H.T. and G.B.

A D.C. MODIFICATION

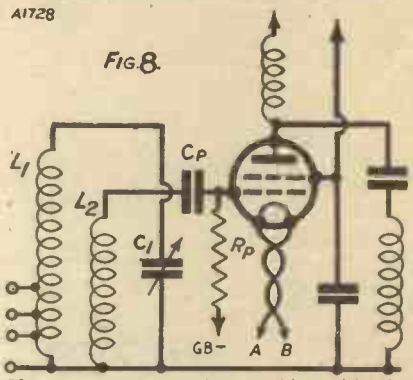


If the set is to be used with D.C. mains the H.T. smoothing and L.T. supply should be arranged as above.

leads and the filament leads. The filament leads are marked "A" and "B," and all the points marked "A" are connected together, and to one L.T.A.C. terminal, and all those marked "B" together and to the other L.T.A.C. terminal, the potentiometer R_7 being connected across them. All these leads should be well-twisted together, so as to prevent A.C. from getting into the set.

For the other leads follow the following key: Connect 1-2, 3-4, 5-6, 7-8, 9-10, 11-12. The points to be connected are shown inside small circles, with the corresponding numbers placed against them. Thus the anode of the first valve holder is connected to the slider of R_3, one side of L_3 goes to one side of R_4, and one side of C_8, and so on.

BIAS FOR THE S.G.

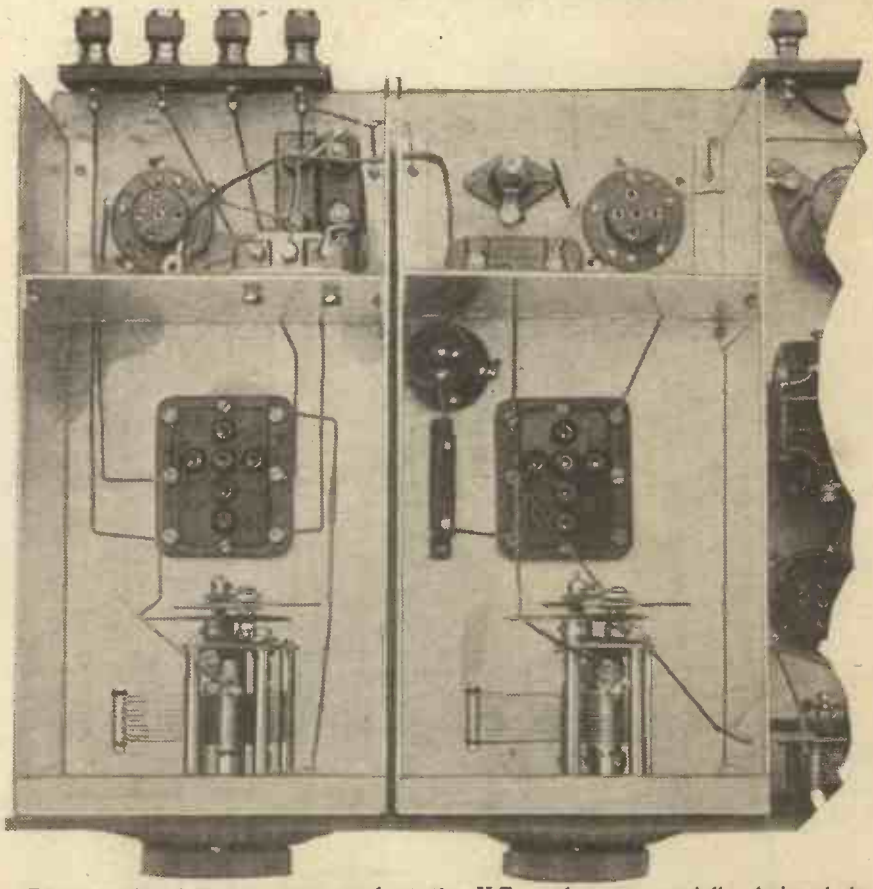


If you want to use battery bias with the H.F. valve a grid leak (Rp) and condenser (Cp) will be needed.

Certain leads in the remainder of the set are more conveniently made with flex, such as the anode lead from the top of the S.G. valve, the loud-speaker terminal leads from the secondary of T_2, and one or two others.

(*Continued on page* 190.)

SPECIAL SCREENING BOXES



The screening boxes or cans used at the H.F. end were specially designed by Mr. Allinson to give adequate screening without causing losses. They are obtainable from a number of manufacturers.

WAR IN THE ETHER

By A. A. GUILLILAND.

All over Europe more and more powerful stations are being built and greater power is being used by existing stations. Where will it end?

UP we go! One European station after another announces its intention of very shortly being on the air with greatly increased power. Where is this going to lead us?

The Prague Plan left hardly any safety margin between allotted wavelengths. The slightest deviation from a station's frequency causes interference with some other station. And if the stations further increase their power where shall we be?

Recent Power Increases

Even now it is difficult to keep Stuttgart, London and Graz apart when listening on the Continent. Stuttgart will soon be operating the new giant Mühlacker with 60-kw. aerial power, Graz is shortly to obtain the present Vienna Rosenhügel transmitter, and Vienna is going up with its power.

Budapest is doing likewise, and also Bucarest and Belgrade. Berne is only increasing its power to 35 kilowatts in the aerial; much less than the proposed 60 kw. of the other stations. Prague will go up to at least 60 kw.; Warsaw even higher.

Rome is already on the air with increased power, Milan is increasing its output. The present Milan station will then either go to Trieste or Palermo. Strasburg will soon be on the air with over 30 kw., and new Belgian stations will be working on high power.

That just gives one an idea of what is actually planned and being carried out now.

The Present Position

A few months ago we gave the new 2 L O a hearty welcome, the old days seemed to have returned when British stations were THE powerful stations, but it seems to me that with their 30 or 45 kw. they may again fall back into the second row as far as reception on the Continent is concerned.

Now, the B.B.C. constructed the new transmitters with a view to the needs of national listeners, but seemingly on the Continent the stations are designed with a view to the international listener as well.

I have put the position as it is now clearly developing. The only remedy seems to be a general international limitation of the number of high-power and other stations, and that at an early date, otherwise when every country has a number of stations in operation it will be difficult to get them to scrap them.

Britain has ten exclusive wavelengths. France, for some reason or other, has more, although the number of listeners is less and the majority of French stations hardly deserve a place in the ether at all.

Will the Weaker Give In?

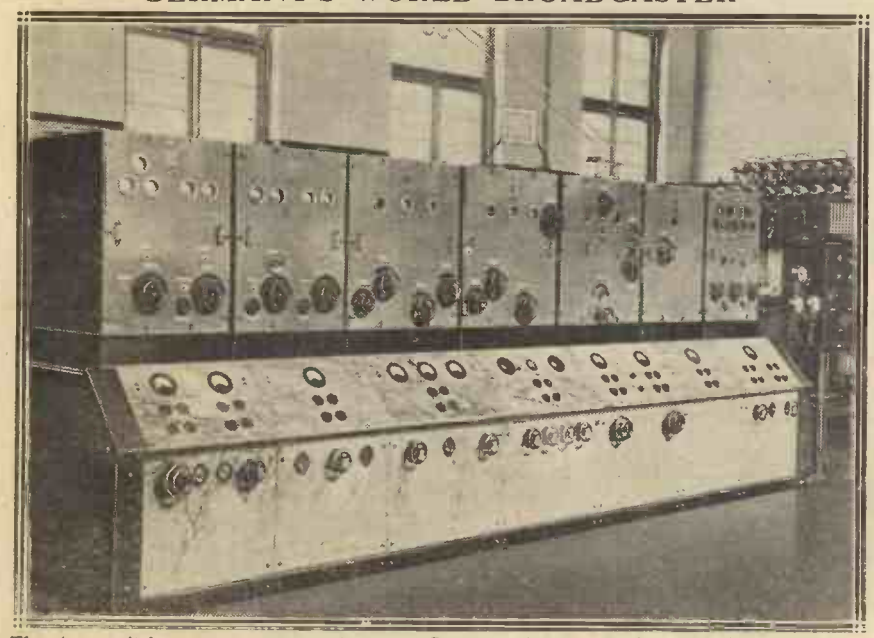
Germany has some twelve or thirteen exclusive waves, and is not likely to part with any. I think it will mean the weaker will have to give in and give up some wavelengths. Whatever it is, something will certainly have to be done.

The B.B.C. should not forget that Continental listeners like British programmes, and that peaceful propaganda for Britain by means of broadcasting is just as essential as propaganda in other things.

Certainly, international relays are a step in this direction.

British broadcasting technique is the best in the world, but what is the use of our knowing it if we hide it in low power?

GERMANY'S WORLD BROADCASTER



The transmitting apparatus at the new German short-wave broadcasting station at Konigswusterhausen.

GEORGE BERNARD SHAW AND THE B.B.C.

Some quite new sidelights on a great personage, and a record of his views on broadcasting.

By HAROLD A. ALBERT.

As every listener knows, George Bernard Shaw is the stormy petrel of the B.B.C. A reason for this is not hard to seek. G.B.S. is the greatest phenomenon of the Edwardian era; he came at exactly the right time.

In all probability he could have made his name during no other decade. The B.B.C., however, stands as the greatest phenomenon of the Georgian age.

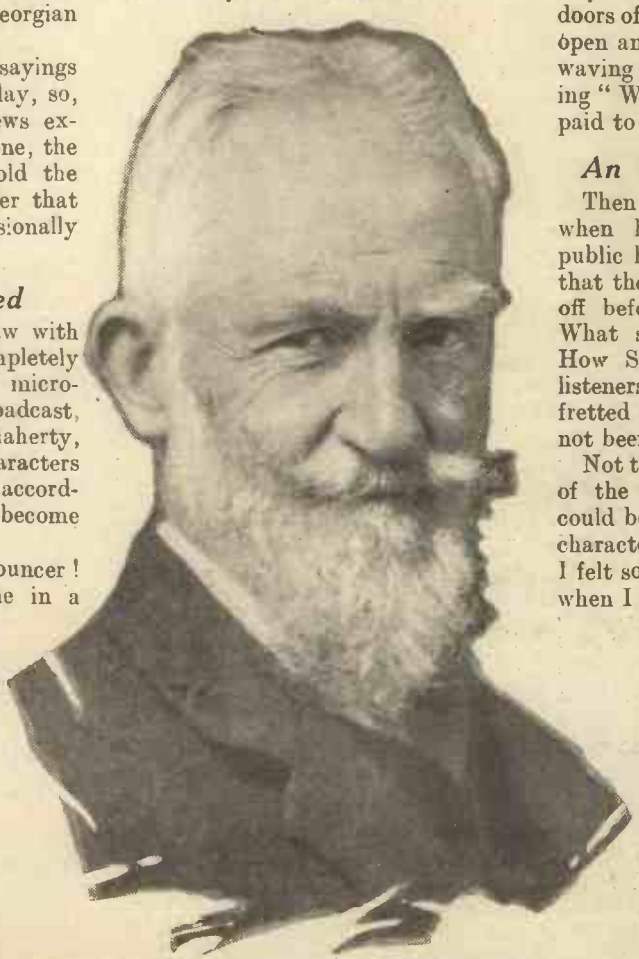
As Shaw's opinions and sayings became catchwords of their day, so, at the present time, the views expressed through the microphone, the mouthpiece of the B.B.C., hold the popular attention. No wonder that G.B.S. and the B.B.C. occasionally clash!

Microphone Mastered

Yet, strangely enough, Shaw with his quick adaptability has completely mastered the medium of the microphone. Ever since his first broadcast, when he read his own play, "Flaherty, V.C.," taking the different characters in turn and changing his tones accordingly, our pet philosopher has become a wireless favourite.

He would be an ideal announcer! He addresses the microphone in a fatherly manner and expounds his views with the air of teaching a pupil what's what. His characteristic voice is the joy of every owner of a good loud speaker, and his studio manner delights the announcers. Although Shaw is the BIG NOISE—in capital letters, please!—he has not an atom of apparent self-consciousness, and is altogether such a pleasant person that he puts everyone at ease. Yet he must nevertheless be a source of constant annoyance to some people.

Ever since those memorable arrangements for a seventieth birthday broadcast by Shaw fell through owing to the inability of the great one to declare that his talk would not be controversial—this in the days when controversy was anathema to the potentates of Savoy Hill, and most talks were exceedingly watery in consequence—there have been atmospherics in the Shavian set.



A recent photo of the great dramatist and essayist.

One recalls that memorable debate between Shaw and G. K. Chesterton on "Do We Agree?" when even the fact that Hilaire Belloc was in the chair did not prevent trouble. Halfway through the programme the doors of the Kingsway Hall were burst open and crowds of people rushed in, waving pink and red tickets and shouting "Wait a minute, Mr. Shaw, we've paid to come in!"

An Unfortunate Incident

Then there was his mighty anger when he broadcast from another public hall and spoke at such length that the engineers had to switch him off before the talk was half over. What storm clouds we saw then! How Shaw raved about the poor listeners—and how he must have fretted because all his remarks had not been heard.

Not that Bernard Shaw is an enemy of the B.B.C. Nothing, or no one, could be an enemy of such an impish character. Still, I must confess that I felt something akin to apprehension when I heard that the Editor wanted me to interview Shaw on what he thought of broadcasting.

But he was not to be interviewed.

"I receive personal visits on the understanding that my conversation is not reported," said he, "but I am willing to answer written questions." This was enough.

I prepared a long list containing every conceivable question of interest to listeners. And the result?

He Laughs at Parliamentary Broadcasts

Silence. If you want to get anything out of Shaw, you must provoke him (perhaps this is how the B.B.C. get him to broadcast !) and so I changed my tactics.

Answered at Last

"If my name were Hezekiah—yes, spelt like that—or Patrick Murphy," said I, "you would probably give me anything I wanted. As it is——" This was sufficient. Roughly speaking, I got what I wanted. "Would I prepare a shorter list of questions ?" I did so.

"Are you in favour of the B.B.C. being run by the Government, or would you prefer a private concern ? If so, why ?" I asked.

Shaw replied : "I am in favour of public control." His reasons for this are that some kind of central control clears the air in more senses than one. We all know what a mess the Americans made of their ether by permitting anyone to set up a station and broadcast.

"The listener, instead of having a choice of programme is often not even able to get one. The towns have too many stations. The wide open spaces have none.

"On the other hand, a monopoly by a private company is not desirable. Such a system lends itself too much to jealousy and favouritism to be really successful."

In fact, G.B.S. has several really original opinions on wireless matters. For instance, he thinks that as long as the present play censorship regulations hold good, a play to be broadcast ought to have the Lord Chamberlain's licence. In other words, the B.B.C. should hold a licence for producing plays and permitting music on their premises.

He laughs at the proposals that the proceedings of Parliament should be broadcast. He thinks that such a step would ruin our democratic institution, and that it would certainly abolish broadcasting. "Why broadcast when there are no listeners ?" the playwright asks. In short, it would seem that G.B.S. has a viewpoint on everything.

But there are two questions which, it appears, he cannot answer. My second query : "If you controlled the B.B.C., what alterations would you make in the present system, or what additional services would you give to listeners ?" brought only the reply "Apply to a firm of experts with a fee of £5,000."

Admitting Defeat ?

This seems to be as good as admitting defeat. Isn't the fee Mr. Shaw offers rather small ? Where is the firm of experts who will arrange the broadcast programmes for a mere five thousand ? Are we to take it that the all-mighty G.B.S. cannot arrange the programmes himself ?

The third question defeats him to a greater extent. "What is the artistic, commercial, or scientific future of broadcasting ?" I asked. "A request for this information should be accompanied by an offer of at least £20,000 advance on account of royalties," he answered in a typical way.

"Really, Mr. Shaw!"

Yet Shaw is known to be so grossly rich that a few years ago he was able to turn down a literary prize worth a large sum. Does he really want £20,000 and more for answering a single question ? If so, why ? I will offer a possible answer.

Because this would entail the manufacturing of a new viewpoint and this might prove impossible. A big question, true, but not one that should defeat a thinker. Really, Mr. Shaw !

G.B.S. ADDRESSES "MIKE"

Mr. George Bernard Shaw introduces, to radio listeners, speakers at a debate at the Kingsway Hall.

THOSE 'PHONES

'Phones should not be stowed away for long periods where they can be attacked by rust, etc.

* * *

After long use 'phones should be wiped dry, and kept in a cupboard in a living-room, or some other place which is dustproof and has an even temperature.

Correct Connections

Telephones should always be connected in circuit the right way round when used with a valve set, though with a crystal set it does not matter.

* * *

When telephones, earpieces, or cords are marked with a red indicator or with a plus sign, this is the lead which should be connected towards the H.T.+ connection on the set.

* * *

If telephones are connected wrongly so that the current flows the wrong way they will in course of time become insensitive.

Don't Drop Them

On no account should you drop telephones on the floor, as they are sensitive electric instruments and should be carefully handled.

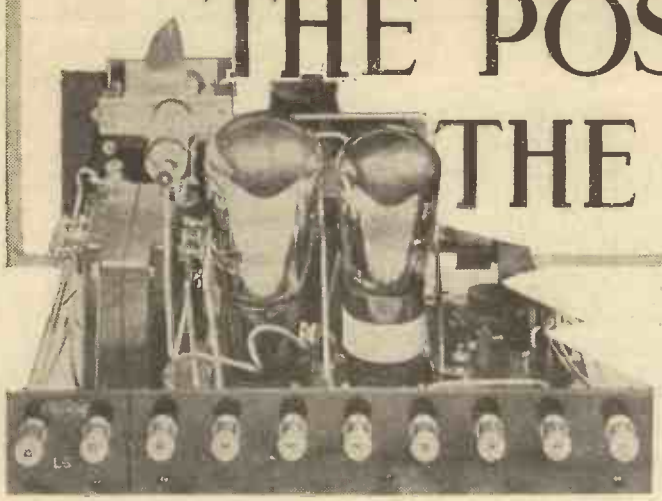
* * *

The diaphragms of telephones should not be removed by inexperienced persons.

* * *

One of the difficulties about the telephone diaphragm is that even a slight bend very easily results in insensitivity.

THE POSITION OF THE PENTODE



The pentode is a popular valve, but it would be much more popular if the various "snags" which accompany its use were more generally realised, and the methods of overcoming them better understood.

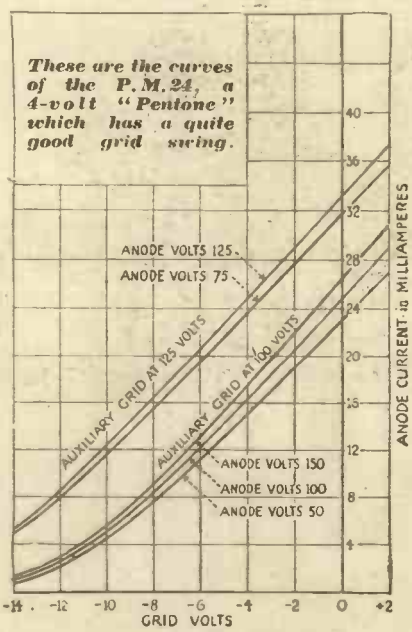
By G. W. EVANS.

ALTHOUGH the pentode valve has now been on the British market for two years, there still seems to be a certain amount of doubt as to the exact position this valve really holds among the other output valves available. It is difficult to define the exact position of the pentode valve, because its peculiarly high impedance and high magnification factor make it a valve not to be used indiscriminately.

A Last-Stage Valve

The ordinary output valve can be plugged in the majority of receivers with a fair certainty that success will follow its use. In the case of the pentode, however, although designed for output purposes, one has to choose the particular pentode very much more carefully to assure success, and one must also remember that the pentode is rather voracious where H.T. current is concerned.

Primarily intended as an output valve, the pentode has also been used as an H.F. valve suitably neutralised, and as a detector, but it is its use as an output valve we want to consider in this article. It is often said that if you take your ordinary last valve out of the set and insert a pentode in this stage you will get results which are tantamount to those obtained by adding an extra L.F. stage to your set.



That is perfectly true up to a point, but the results will not be satisfactory unless great care is taken. In the first place, as a rule, the pentode valve (unless you use one of the super-power pentodes such as the P.M.24A or the P.M.24B, with something like 300 volts anode potential) will not handle a very big input. Quite a number of pentodes take a bias of only about 10½ volts, according to their static curves, although in actual practice something up to 15 volts is very often used. But this means a really small grid swing for an output stage if it is to work a loud speaker properly.

True, you get a high magnification for a small input, so that to some extent the disadvantage of the small grid swing is overcome. As a useful output valve in a two-valve set the pentode is extremely valuable, but when one wants to insert it in the end of a detector and two L.F. set, possibly preceded by an H.F. valve, very much greater care has to be taken in the choice of the pentode for one thing, and in the choice of suitable H.T. for another.

The H.T. Problem

"Suitable H.T." does not mean merely H.T. voltage, for many pentodes work at quite ordinary voltages of something like 120 to 150, but it incurs the provision of quite a considerable amount of current. The anode current of a 6-volt pentode can quite reasonably be 20 milliamps. or more; we have also to consider the

A P.M. 24 and the Cossor 2-volt pentode.

This is the first of the indirectly-heated pentode valves—the Mazda A.C./Pen. It takes a grid bias of 10·5, with an anode voltage of 250 and a screen voltage of 200. It has a slope of 2·2 milliamps. per volt.

Very Careful Biassing is Necessary with Pentode Valves

screening - grid current, and this can be 7 or 8 milliamps.

So that if you are running your pentode valve from a battery, the battery must be of the largest proportions available, while if you are using it with a mains eliminator you have got to be absolutely sure that your eliminator will stand the current to be delivered from it without causing a loss in smoothing, or undue coupling effects, and therefore distortion and probably motor-boating.

The Output Circuit

With the many cone types of loud speaker, it is usually very advisable to have a proper output transformer for the pentode, otherwise the high notes will be over-emphasised, because cone loud speakers are inclined either to over-emphasise the high notes or to have a resonant point somewhere up there which becomes very prominent when a pentode valve is used. Where a peasker has plenty of bass, however, it is sometimes useful to employ a pentode valve without the output transformer, just using a filter choke system.

With moving-coil loud speakers the pentode valve is sometimes very useful for giving a sort of artificial " brilliance " to the reproduction. By this I mean that if the loud speaker itself is rather inclined to be "smudgy" in its reproduction then the pentode will tend to give a brilliance to the music, owing to the fact that this valve will tend to over-emphasise the high notes. Here again the pentode is being used with an ordinary output filter circuit.

Overloading

If your loud speaker is well balanced and you want to use a pentode with it, it is almost essential to use it with a good output pentode transformer, but in the writer's opinion you must use a very big pentode valve indeed in order to get really satisfactory results, especially with a moving-coil loud speaker.

The majority of the sets will load a pentode fully with the greatest of ease, and as a matter of fact there are very few that will not require volume-controlling in order to prevent overloading. The , or a similar type of valve, has no doubt come to stay, and though its design will probably change as time goes on, there will always be a big demand for it for small sets.

The pentode is rapidly becoming more and more efficient, and during the last few weeks you have probably noticed that the A.C. indirectly-heated type of pentode has made its appearance on the market. This valve—I refer, of course, to the Mazda A.C.Pen.—except that the mutual conductance is higher, has the normal characteristics of the pentode valve, and is intended for use in A.C. sets where indirectly-heated cathode valves are employed.

High Mutual Conductance

The mutual conductance is 2·2, and the grid swing according to the static curve is about 10½ volts on either side of the grid-bias point. In other words, the valve is biassed 10½ volts negative.

Obviously, then, the valve is not suitable for use in big sets, but in small receivers should prove a very useful valve indeed.

As *directly*-heated A.C. pentode valves, of course, one could use the 24A or 24B, which are very much bigger valves, having grid swings nearly three times as great as the A.C.Pen., but of course, they require careful filament wiring to be used in conjunction with the other directly-heated valves in the set, for although they use four-volt filaments the amperage is not standard as it is in the case of all other directly-heated valves.

The 24A, taking about ·275 amp., and the 24B, taking 1 amp. This type of valve is remarkably good and when its bias is adjusted to give 24 to 25 milliamps anode current, at about 400 volts H.T. on the plate and 300 on the screening grid, very remarkable results and magnification can be obtained, and, of course, the valve will carry quite a considerable input for a pentode.

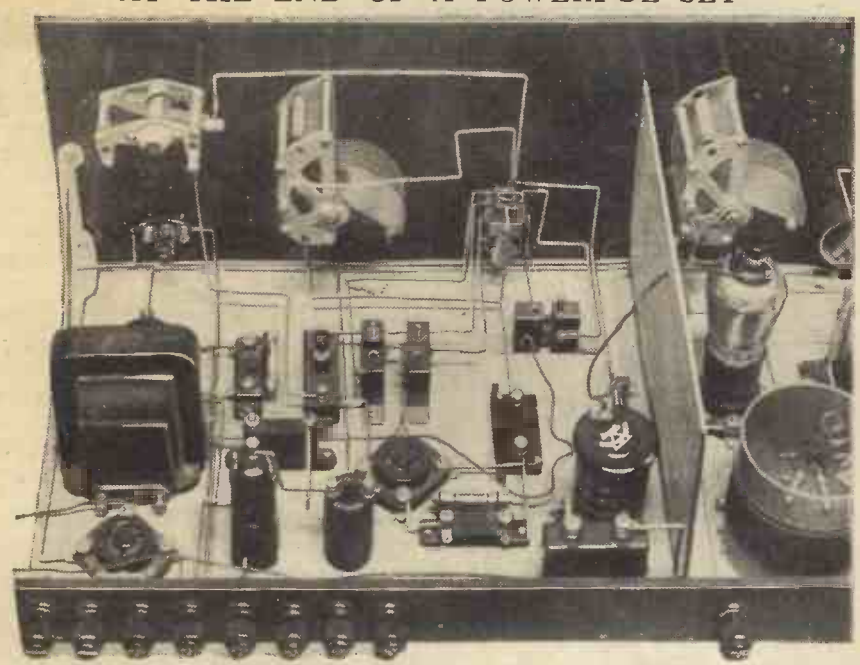
Must be Used Properly

For the man with a fairly powerful set who wants to use a pentode it is a distinct advantage to use this type. For small sets the A.C.Pen. or the smaller types of battery-driven pentodes are useful, provided he goes about the business in a careful and circumspect manner.

It cannot be too much emphasised that the mere plugging in of a pentode valve in the last stage of a set quite indiscriminately, with a rough adjustment of bias, is almost fatal to good results.

The pentode valve has to be used properly, otherwise the results will be indescribably horrible.

AT THE END OF A POWERFUL SET



The ordinary output valve at the end of a large set does not need such careful choosing as the pentode. The pentode, with one or two exceptions, is really a small set valve.

CIRCUIT CLUES

It is a simple matter to understand what the various theoretical circuit symbols stand for, but not quite so easy to follow out exactly what happens in a complicated circuit. Here are some details which will help you to get a sounder understanding of circuit principles.

By SEXTON O'CONNOR.

THE beginner is often puzzled when dealing with valve circuits as to where exactly he should make a start amongst the network of wires and components in order to get the clearest idea of "how the wheels go round."

For instance, he is told that when signals are applied to the input circuit they throw the grid alternately positive and negative, relatively to the filament. He cheerfully accepts this, but possibly wonders vaguely why it doesn't happen the other way round, i.e. why the filament voltage doesn't swing up and down, leaving the grid voltage stationary.

The Natural "Zero"

Of course, the answer is that the whole system is anchored to the H.T. and L.T. batteries, which even when they are not directly earthed have a sufficiently large capacity to form an effective earth. Curiously enough, this simple fact is not always fully appreciated.

ANCHORING

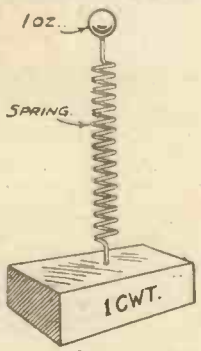


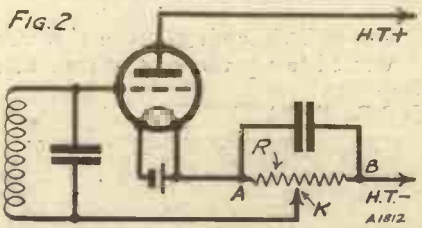
FIG. 1. A1811

A diagram which illustrates how grid potentials vary in relation to the filament.

In Fig. 1 the grid is shown as a small ball, connected by a spiral spring to a much larger mass representing the battery system—or a direct earth. The effect of the incoming signals can now be represented by rubbing one's finger along the spiral spring. Obviously it is the smaller weight and not the heavy "earth" which responds to the impulse by swinging up and down.

In addition to being the natural "zero" point of the system, the negative terminal of the L.T. battery is usually the only point that is common to the three fundamental circuits of the valve. That is to say, it is included not only in the filament circuit, and in the grid-filament or input circuit,

AUTOMATIC GRID BIAS



What is generally known as the "K" point is where the plate-filament circuit joins the grid-filament circuit.

but also in the plate-filament or output circuit.

The "K" Point

In some cases, however, especially in connection with the use of automatic grid bias, the junction point between the plate-filament and grid-filament circuits is specially distinguished, and is often referred to by radio engineers as the "K" point.

For instance, Fig. 2 shows a well-known method of deriving automatic grid bias by inserting a resistance R between the negative terminal of the H.T. battery and the filament accumulator. Here the bias on the grid is determined by the position of the tapping K which marks the point common to the plate and grid circuits.

The path of the plate current is from the H.T. battery along the resistance R, so there will be a fall in voltage along the resistance R.

The point K is accordingly at a lower potential than the point A, i.e. the grid is maintained at a negative bias relatively to the filament, the bias depending upon the resistance between A and K.

The "K" point also plays an important part when the filament supply is taken direct from the A.C. mains. It is quite possible to do this with ordinary valves (as distinct from the special "point eight" type), provided the K point is properly chosen.

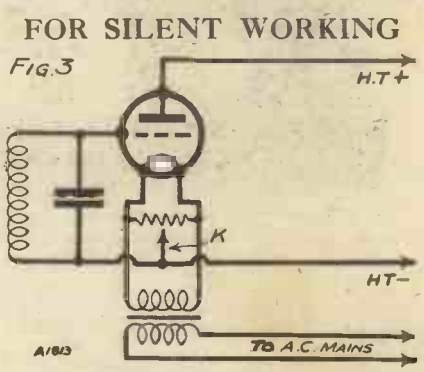
Properly "Anchored"

The usual plan, as shown in Fig. 3, is to use a step-down transformer and to shunt the secondary winding with a potentiometer from which a tapping marked K is made to the grid circuit and H.T. negative. If the K point is properly adjusted the raw A.C. supply produces no "noise" in the loud speaker.

The reason is that both the grid and the plate are now "anchored" to the filament at a point of fixed potential.

By inserting an extra resistance R in the lead to the negative H.T., as shown in Fig. 4, and connecting the

FOR SILENT WORKING



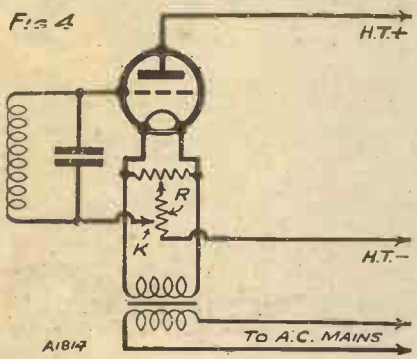
For directly-heated A.C. valves it is necessary for the "K" point to be at the mean point of filament voltage variations

grid lead to a point K along its length, automatic grid bias can also be obtained in a manner similar to that shown in Fig. 2.

Treating the Valve as an Ordinary Resistance

Valve batteries, if in good condition, offer practically no impedance to the currents flowing in the circuit. For this reason the ordinary tuned-anode

COMBINED EFFECTS



This illustration shows how it is possible to obtain automatic grid bias at the same time as a centre-tap to the filament circuit.

coupling between, say, a high-frequency amplifier and a detector valve is sometimes said to be as much in the input circuit of the latter valve as in the output of the former.

One end of the coupling circuit is always connected through a condenser to the grid of the detector. The other end goes direct to the high-tension positive, which, if the H.T. battery has no impedance, is the same as being earthed. In other words, the circuit is, in effect, connected across the grid and filament of the detector valve.

Of course, after a dry-cell battery has been in operation for some time it tends to develop a high internal resistance. Similarly, the impedance of a mains supply unit is always considerable, so that in order to prevent "motor-boating" special decoupling resistances must be inserted to divert the amplified currents through shunt condensers away from the source of supply.

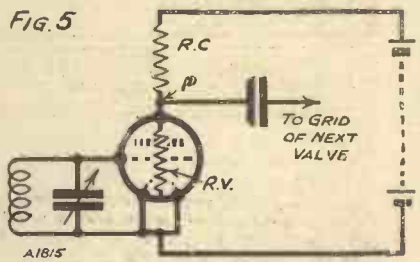
Internal Resistance

It is sometimes very helpful to replace the internal filament-plate path of a valve by the high ohmic resistance which, in fact, it represents. For instance, in the case of resistance coupling there is a rule that maximum efficiency is only attained when the coupling resistance is made approximately three times the internal resistance of the valve.

This is illustrated in Fig. 5, when the filament-plate path inside the valve is replaced by its equivalent resistance RV, in series with the coupling resistance RC. The circuit is in this way reduced to a potentiometer resistance across the H.T. battery, with a tapping at P to the grid of the following valve.

It is useful to remember that the voltage applied by the battery to the plate of the valve is equal to the full battery voltage, less the drop across RC. If RC is equal to RV, the drop will be half the voltage of the battery, or, say, 50 volts.

THE R.C. POTENTIOMETER



By considering the valve as an ordinary resistance it is possible to obtain a clearer conception of the working of certain circuits.

But the fluctuating signal voltages must be considered when dealing with the magnification obtained from the stage.

PRACTICAL POINTERS

When studying valve-makers' curves do not forget that these represent static conditions and are intended as guides only. The curve is flattened and otherwise modified under working or "dynamic" conditions.

* * *

Do not allow kinks to form in your telephone cords if you want them to last as long as possible without replacements.

* * *

Never poke a telephone diaphragm with a duster on the end of a pencil, etc., to clean it, as rust will do it far less harm than such a "remedy."

Your A. and E. Leads

Aerial and earth leads should never be run close together and brought in through the same hole in the window.

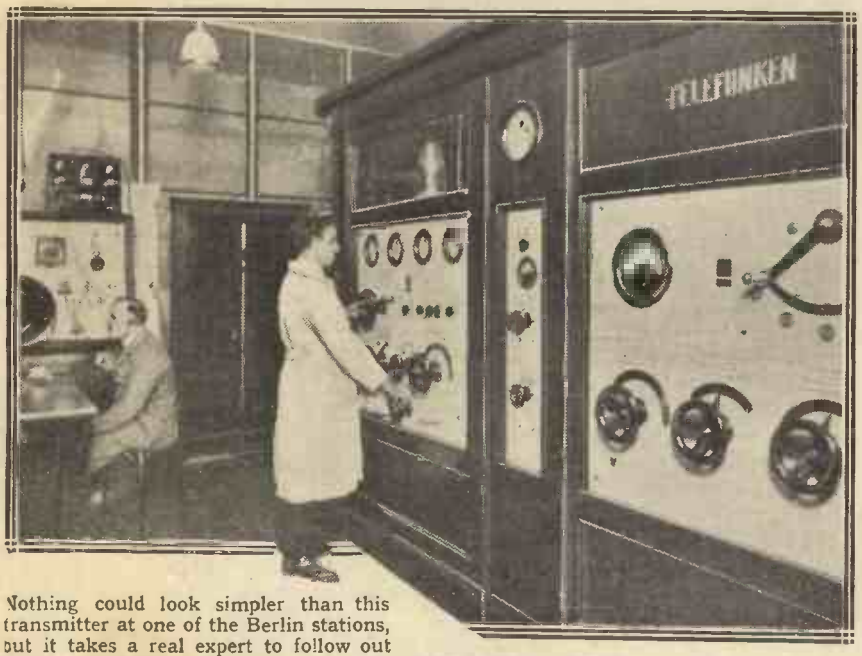
* * *

Battery leads should never be disconnected at the set end of the leads, but always at the battery end.

* * *

If an L.T. battery is disconnected from the set and the leads are left on the battery an accidental "short" may cause no end of trouble.

PANELS WHICH HIDE THE CIRCUITS



Nothing could look simpler than this transmitter at one of the Berlin stations, but it takes a real expert to follow out the various sections of the circuit when it is presented in theoretical form.

The WORLD'S PROGRAMMES

WHEN WHERE AND HOW TO HEAR THOSE FOREIGNERS

CONDUCTED BY "D.X."

LONG-WAVE LISTENING

Some of the best programmes in Europe go out on the long waves. Good concerts—at wonderful strength for foreigners—can be picked up daily and at all times of the day.

* * *

Yet for some reason the long waves get neglected. People don't appreciate their advantages, or else they won't bother to change coils, or to turn the switch over to "Long." How often do *you* listen on long waves?

* * *

This neglect of long-wavers is all the more remarkable because the stations there are so reliable and friendly. They don't fade and flirt with you half so badly as those ordinary wavelength stations. In fact, if you want a good foreign programme in daylight, on the *long* waves is the place to look for it.

Programmes for All

You can't say the stations aren't good, either. Look at Radio-Paris and Eiffel Tower—couple of good chaps always ready to be "matey" with your loud speaker.

* * *

Look at Huizen and Hilversum—those Old Dutch Masters of high repute and wave-length! Easy to get, too, especially in the South of England!

* * *

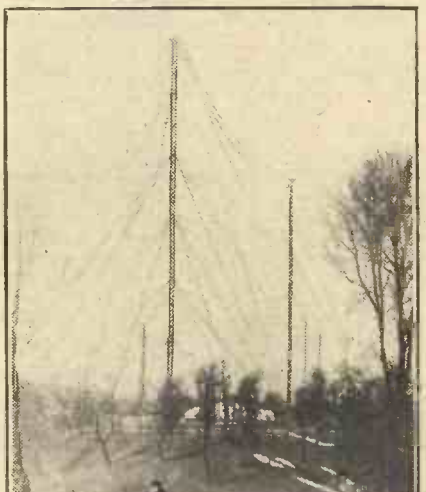
And Northern listeners needn't grumble. They are not neglected, because there are some fine long-wavers in Northern Europe. Kalundborg—the Great Dane—there's a gay dog for you, barking away on 1,153 metres!

* * *

If you don't like these easy-to-get stations, try for some of the Russians—they'll puzzle you all right. And when you get one, you'll think it's a bomb going off when the announcer says: Good-night." Hot Stuffski!

And look at Zeesen (or Konigswusterhausen, if you like that name better). He hands out the Berlin programmes on 1,635 metres. Admittedly that's a bit close to 5 X X, but perhaps you think your set is the last word in selectivity, in which case Zeesen will give you something to think about before you get him clear of interference.

KAUNAS CALLING



These are the aerials of Kaunas—or "Kovno," as it is often called—the long-wave Lithuanian station that works on 1,935 metres.

There are plenty of others, too. Plenty of them, including "The Terrible Turk." His proper name is Ankara (1,931 metres), but I call him The Terrible Turk because—no, I won't tell you why I call him that.

You tune for him yourself, and that's what you too will call him. He's got the longest wavelength in Europe, and he really is a Terrible Turk!

Try to get him, and you'll agree.

D.X.

GOING ABROAD THIS YEAR?

Remember that the Customs people will want to know all about your set if you take one. Visitors to this country can bring a set with them without paying duty, but here is how they treat radio sets going abroad.

* * *

Irish Free State. Duty 33⅓ per cent., ad valorem, 10s. receiving licence, and a deposit as security.

* * *

France. 22 per cent. ad valorem duty, and an additional 6 per cent. duty for high-priced sets and loud speakers.

* * *

Holland. Free, if your stay is short. At most an 8 per cent. deposit, refunded when set is brought out of the country again.

* * *

Belgium. A small fee is payable on entering the country and is refunded when set returns via same Customs house.

How They Treat You

Spain. The visitor to Spain can get a temporary licence at any telegraph office. An import duty (which is not refunded) is chargeable at the rate of 2·88 pesetas (about 1s. 10d.) per Kg.

* * *

Sweden. The import duty is 10 per cent, ad valorem, and this is refunded when leaving.

* * *

Italy. A fee of 2 per cent, ad valorem, is payable and this is not refunded. In addition, on entering the country a duty of approximately 1s. 4d. per Kg. is chargeable, but this is refunded when the traveller leaves the country.

* * *

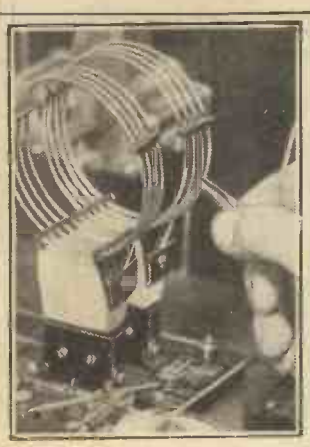
Germany. You must get a listener's licence and then can use the set free of duty.

* * *

Switzerland. A fee of at most about £2, repayable when leaving the country. Also a 2s. monthly licence, renewable once, and not refunded.

* * *

Other countries have their own ideas, but you see from above that most of them are very nice about it.



STATION INFORMATION

A summary of the latest news about the world's radio programme providers.

PRAGUE is to have a new Broadcasting House, with right-bang-up-to-date studios and equipment.

* * *

SYDNEY and other Australian stations have arranged that the Test matches shall be "reported" by beam wireless from England, whilst play is in progress. These telegrams are "elaborated" in the studio in such a way that a sort of running commentary on the game is heard by listeners.

* * *

VANCOUVER and fourteen other Canadian stations re-broadcast the Prince of Wales's speech at the launching of the "Empress of Britain," and no less than 78 U.S. stations "took" this titbit for re-broadcasting.

* * *

SAN SEBASTIAN appears to have increased its power, or else is getting over singularly well for a low-powered station.

* * *

CORK has been bobbing up and down in wave-length lately, and has been bitterly complained of in Germany.

* * *

TURIN determined to have a lady announcer as popular as "Radio Roma's," and a ballot in the Press was the unusual method chosen to select a candidate.

* * *

NEBRASKA has been chosen as the site for a huge American listening-station, which will check wave-length wobbling, etc. A site near Grand Island, Neb., is said to be almost in the geographical centre of the country.

KAISERSLAUTERN may be closed down when the new Mühlacker-Dürrmenz high-power station gets going.

* * *

BUDAPEST has prepared plans for a new 100-kw. station, but there is little likelihood of this operating for at least a year.

* * *

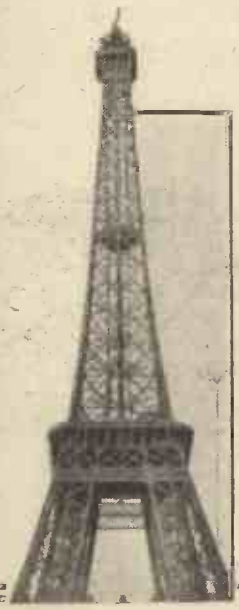
WARSAW is to give more operatic programmes as the result of a recently-made agreement with the Warsaw Opera House.

* * *

REYKJAVIK, the capital of Iceland, has a powerful new station opening shortly with a power of 15 kw. The wave-length will be about 1,200 metres, and tests should be heard in this country before the end of the month, if all goes well.

* * *

VIENNA listeners have been rejoicing over the return to the microphone of their favourite announcer, who has been ill. His singularly clear and engaging voice was missed by many English listeners as well.



ALGIERS occasionally transmits weird effects in the shape of Arabian music by native players and "singers."

* * *

CESKY BROD is to take the air after Christmas on high power (60/120 kw.). Situated near Prague, it is to be "the big noise" of Czecho-Slovakian broadcasting.

* * *

CAPE TOWN and the other South African broadcasting stations are "up against" the language problem again, an agitation having broken out among Afrikaans-speaking listeners for better representation at the microphones.

* * *

BRUSSELS wave-length checking station employs a "cage" aerial when listening to European broadcasters who are suspected of wave-length wobbling.

* * *

DAVENTRY 5XX and **RADIO-PARIS** have at the time of writing been keeping more accurately to their own wave-lengths than any other European long-wavers.

STATIONS YOU HAVE HEARD—
EIFFEL TOWER.

The Tower itself was built back in 1889, for the Paris Exhibition; 7,300 tons of iron was used in its construction, and electric lifts run to the top, which is 894 ft. from the ground.

* * *

Its wonderful possibilities as a wireless mast were soon recognised, and an underground wireless station was built beneath it by the French Government.

* * *

During the Great War "F L" was working day and night. It was from this station that news of the signing of the Armistice was flashed to all fronts.

* * *

Call-sign, F L. Wave-length, 1,444 metres. Power, 12 kw.

are the radio "stop-out-lates" of Europe, their programmes often being gaily on the air at 2.30 a.m.!

* * *

TURIN, which uses a nightingale's song as an interval signal, experienced some difficulty this year owing to the popularity throughout Europe of relaying the song of real nightingales as outside broadcasts.

* * *

NANCY, FRANCE, broadcasts Europe's lowest wave-length programmes on 15·5 metres.

* * *

CHICAGO has installed a thousand sets in one of its prisons, the convicts being allowed to hear two hours of broadcasting daily.

* * *

KONIGSWUSTERHAUSEN has been highly commended by German agriculturists for the accuracy of its "Weather for Farmers" bulletin.

* * *

MUNICH listeners were keenly interested in the recent broadcast there by Mr. John Galsworthy, whose novels are well known in Germany.

* * *

PARIS has decided to cut out picture transmissions owing to the interference they cause, and to the limited number of listeners who want to "look" as well.

* * *

RADIO-NORMANDIE, the Havre amateur-run station, is to be assisted technically by five local radio societies.

* * *

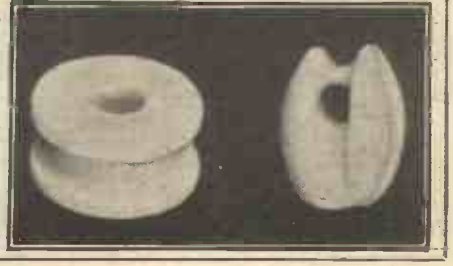
"ELETTRA," Senatore Marconi's yacht, has been very busy on long-distance work recently. (Mussolini himself recently visited this wonderful floating laboratory.)

HILVERSUM (1,071 metres) works on 298 metres up till 5.40 p.m., because the long wave-length is used by the Dutch coast station Scheveningen Haven for communication with shipping.

RADIO VITUS (PARIS) has been suspected by Cardiff listeners of trespassing on their local station's programmes.

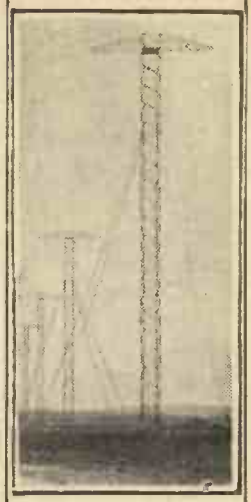
* * *

MADRID and other Spanish stations



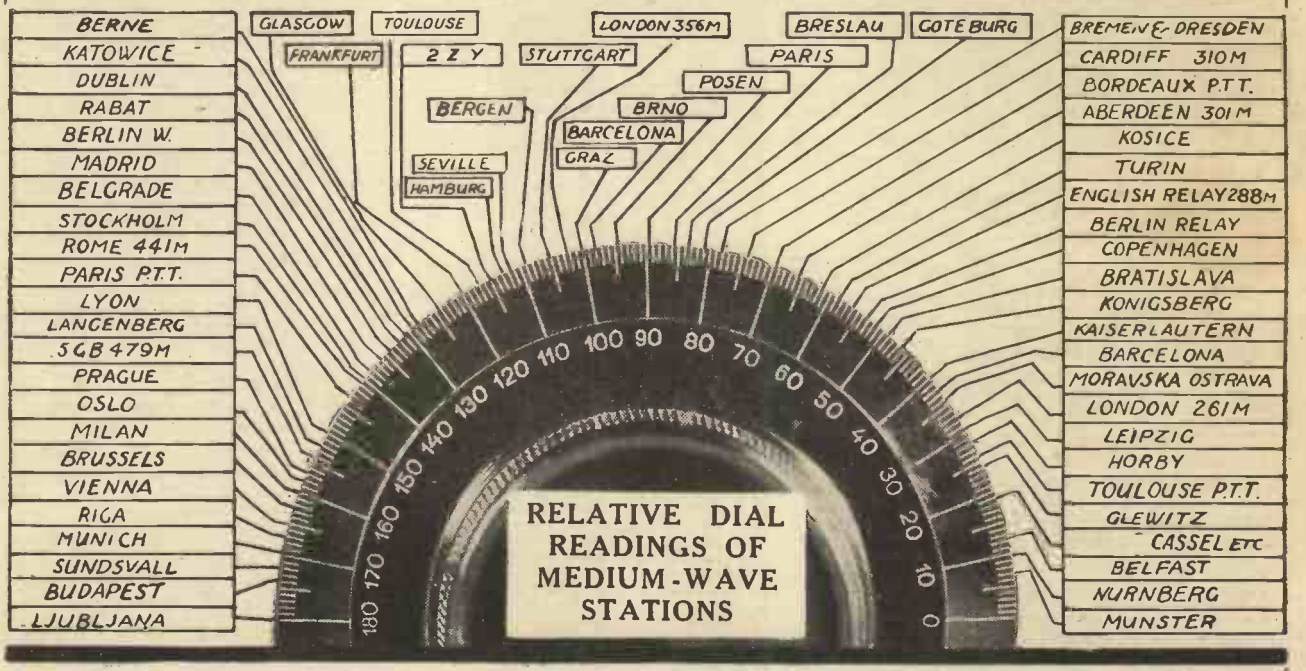
SELECTED SHORT-WAVERS

Wave-length in Metres.	Name of Station.	Wave-length in Metres.	Name of Station.
104·5	Perth (Australia), 6 W F, 0·25 kw.	32·5	Sydney (2 B L).
99	Motala (Sweden).	31·48	Schenectady (N.Y.), W 2 X A F. 10 kw. (Aer.).
54·02	New York City (W 2 X B H).	31·38	Zeesen (Germany).
49·67	New York (W 2 X A L).	31·28	Eindhoven (Holland), P C J, 25 kw.
49·5	Philadelphia (Pa), W 3 X A U.	31·28	Sydney (2 F C).
49·4	Vienna (U O R 2), 0·4 kw.	31·1	Nairobi (Kenya), 7 L O. Daily. Relays 5 S W, 7—8 p.m.
48·86	Pittsburg East (W 8 X K). Relays the K D K A programmes on Weds. and Sats., 10 a.m. to 5 a.m.	25·53	Chelmsford (G 5 S W). 15 kw. (Aer.).
43·86	Georgetown (British Guiana), occasional evening transmissions.	25·25	Pittsburgh East (W 8 X K). Relays K D K A from 11 p.m.
41	Radio Vitus (Paris) Testing.	19·56	Schenectady (W 2 X A D). 11 p.m. to 5 a.m. Relays WGY.
40	Doberitz (Germany), 6 p.m.—8 p.m. daily.	16·88	Hulzen (Holland), P H I, 40 kw.
		16·3	Kootwyk (Holland), P C K.



LONG-WAVE FAVOURITES

Wave-length in Metres.	Name of Station.	Wave-length in Metres.	Name of Station.
1961	Ankara (Turkey), 7 kw.	1304	Kharkov (Russia), 25 kw.
1935	Kaunas (Lithuania), 7 kw.	1200	Istanbul (Turkey), 5 kw. / Boden (Sweden), 0·6 kw.
1875	Huizen (Holland), 6·5 kw.	1153	Kalundborg (Denmark) (relays Copenhagen), 7·5 kw.
1796	Lahti (Finland) (relays Helsinki), 40 kw.	1116	Novosibirsk (Russia), R.A., 4 kw.
1725	Radio Paris (C F R), 12 kw.	1103	Moscow, Popoff (Russia), 40 kw.
1635	Konigswusterhausen (Zeesen) (Germany), 26 kw. Relays Berlin.	1071	Hilversum (Holland), 6·5 kw. Daily after 5.10 p.m.
1554	Daventry National Station (Gt. Britain), 25 kw.	1010	Basle (Switzerland), 0·25 kw.
1481	Moscow (Old Komintern) (R A 1) (Russia), 40 kw.	1000	Leningrad (Russia), 20 kw.
1445	Eiffel Tower (F L), 12 kw.	938	Moscow (Trades Unions), 50 kw.
1411	Warsaw (Poland), 8 kw.	840	Nijni Novgorod (Russia), 1·8 kw.
1348	Motala (Sweden) (relays Stockholm), 30 kw.	760	Geneva (Switzerland), 0·25 kw.



RELATIVE DIAL READINGS OF MEDIUM-WAVE STATIONS

ON THE CARPET!

Accumulator acid on the carpet? You'll be "on the carpet" next. And you'll hear some "acid" remarks, too! My word, you will! Phew!

* * *

For accumulator acid is nasty stuff, poisonous and corrosive. It "eats into" most metals and "eats through" clothes, curtains, carpets, wood, and all those similar things that housewives take a pride in.

If you do spill some on the carpet, *get a move on*, for time is important.

* * *

Got ammonia in the house? Grab it, and wash the stain with a fairly strong solution, which will "neutralise" the acid. (If you use it too strong you may take the dye out of the material, so "watch points.")

WHAT'LL I DO?

Several washings with ammonia-water will save a carpet, and if you finish off with clean water you may be unable even to find the place when it is dry. (*What* an escape!)

* * *

But suppose someone has used up all the ammonia for a bath? What then?

* * *

Strong soda water will do. Same tactics as before, and don't "scamp" the job, but follow strong solutions with weaker ones.

* * *

Best of all, use *care*. All the time. For care is better than "cure," and if the acid never gets on the carpet you will not find yourself in that said unpleasant position. (I know. I've been!)

REAL "LONG-DISTANCE"

Ever picked up America direct on a one-valver? Pretty good work, eh? 'Bout three thousand miles on one little valve wants doing, doesn't it?

* * *

But some chaps—those hot short-wave fellows—get even *Australia* on one valve. Reach out right across the world.

* * *

You might think that hearing Australia was real long-distance reception. After all, it's right round the world, isn't it? Surely wireless can do more than that, ses you?

* * *

You'd be wrong. Picking up Australia is mere *short-distance local* work by comparison with what can be done by radio. Listen to this.

ASTONISHING ECHOES

Professor Stormer, who lives at Oslo, has been studying these short-wave *echoes* that have been discovered. It was found that if P C J sent out a dot it could be picked up anywhere on earth almost instantaneously. But if you waited about half a minute you could *hear that same dot* again.

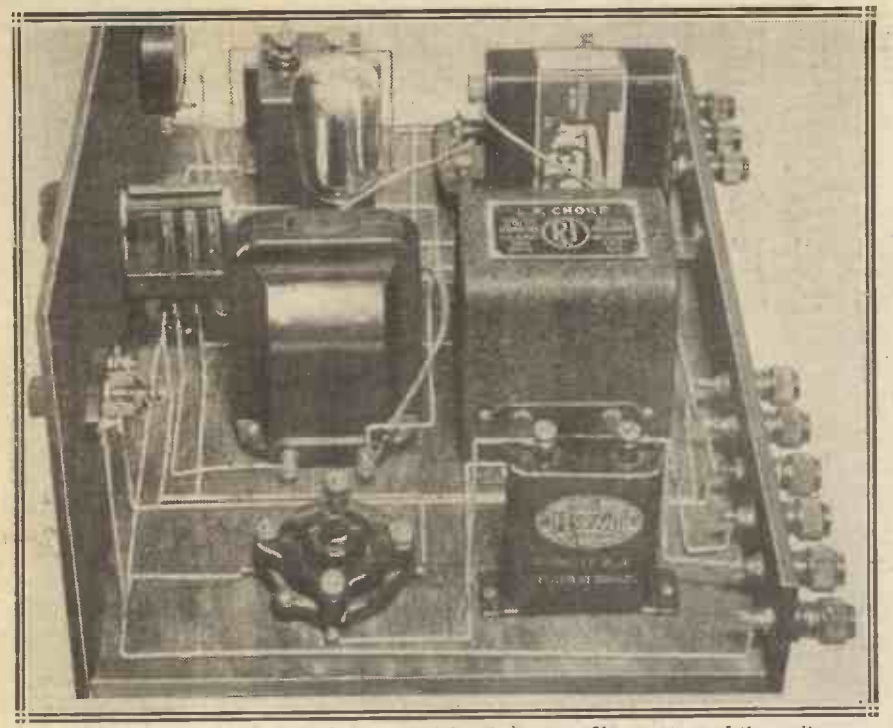
Fact. It's been done repeatedly.

Professor Stormer says the dot leaves the world altogether, goes out into space a few million miles or so, and then gets reflected back to earth again. (It's been *proved* to be the same dot all right.)

* *

The Professor is still experimenting on these lines, but if he is right he must be receiving radio that's travelled simply and literally *millions of miles*.

The



A heavy-duty L.F. choke is employed for the output filter system of the unit.

IT is always a source of wonderment to the present writer that so few people seem to realise what an extraordinarily useful piece of apparatus a good L.F. amplifier can be. Not merely is it an invaluable help in carrying out all sorts of experimental work, but it also forms a most useful basis for an actual receiving outfit.

Simplifying Experimental Work

The first point deserves to be emphasised a little. Only a moment's reflection should be needed to convince anyone that the use of a standard L.F. amplifier as a separate unit must do much to assist the man who likes to try out new schemes whenever he sees them published, when it is remembered that such new devices are, as a rule, concerned with the H.F. and detector portions of a receiver design.

If you have your standard L.F. amplifier always available it means that you can try out any new idea quickly and easily by simply building up a detector or H.F. and detector unit, thereby having at once a complete loud-speaker outfit for your tests.

What About It?

We need not labour the point, for the thoughtful reader is bound to realise from the little we have said that a good L F. amplifier is indeed a useful thing to have about the house. We are out, frankly, to persuade the reader that it would be a thoroughly sound idea if he were to make himself such an amplifier right away, for we feel sure that he will be very well repaid for his quite moderate expenditure of cash and time by the host of things it will enable him to do in the future.

The reader will probably have noticed that each time we have mentioned an amplifier as a desirable possession we have specified that it should be a "good" one, and we should perhaps explain ourselves a little on this point. We do not mean merely that the amplifier should be well designed and assembled with such component values and so on as will give reproduction up to the high modern standard.

That, of course, is to be understood, likewise that components of high quality shall be employed, but what we had in mind was rather that the instrument should be so designed that it should serve satisfactorily as many different purposes as possible, so that the owner may feel confident that it will answer to every call he may make upon it, however unusual.

A Universal Design

The amplifier design we are presenting in these pages has been worked out with a good deal of care to fulfil these requirements, as you will see upon looking over its main features. Reference to the circuit diagram will show you that it consists of the useful standard arrangement of one stage of resistance-capacity coupling, followed by a transformer stage, this being the combination which we ourselves have found most useful for general purposes.

Switching is provided so that if desired only one stage can be employed for certain special purposes which we shall explain later. There is a volume control which functions whether one or two stages are in use, means of employing a gramophone pick-up, and a special input circuit which enables you to bring an anti-motor-boating filter into circuit when desired.

WHAT YOU WILL REQUIRE

- 1 Panel, 14 in. × 7 in. (Lissen, or Trolite, Paxolin, etc.).
- 1 Cabinet to fit, with baseboard 10 in. deep (Camco, or Pickett, Lock, Osborne, etc.).
- 1 Volume control, ·5 meg. (Varley, or Lissen, R.I., Gambrell, Magnum, Wearite, etc.).
- 1 3-pole panel-mounting change-over switch (Wearite, or similar type).
- 1 L.T. switch (Lotus, or Lissen, Bulgin, Igranic, Ormond, Benjamin, Ready Radio, Magnum, Jewel, etc.).
- 1 4-mfd. fixed condenser (T.C.C., or Lissen, Dubilier, Hydra, Mullard, etc.).
- 1 ·01-mfd. fixed condenser (Dubilier, or Lissen, Mullard, T.C.C., etc.).
- 1 25,000-ohm resistance and holder (Ready Radio, or Ferranti, etc.).
- 1 100,000-ohm resistance and holder (Varley, or Igranic, Mullard, R.I., Lissen, Dubilier, Ready Radio, etc.).
- 2 Sprung valve holders (Igranic, or Lotus, Benjamin, W.B., Formo, Magnum, Lissen, Junit, Bulgin, Wearite, etc.).
- 1 Low-ratio low-frequency transformer (Lissen, or Ferranti, Varley, Lotus, R.I., Lewcos, Telsen, Mullard, etc.).
- 1 Output choke (R.I., or Ferranti, Lissen, Varley, Wearite, Magnum, etc.).
- 1 2-mfd. fixed condenser (Ferranti, or Lissen, Dubilier, T.C.C., Mullard, Hydra, etc.).
- 1 Jack for pick-up (Bulgin, or Igranic, Lissen, Ormond, etc.).
- 9 Terminals (Belling and Lee, or Eelex, Igranic, etc.).
- 1 Terminal strip, 14 in. × 2 in.
- 1 Clip for G.B. battery (Bulgin, etc.).

Flex, G.B. plugs, wire, screws, etc.

"Dual" Amplifier

The " Dual " in use with a single-valver of recent design.

Specially designed to suit practically any type of receiver, and to be available for use with a pick-up, this two-valve amplifier is also intended for use with the "Two-Range" Two, described elsewhere in this issue. For listener and experimenter alike it forms an ideal L.F. amplifier.

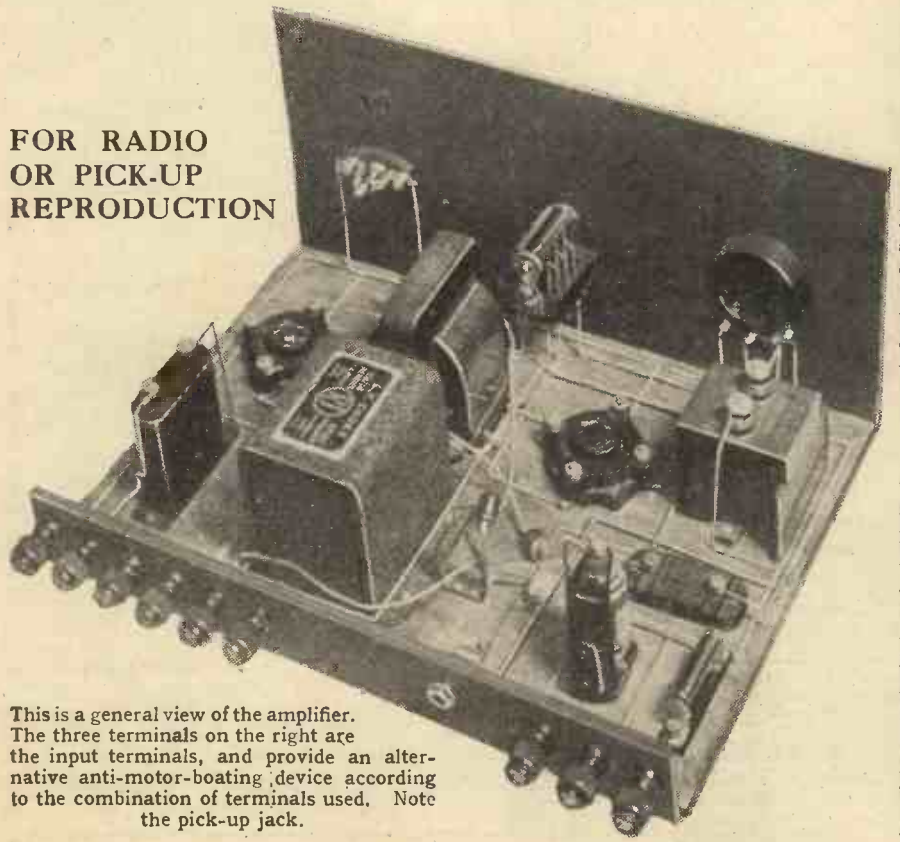
Designed and Described by the "M.W." Research Department.

An output filter is, of course, provided for the loud speaker, since one of the possible applications of such an amplifier as this is the reproduction of dance music at considerable volume, with the aid of a gramophone pick-up, in which case no doubt a fair-sized super-power valve would be employed.

Now let us go over the circuit diagram rather more in detail and see how these various devices are arranged, looking first at the special input arrangement we have mentioned. You will see that there are three input terminals, and it is intended that terminal No. 1 should be connected across to that output terminal of the receiver which is wired internally to the plate of the detector valve.

The output terminal of the receiver which is wired to H.T. positive inside the set will be connected to No. 2 or No. 3 on the amplifier. When connected to No. 2 we have just the ordinary arrangement of resistance-capacity coupling between your detector and the first L.F. valve.

FOR RADIO OR PICK-UP REPRODUCTION



This is a general view of the amplifier. The three terminals on the right are the input terminals, and provide an alternative anti-motor-boating device according to the combination of terminals used. Note the pick-up jack.

Using a Pick-Up

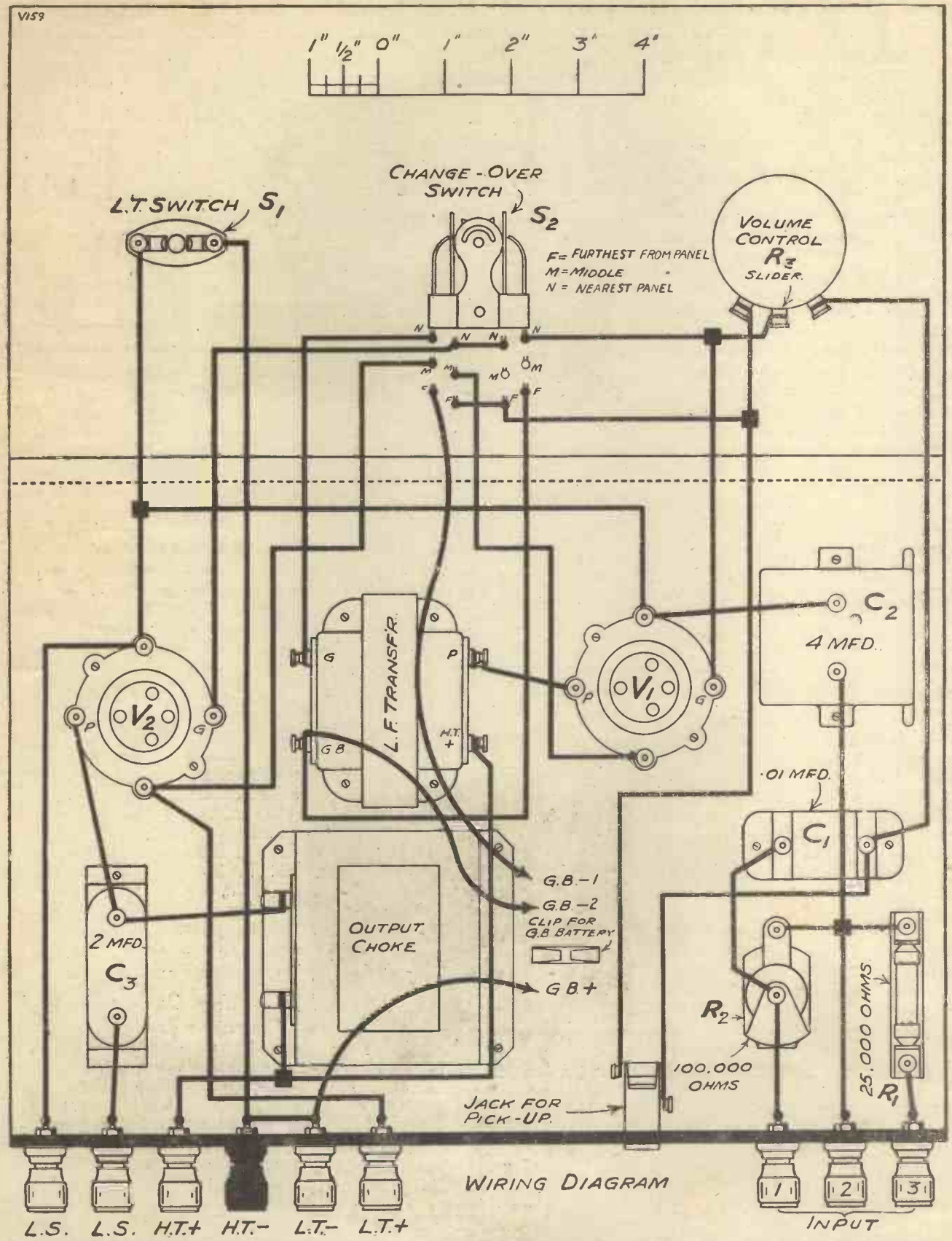
On transferring the lead to terminal No. 3 you bring in the conventional type of resistance-condenser decoupling filter, which will be used in dealing with cases of motor-boating. The anode resistance, you will observe, is of only 100,000 ohms, a value which usually enables much better reaction effects to be obtained than the older standard value of 250,000 ohms.

The volume control and the device for connecting the pick-up into circuit you will find are both located in the grid circuit of the resistance-capacity stage, the volume control itself replacing the usual grid leak. You will see presently that even when only one of the stages is in use this volume control remains in circuit.

Either One or Both

The pick-up device is very simple consisting merely of a jack connected across the volume control, so bringing the pick-up into the grid circuit of the valve. In use, of course, it is only necessary to furnish your pick-up leads with a plug and insert the plug in the jack we have just mentioned, at the same time turning off the filaments of the valves in the receiver proper.

The switching scheme which gives you the choice of using either one or both of the L.F. valves may look at first sight a little complicated,



You should follow this diagram as closely as possible when building the unit. The resistance R_2 and condenser C_2 constitute a useful de-coupling device, while you will notice that one H.T. — terminal is marked in black. This should *not* be used when the amplifier is employed in conjunction with a radio set, unless separate H.T. batteries are used for the amplifier. It comes into use, however, when a pick-up and no radio set is connected to the amplifying unit.

An Ideal Amplifier for Practically any Receiver

but it is actually simple enough. In one position of the switch you have just the normal circuit with both valves working, while on turning it over to the other side the filament circuit of the first L.F. valve is broken and the signals from the R.C. stage transferred to the grid circuit of the second valve. You thus have the second valve in use by itself, resistance-coupled to the detector valve in the receiver.

Simplifying the Switching

This scheme we only adopted after careful consideration, for the following reasons. In the first place, it is only in this way that one is able to arrange in a simple manner for the volume control to be satisfactorily effective regardless of whether one or two valves are in use. Secondly, we decided that one stage alone would only be used for reception of just the local station or stations, for which purpose a resistance-capacity stage is usually ample with any receiver incorporating one or more H.F. stages.

With single-valve and crystal sets, on the other hand, two L.F. stages will almost always be used, just as they will in practically every case for the reception of foreign stations. We therefore decided that the single R.C. stage would probably suit the present requirements better than some necessarily more complicated system of switching which would bring in the transformer when only one valve is in use.

That Extra Terminal

A further advantage of the system employed is that since the R.C. coupling is always in the detector anode circuit, there is no change in the effective H.T. voltage applied to that valve.

You will observe, by the by, that this amplifier is a little unusual in being provided with a terminal for the H.T. negative. This is only intended for use when the instrument is being employed by itself—i.e. as an electric gramophone or with a crystal set. When the amplifier is connected to a valve set and the same L.T. battery serves set and amplifier, *no* connection should be made to the H.T.— terminal on the amplifier. This is important. If separate L.T. batteries are used for set and amplifier, on the other hand, the H.T.— on the latter requires to be joined up to the H.T. battery as usual.

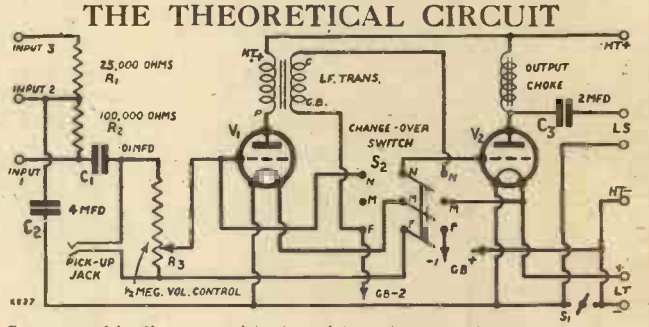
When the amplifier is used with a crystal set you have a choice of two methods of connecting the output of the crystal to the input of the magnifier. You can use either the input terminals 1 and 2, taking care to join No. 1 to that 'phone terminal on the receiver which is wired internally to the crystal detector, or you can plug into the pick-up jack.

Correct Crystal Connections

The latter method is recommended, and requires the use of a twin flex lead ending in a plug to fit the jack, and connected at the free ends to the 'phone terminals of the crystal set. To get the

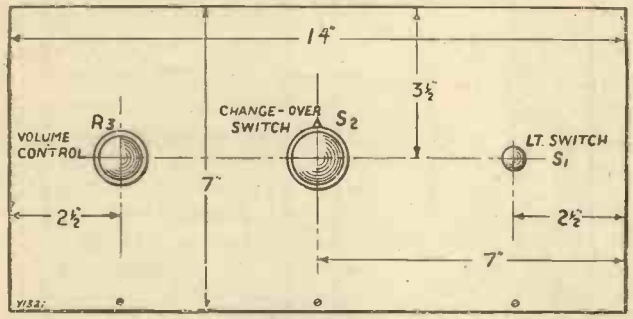
(*Continued on next page.*)

THE THEORETICAL CIRCUIT



Compare this diagram with the wiring chart on the opposite page.

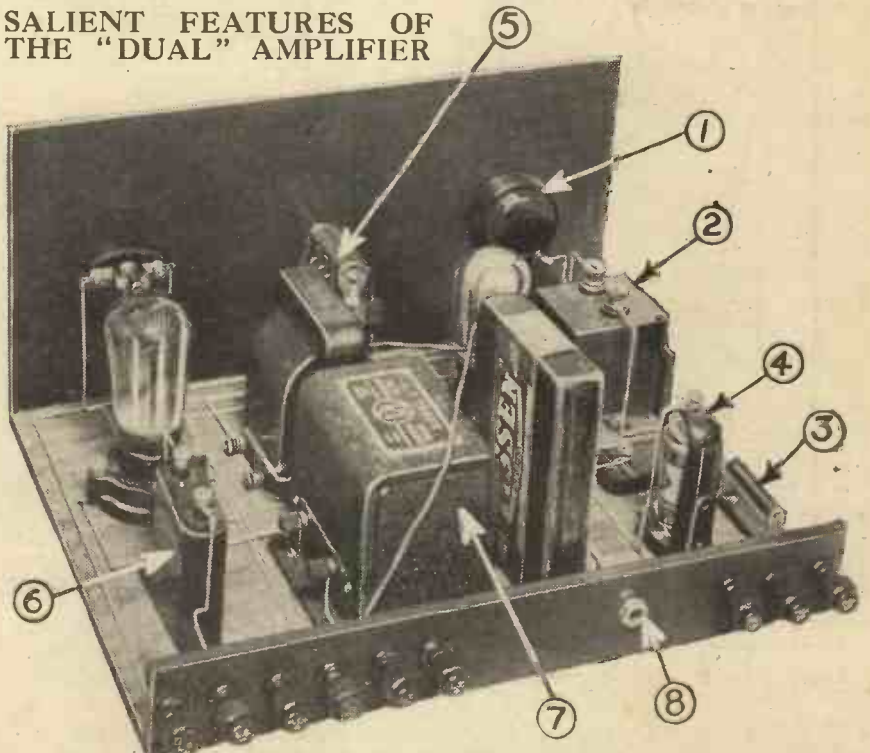
THE PANEL COMPONENTS



PANEL LAYOUT

By means of switch S_2 either one or two valves can be used at will.

SALIENT FEATURES OF THE "DUAL" AMPLIFIER



The main parts of the amplifier are detailed here : (1) is the volume control R_3 ; (2) and (3) the de-coupling condenser and resistance ; (4) input resistance R_2 ; (5) change-over switch S_2 ; (6) output filter condenser C_3 ; (7) output choke ; (8) pick-up jack.

THE "DUAL" AMPLIFIER

—continued from previous page.

connections the right way round may be a little puzzling unless the flex you use has distinguishing colours in the covering, but it is easily done by trial and error. Just reverse the connections to the 'phone terminals on the set, and you will soon see which is the right way.

Now for some constructional points. The greater part of the work is quite simple with the aid of the various diagrams, but we should just explain certain details connected with the switch S_2.

Wiring the Switch

We think you will find it easy enough to identify the various contacts with the aid of the wiring diagram, but a few hints on the best method of wiring them into circuit may be helpful.

If you use the same make of switch as the one in the original amplifier you will find upon examination that it has twelve connecting points to which leads can be soldered.

The six points which form the two middle rows require to be wired together in pairs at two points, as you will see from the wiring diagram, and it is advisable to do this *before* you fit the switch upon the panel.

The wires to the various points on these middle contacts (there are only three) should also be soldered on before the switch is fixed, which you will find quite simple because they are fairly short and do not require bending to any complicated shape afterwards.

Checking the Contact Points

The connections to the contacts in the outer rows can be attached after fitting the switch, for these points are fairly accessible, and can be rendered more so by bending them outwards a trifle.

By the way, for identification purposes these connection points on the switch are marked "N," "M" and "F," which refers to their nearness to the panel of the amplifier. In other words, "N" means next to the panel.

The rest of the work you will find is just a simple matter of following the diagrams and photos, but there is a point about the volume control which we should like to mention. The wiring shown for this component is such as to cause it to come into action when it is turned to the *right*—i.e. it then cuts down the volume—and to obtain full strength you must turn it right round to the left. If you prefer the alternative scheme of increasing volume by turning to the right, just reverse the two leads to the outside terminals of the volume control.

That completes our review of the constructional side, and now you only want some brief data to guide you in putting the finished instrument into operation. The general details of its connections, and so on, you will already have gathered, and all you really want now are the valve types. In general we should advise a valve of the L.F. type for V_1, impedance perhaps 10,000 to 18,000 ohms, but for the maximum amplification when signals tend to be weak one of the H.F. type should be used.

In the last stage (V_2), of course, you will use a power valve if you want only a moderate output or your available H.T. current is limited, or a suitable super-power for larger outputs. The H.T. voltage will be the usual 120 volts or more, according to the valve, and grid bias should be adjusted in accordance with the valve-maker's specifications.

A "RECORD" EXAMINATION

Either radio or gramophone record reproduction can be obtained with the "Dual" Amplifier. Here we see a record being examined in sunlight at a well-known German laboratory.

SOME PRACTICAL DON'TS

DON'T apply a much higher H.T. voltage to a valve than the makers specify, or the valve may become soft.

Don't use cheap flex for connecting a unit to the mains. Employ stout, adequately protected material.

Don't place terminals closer together than is absolutely necessary.

H.F. Valves

Don't forget that an H.F. valve is not necessarily used for H.F. stages only.

Don't, when your set fails to operate, obtain new components without first ascertaining the cause of the failure.

Don't trouble to tap holes for terminals: ebonite is soft and screw threads will act as their own taps when warm.

Don't forget reception is usually better at night than during the day.

Don't forget valves are fragile, and a slight knock may damage them.

Don't forget to take the lacquer off any parts of terminals with which connecting wires make contact. Methylated spirit will usually remove it.

A G.B. Tip

Don't be afraid to use plenty of grid bias in L.F. stages; an excess can do no harm—except to reproduction.

Don't forget to polish both sides of a panel when the holes have been drilled; a soft rag and a little turpentine will do the trick.

Don't omit to mark plus and minus H.T. and L.T. terminals distinctly; this may save you trouble.

Don't put terminals too near the edges of a panel or the latter may not fit into the cabinet.

AT YOUR SERVICE

BY THE TRADE EDITOR

In this special feature every month readers will find items of interest concerning the latest doings of the radio trade. "At Your Service" provides a valuable link between the reader and the advertiser, and firms are invited to send in news of interest for inclusion in these columns.

FEW owners of wireless sets would think that there was any connection between radio or the radio trade and the everyday running of a newspaper, although messages come in from all over the world by radio, and are reprinted in the text. But not only is it important that a paper should have its finger on the pulse of the world, but each department must be within instant communication with each other department in the vast organisation necessary in this type of concern.

Speeding Things Up

There are few places in this country where newspaper competition is keener than in Newcastle, and the beginning of 1929 saw the launching of the Newcastle "Evening World," making the pace in newspaper production hotter than ever. In the battle between two great newspapers in that town it is interesting to note that one of the papers has turned to Messrs. S. G. Brown for assistance in speeding up its production by helping to get better communication between the various departments in its business.

Consequently the Brown electro-megophone has been installed complete in the offices of the Newcastle "Evening Chronicle." Prior to the installation of the electro-megophone, communication between the various departments had been by means of an old type of hand microphone.

Now, however, things are being rapidly speeded up, due to the efficient communication between the various departments which is made possible by this device.

A Novel Scheme

Another interesting thing Messrs. S. G. Brown have done is the production of the Carnival Model Music Reproducer. This is a device which packs complete into a trailer to be towed behind any car, and the outfit provides approximately 16 watts undistorted output for use in the transmitting of gramophone records through loud speakers in fair grounds.

The apparatus is housed in a modern trailer running on pneumatic tyres, and can be connected on to a van for travelling purposes. It is very similar to the trailers which run connected to a motor-car for caravan purposes. Inside the trailer is a petrol motor coupled directly to an electric generator which provides both the H.T. and L.T. necessary for operating the amplifier. A double-motor turntable suitable for modern gramophone records is provided in the equipment, so that nowadays instead of the old worn-out tunes usually played by a calliope on the fair ground we can expect to hear selections from the Guards Band, or from Jack Hilton's or Jack Payne's orchestra, floating over the green fields.

At the Show

Most of the radio firms are now working at fever heat getting ready for the Radio Exhibition to be held at Olympia on September 19th next. I understand that the majority of the stands have already been allotted and that this year it will be an even more marvellous Show than last.

A representative of one of the well-known valve firms was discussing the matter with me the other day, and

THE HOME OF PIP, SQUEAK AND WILFRED

This special "Daily Mirror" van, touring the seaside towns, is fitted with Celestion amplifiers and loud-speaker equipment.

Philips "Score" at Wimbledon

mentioned the fact that in spite of all precautions they always have quite a number of valves stolen each year. So nowadays they put dummy valves on show.

Valves "Pinched"

The funny part of it is, however, that these dummy valves get stolen in the belief that they are good ones, and that not content with stealing the valve some of the purloiners actually send them back with a complaint saying that they have had the valve a very short time and it has "given up the ghost," and what are the makers going to do about it?

Of course, examination shows that either the valve has never been exhausted or the pip has been cut off, or that the electrodes have actually been twisted together inside the pinch and never connected to the valve pins.

How it Ends

The end of the matter is usually that the complainant receives a polite letter to the effect that unfortunately he seems to have sent in a dummy valve by mistake, and on receiving the proper valve the makers will be glad to look into the matter at once, and, of course, there it all ends. But it is rather an interesting sidelight on a certain type of human psychology, isn't it?

* * *

During the recent lawn tennis championships at Wimbledon, car-owners attending the tournaments were enabled to have their cars called by radio, owing to the co-operation of Messrs. Philips Radio with the A.A.

A microphone controlling a number of loud speakers in the official car park was installed in the A.A. box near the centre court. As an owner left the court he gave his name and the name of the chauffeur in charge of the car. Information was immediately transmitted over the microphone to the car park and the chauffeur concerned would bring the car out.

Messrs. Phillips also have sent us news that the church at Tintagel, Cornwall, is following a very unusual plan to take the place of their chimes of bells, which for thirty years have been silent owing to the cost of installing being too high for the parish.

Now, a loud-speaker equipment, which can reproduce a peal of bells by means of an electric gramophone and an amplifier, is to be installed in the tower. Tintagel, of course, was the home of King Arthur and the Knights of the Round Table, and possesses a very fine old country church. We wonder what King Arthur and his men would think if they could only see what modern science has done for their old "home town."

"EKCO" ANSWERS YES!

When asked whether the mains unit and set trade was really developing as rapidly as might be expected, Messrs. E. K. Cole & Co. replied in no uncertain terms by sending us this photo of their new works, which are nearing completion. Although the floor space is 2 acres, "Ekco's" are keeping 9 acres spare for future development. Who said there was a slump in the radio trade?

Here's Your Chance!

An interesting competition is being run by the Marconiphone Company, who are offering prizes to "Radio" readers in their radio Snaps competition.

This is what you have to do. While on holiday you will see many interesting subjects for snaps, humorous or otherwise, for your camera, and the prizes are offered for the best photographs showing a portable radio set in use. Further details can be had from the Marconiphone publication called "Radio," which is published monthly at the price of 1d.

The July number has the particulars of this competition on page 14. The winning photo becomes the property of the Marconiphone Company, who also reserve the right to take further prints at the current press rate. The competition closes on Aug. 20th.

Down South

Eastbourne has been having a very lively time lately, for Devonshire Park has been the scene of an exhibition held in connection with the recent I.M.E.A. convention. At the convention Messrs. G.E.C. have been going in full force; in fact, the lighting of the gardens was left to them, and the fountains and various buildings were illuminated by special floodlights. The main fountain lighting was provided by a 1,000-watt G.E.C. projector lamp fitted within the fountains, and this lamp was surrounded by seventeen 40-watt amber-coloured lamps.

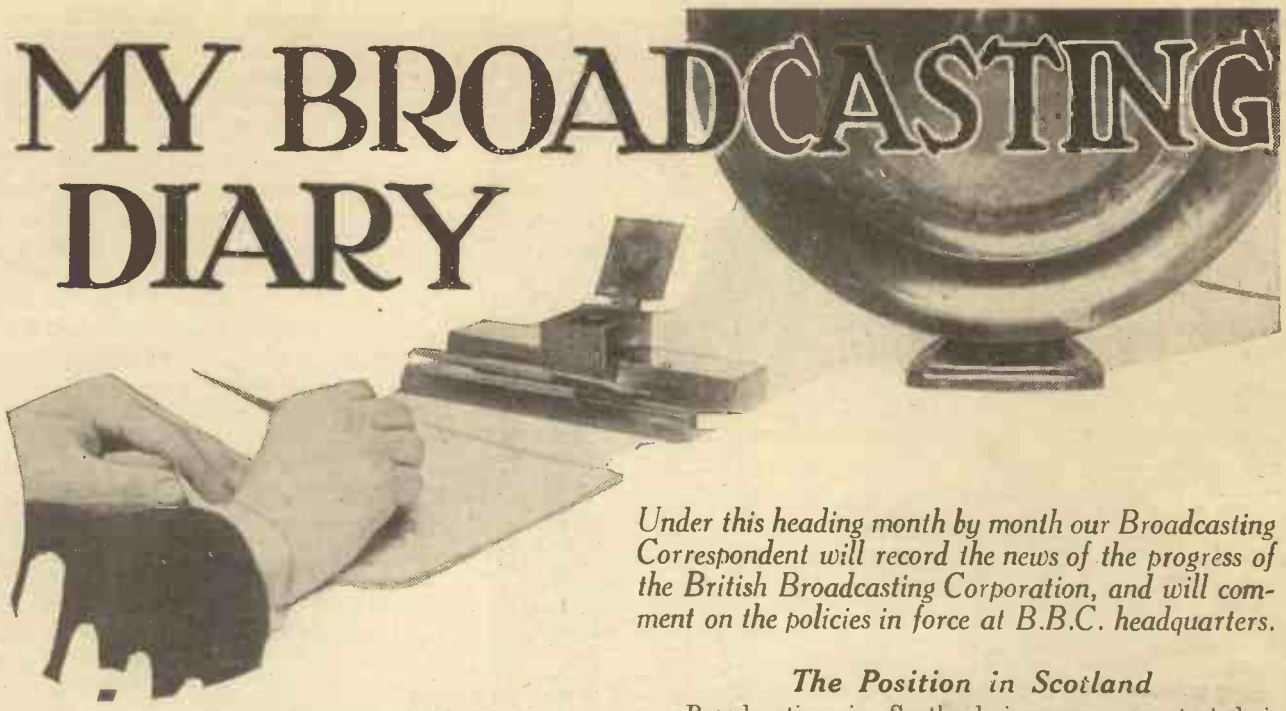
Another Osram Success

It is a far cry from Devonshire Park, Eastbourne, to Kingsford Smith's flight to America, but the lamps used in the park and the valves used by Kingsford Smith both came from the same works—the well-known Osram factory. Osrams are in the front rank with anything to do with lamps or valves.

Smoothing at Oslo

It is interesting to note that all the smoothing condensers used in the Oslo transmitter are Hydra condensers, big brothers to those wonderful little chaps so many of us use in our mains units.

MY BROADCASTING DIARY



Under this heading month by month our Broadcasting Correspondent will record the news of the progress of the British Broadcasting Corporation, and will comment on the policies in force at B.B.C. headquarters.

Calm at Savoy Hill

SINCE the appointment of Mr. Whitley to the chairmanship of the B.B.C. almost complete calm has prevailed within that organisation. It is not that the new chairman has taken any special action; on the contrary, it is believed that he still plays the rôle of the attentive learner and listener. But the fact remains that the main battles have died down both in the staff and as between the staff and the Board of Governors. Simultaneously, there is renewed interest in broadcasting, which is to be commended.

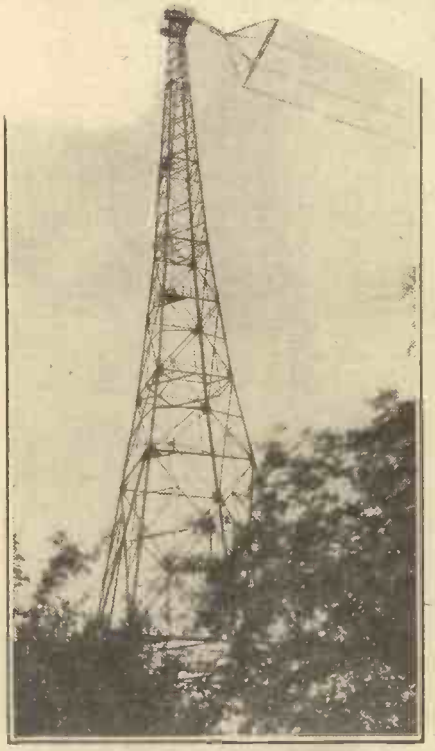
Regional Scheme Doubts

It is unlikely that the Regional Scheme will be applied entirely as originally intended. A lot of new problems are being revealed in experience. The restrictions on the efficiency of the lower waves are rather greater than were anticipated. Also, 5 X X suffers rather more in crowded centres than was believed.

I would not be surprised to see some modifications introduced as early as August, or at the beginning of September at the latest. The London Regional wave (356), formerly the channel for 2 L O, will be given some of the big broadcasts formerly reserved for the London National on 261. Thus there will be created virtually two national programmes radiated from London.

This is as it should be. There is no such thing as a London Region, anyway. Daventry 5 X X will be linked to whichever London transmitter is giving the programme of more general interest. The weekday morning religious service will be one of the first items to be transferred.

A LANDMARK FOR MILES



One of the masts at Brookmans Park station which are a local landmark. The transmissions from the 2 L O "twins" are also a "landmark," but in the ether.

The Position in Scotland

Broadcasting in Scotland is now concentrated in Edinburgh, and preparations are going ahead for the dual service to be given from the Scottish Regional transmitter some time next year. Mr. Cleghorn Thomson, the B.B.C. Director for Scotland, has done notable work in programme building and in lifting the prestige of the Corporation on the other side of the Tweed.

In fact, so hard has Mr. Thomson worked that he was recently ordered away by his physician in order to avoid a complete nervous breakdown. I understand that his health is now on the mend. If so, and if he cares to stay on in the B.B.C., much will be heard of this brilliant young man, of whom Sir John Simon is reputed to have said that he could be the "Gladstone of the twentieth century."

Testing Listeners' Opinions

Mr. Siepman, the broadcast adult education officer of the B.B.C., revealed an interesting development of policy the other day at a meeting of one of his committees. He said that in the autumn the B.B.C. would undertake a statistical survey for the purpose of securing the views of listeners on subjects connected with broadcast education. The project may be extended to include the work of other departments as well, and questionnaires are now being prepared. This is the first time the B.B.C. has admitted the possibility of there being anything to learn from a referendum or reference back of any form. The idea has always been that the programme experts are in the best position to judge of programme composition, much better, indeed, than any individual listener or group of listeners.

Latest News Items for the Listener

My view is that no good can be expected of any such venture as that now contemplated. If it is to include all departments, the questionnaires will be much too cumbersome and involved for any ordinary person to take the trouble to deal with.

If it is to include just the education department, then its result is a foregone conclusion. It is obvious that no competent group of persons, let alone such enthusiasts as run B.B.C. education, are going to sponsor their own official execution. No, the only retrieving feature of the whole thing is the fact that it is to be experimental.

This makes it possible for such extravagance to be curtailed before it has reached the stage of heavy commitment.

The Menin Gate

At the Menin Gate there is blown every night a fanfare of trumpets. It is hoped this year to work this into the Armistice Day programme. Mr. Gielgud, the dramatic producer at Savoy Hill, is planning a repeat performance of "Brigade Exchange," the German war-play which was so successful when given by the B.B.C. some time ago. If Mr. Gielgud's plan materialises, he will introduce the Menin Gate fanfare at a dramatic moment of the play.

RADIO IN INDIA

Broadcasting is becoming increasingly important in India, and here is His Highness the Maharaja Holkar before the microphone.

The Original "Co-ops."

The B.B.C. is planning to put on a special series of light broadcasts in August, featuring six of the original Co-optimists. This series will replace the customary weekly vaudeville.

Less Talk ?

There is a strong movement in the B.B.C., believed to have the blessing of the Director-General himself, to curtail the time now allotted to talks. There is a feeling that there might be more music and news than at present and that the talks might be timed more felicitously. Thus if the period from 7.30 to 9 were left clear for the main entertainment of the evening, most people would feel much happier about their wireless programmes.

Then just the news and one talk, and then back to entertainment. I sincerely hope something comes of this movement. It is no reflection on the Talks people that some of their time may be taken away. On the contrary, their talks are excellent—but they cannot escape the fact that they are talks and not music.

Aberdeen's Wave-length

When the twin-wave transmitter at Slaithwaite begins, probably next February or March, it will take from Aberdeen the exclusive wave it has been enjoying for some time past. What then will happen at Aberdeen ? There appears to be three alternatives : the Leeds' wave of 200 metres ; the national common of 288·5 ; or an international common of about 290 metres. No decision has yet been taken on this very difficult choice.

The National Anthem

Several of my correspondents recently have complained at the apparent disregard by the B.B.C. of the practice of concluding concerts with the playing of the National Anthem. Birmingham is the only centre which has observed the rule regularly. Now I hear that the subject has come up in the B.B.C., with the result that a rule has been made that the National Anthem is to be played at the conclusion of a programme whenever there is a reasonable-sized musical combination in the studio, it being understood that it should be heard at least twice weekly.

Success of the Northern Proms.

The B.B.C. venture of a series of Northern Proms. in co-operation with Sir Hamilton Harty was an undoubted success at all three places, Manchester, Leeds and Liverpool. There is already a move on foot for a longer and more ambitious series next year, including Sheffield, Newcastle and Hull.

"The Week in the Provinces"

Miss Matheson, the energetic Talks Director at Savoy Hill, is contriving a new series to be complementary to the series "The Week in London," originated by Gerald Barry and now carried on by Harold Nicholson. The idea is to have some well-known and popular personality give an account week by week of happenings outside London. There would have to be a special man for Scotland, and Major Walter Elliot's name is mentioned for this.

I have not heard who is to do the "Provinces," but I have a shrewd suspicion that Miss Matheson will find that this can be done better by the Regions themselves than by London. It would be much too expensive to keep a man on the move all the time in order once a week to give an eye-witness account of everything outside London.

THE "EKCO - LECTRIC" S.G.P. THREE

A review of a modern radio receiver which is run direct from A.C. mains.

THE present-day popularity of radio sets operated from the mains is no accident. Behind the modern all-electric receiver are years of hard work and plenty of it, and a hard-won knowledge of what the public wants. And among the names especially famous in this line of the radio business is the name of E. K. Cole, Ltd.

A "Last-Word" Set

In the business right at the beginning, this firm made its reputation early and has continually enhanced it; and as the set under discussion represents the last word in "Ekco" construction and design it was with a particularly keen interest that this model was tested.

The distribution of the controls, etc., is well shown in the photograph. The four main controls are in the front, the on-off switch and the control for selectivity and volume are on the left-hand side of the case, and the rest of the fittings are at the back.

One of these takes the form of a flexible lead with an ordinary socket at the end which you plug into any lampholder in the house. Besides this there are sockets with well-made plugs for aerial and earth to which the leads may be attached, a pair of sockets for the attachment of the gramophone pick-up, and three loud-speaker sockets.

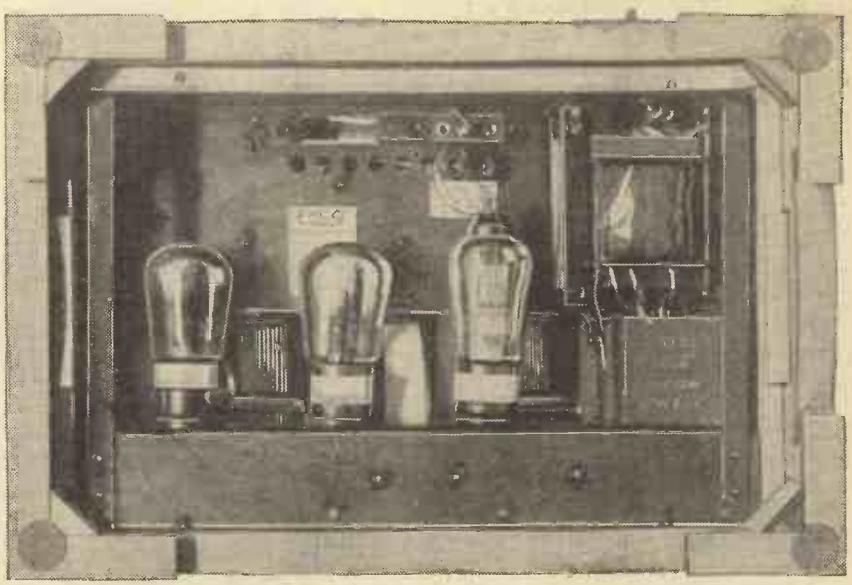
Switch On—That's All!

The first query raised was: "Why *three*"? A glance at the book of words shows that two different output arrangements are provided, so that no matter what kind of speaker you are using it can be placed on the class of output which suits it best, thus enabling you to get maximum results. This was distinct advantage No. 1!

Prominently in their book of instructions the Ekco people say: "Switch on—That's all," so when the word "Go" was given, and the switch was depressed, "the family" stood round in expectant agitation. And though the switch went down firmly with a nice workmanlike click, at first nothing happened. Not a sound!

The reason for that is an interesting one. In the set are indirectly-heated valves of the special type in which a heater element is placed close to the actual filament, the latter being electrically isolated from the mains in order to prevent any hum getting through.

A "WORM'S-EYE VIEW" OF THE WORKS



This view shows the set from underneath. The drum-drive tuning controls a twin condenser which tunes both aerial and high-frequency stages.

With this type of valve there is an appreciable time-lag before this heater gets going properly, so that a minute or even more after the switch is on is necessary. This, of course, was unknown to the "family"; there was a horrified feeling of disappointment during that minute of waiting that showed what high hopes had already been encouraged on the appearance of the receiver.

So far as ordinary reception goes, one charm of operating an Ekco electric receiver is its simplicity. It was, in fact, a delighted child who tuned-in first the National programme (20 on the dial), then the Regional at 50, and finally, round about the 70 mark, the Midland Regional.

Paris Clear of 5XX

This was all done on one tuning knob alone, with reaction set at minimum and the volume control at maximum. As a further test of what a child could do with it the switch below the tuning dial was turned across to long waves, and the same small pair of hands succeeded in not only getting Daventry, but Radio-Paris as well, out of the ether.

The volume was really good, there was not a trace of Daventry

interference, and the delighted exclamations of the young operator showed that the "Ekco Electric" had already made one radio friend!

Turning back to the short waves, the usual "run round the dial" showed the set to be an absolute winner so far as long-distance reception was concerned. Station after station could be brought in, the reaction control was smooth and reliable, and (even with the reaction practically at zero) the use of the tuning control with but a touch on the compensator brought in Toulouse, Radio Roma, Budapest and Moraska-Ostrava.

"How it is Done?"

Anybody skilled in the use of reaction could get a station at every few degrees on the dial, and as the quality was very good the questions soon began to arise: "How is it done?" "Why are the foreigners so clear?" "How do they make it so simple?" etc., etc.

The secret of the success of the set is hinted at in the initials "S.G.P.," the S.G. meaning screened-grid H.F. valve, and the P. pentode.

By taking advantage of modern valve technique the designers aim at getting everything possible out of three valves in the way of range and power. Moreover, all the "extras" are right and the power consumption of the A.C. model is only 16 watts.

In every detail the set gives ample evidence of careful thought, combined with long experience, and at the price of £21 complete it can be considered as a radio bargain of high distinction.

This mains-driven unit supplies H.T. and charges the accumulator as well.

THE "EKCO" COMBINED UNIT

It is only about three months ago since portable models of the Ekco combined H.T. unit and L.T. charger (for A.C. mains) were placed on the market. During that short period they have aroused considerable interest, so that a brief review of the device will be of interest.

The idea was to produce a unit capable of supplying up to 20 milliamps. which could be fitted into any type of portable set and enable the set to be run from the mains when used as a home receiver. In addition to doing away with the H.T. battery the unit enables the accumulator to be kept fully charged.

For the screen of a screened-grid valve from 60 to 80 volts are obtainable, and particular attention has been paid to the detector valve's supply. This is variable between zero and 120 volts, and current up to a maximum of 6 milliamps. may be taken, according to the exact requirements of the detector.

The Westinghouse metal dry rectifier is incorporated.

Smooth and Reliable

A third flexible lead gives a voltage of 120 to 150, and by means of the special plug and socket this can be reduced to 100 volts if required for the particular valve in use.

A thorough test of the unit on a four-valve receiver showed that the manufacturers' claims are completely justified, the action being absolutely silent and the variable controls smooth and reliable. Sturdy flexible leads, well-made sockets, a separate switch for the L.T. battery, and plainly-marked output leads are useful features that help to explain the great popularity already obtained by this instrument.

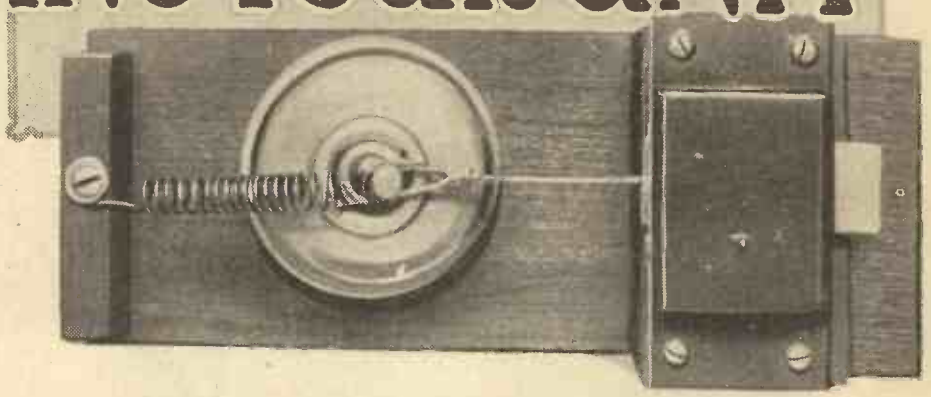
Compressed Efficiency

Either two, four, or six volts L.T. are available, and the size of the whole thing is only 9 in. by 5 in. by 3½ in. To compress a trickle charger and H.T. unit into this small space is a feat of which the Ekco people are justifiably proud, and as the one drawback to many a good portable receiver is the battery supply, there is no doubt the latest Ekco model C.P.1 will find a ready sale.

WHAT THE CONTROLS DO

The "Ekco S.G.P. Three" is very easy to handle, and on this photograph our artist has indicated the use of the various controls.

LOCKING YOUR UNIT



How to make switches that need keys for their operation and thus prevent unauthorised people from switching on your set or mains unit.

By
J. R. WHEATLEY.

FOR use with mains an ordinary tumbler switch is employed, and for battery-operated sets a push-pull on-off switch.

An examination of the photographs will clearly explain the method whereby the lock fulfils a double purpose. The actual bar of the lock passes completely through the lock and can protrude at either side, its position depending on which way the key is turned.

Easy to Fit Up

If the switch is attached to the lid of a cabinet, and a block of wood is screwed to the side of the cabinet so as to engage with the lock bar when the switch is in the on position, until the switch is unlocked (the set then being switched off) it is not possible to open the lid of the cabinet.

Some details as to the method of constructing the two types of lock switches will be helpful. The mains type is shown mounted on a small baseboard which, in turn, is screwed to the lid of the cabinet.

To bring the switch and lock to the same height a block of wood is placed under the lock.

Before finally mounting the lock in place a hole must be cut for the key through the baseboard and block of wood. This is not a very difficult undertaking. Secondly, a hole must be drilled into the actual bolt of the lock to accommodate the Bowden wire control—a small Archimedean drill is the most suitable tool for this operation.

Bowden wire is readily obtainable from any cycle dealers or garage—but it is necessary to solder the wire before any attempt is made to cut it, since Bowden wire has a habit of unravelling, and once unravelled is useless.

The link to slip over the thimble of the tumbler switch can be made quite roughly, and the surplus solder removed with a file. To return the switch to the off position a spring is employed which should be of only sufficient strength to pull the switch into the off position.

Using an "On-Off" Switch

Too powerful a spring will destroy the working of the lock. By bending over the last turn of the spring with a pair of pliers it is possible to utilise this turn, not only as a link to slip over the switch control knob, but also as a locking device to prevent the Bowden wire from slipping.

The other end of the spring is tethered by means of a wood screw to a block of wood of a height similar to the piece placed under the lock.

The second version of the lock switch employs a normal L.T. on-off switch, but since the movement on this switch is a parallel movement (the motion of the tumbler switch is really through an arc) the construction is greatly simplified.

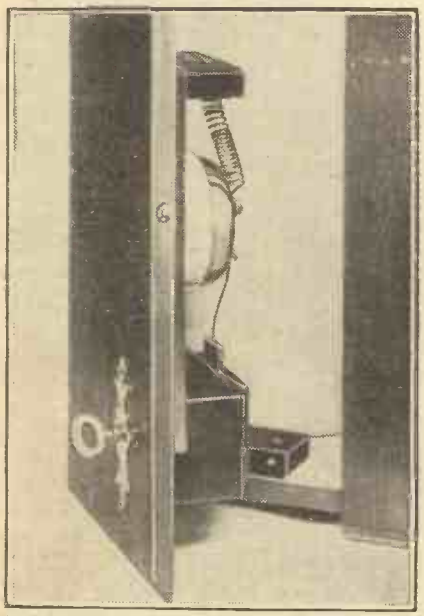
Exactly the same procedure is adopted for mounting the lock. This time the block is of a convenient height to suit the small bracket which holds the switch.

The Connecting Link

This bracket is composed of two pieces of four-ply wood roughly one inch square. A small piece of thin brass rod is soldered to the lock bar.

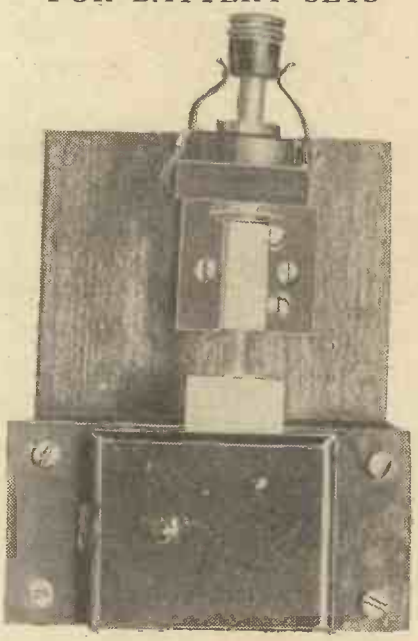
The switch is completed by connecting the shank of the switch to which the knob is usually attached to the brass rod by means of a connector link. The type shown in the photograph below is obtainable t any "electrical" shop.

MAINS SWITCHING



Showing how the mains type of lock-switch is mounted in the lid of a cabinet.

FOR BATTERY SETS



An ordinary L.T. on-off switch is used here

The B.B.C. News

By PHILEMON

You ought to read this delightful article about "the news"—a commonplace incident in the programme which nevertheless has a world of romance behind its stereotyped phrases.

Whether in a windjammer like this one, or in the last word in ocean-going luxury, like the "Europa" below, to the sailor the most interesting part of the programme is the News Bulletin.

IT used to be a very friendly sound: "This is London calling the British Isles. Here is the first news." I remember one occasion when it was particularly pleasant to hear. I was in the South of France.

I had been there for some months. I had become very homesick. One day a Frenchman, having beaten me at golf, and feeling, therefore, kindly disposed towards me, invited me to take tea with his family.

A Pleasant Surprise

It was a jolly tea It was a jolly family. There is something about foreign hospitality which is very sweet in the mouth. We talked of many things, and we laughed at the way I spoke French; so I made them talk English, and we laughed at the mess they made of it.

The time passed quickly, and then, to my surprise, I noticed that my host looked furtively once or twice at his watch. It seemed almost like a hint that I should go, so I began at once to make my excuses for departure.

"But wouldn't you like to listen to our wireless for a little while?" he said. "There's no hurry." So we all went into another room where he had a splendid wireless set, and we sat around. He fingered the dials.

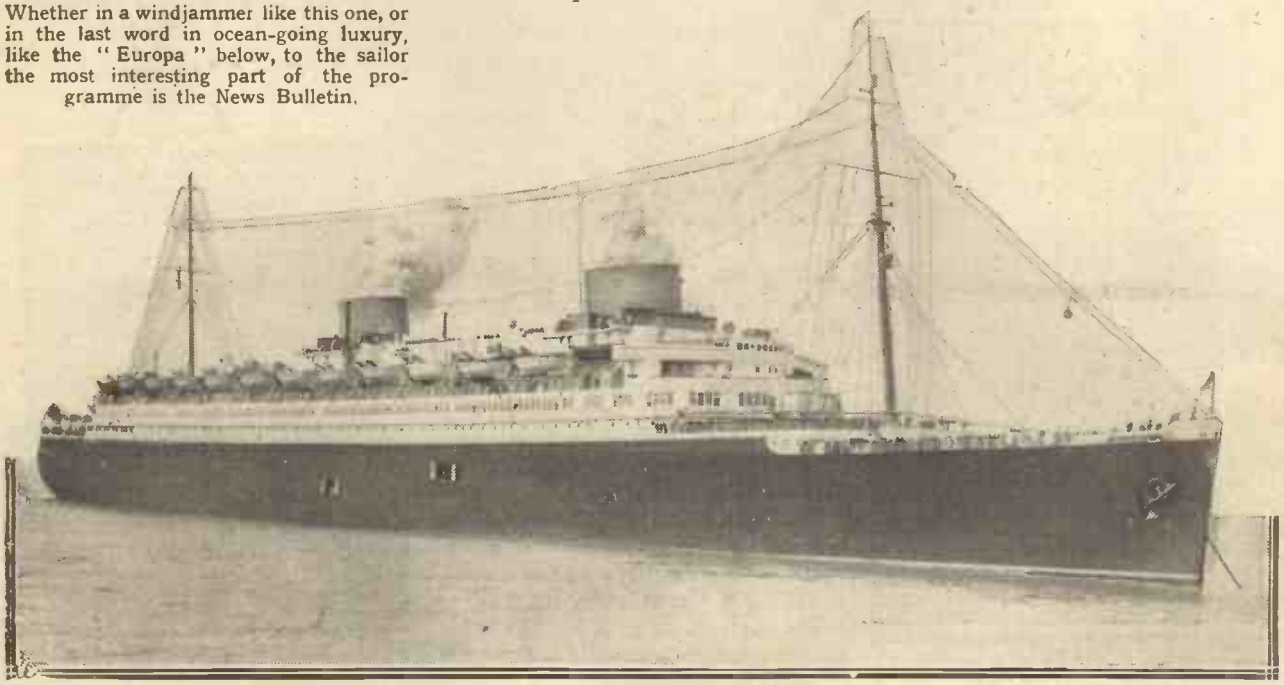
I expected Toulouse or Paris Radio and was prepared to be bored without showing it. But he had timed it to a nicety. It was six-thirty.

The moment he switched on I heard, crisply and clearly as if it had been my own room at home: "This is London calling the British Isles." I could have wept for joy!

French Felicity

It was surely the very felicity of hospitality, and I doubt if anybody but a Frenchman would have thought of doing it just in that way.

After five months in a foreign country, with a foreign tongue and foreign manners, and me longing to be back home again, I thought I had never heard such blessed words: "Here is the first news"!



Bulletin

I do not often listen to the News Bulletin at home. Chiefly, I think, because it forestalls my morning paper.

I love that quiet half-hour with the morning paper after breakfast—beginning even at breakfast if, by the grace of heaven, I am taking it alone!

An announcer reading the News Bulletin at Savoy Hill, London.

Out for a Duck?

I love the nest of surprises which lurks between the personal columns on the front page and the estate agents' pictures on the back. I turn with eager hands and throbbing heart to see whether my favourite batsman has made a century or been bowled for a duck, and I scan the captions to see what the devil has been doing during the past twenty-four hours.

I cannot see how you city people can tolerate your evening papers, which make the morning paper dull and unprofitable and out of date.

So I do not usually listen to the News Bulletin. I don't back horses, and, if I did, I would sooner know the worst with the day before me than with the night coming on!

And I would as soon think of having the sports news at night as I would of having scrambled eggs—which is an unpalatable dish unless it has the pride of the morning on it—for supper.

Brief—But Not Brotherly

And, for the rest, the Bulletin is rather dull. It is the very bare bones of news. It reminds me of those little sheets which did duty for a newspaper in the days of the General Strike.

Perhaps in the old days all newspapers were like that—brief, but neither very bright nor brotherly!

Mr. Percival Westerman, the novelist (right), with his wife and a friend listening-in on his barge home with which he tours the rivers of England.

But I like news. Everybody likes news. Our common first greeting of each other on meeting after an interval is: "Well, and what's the news?"

We like news so much that we are willing to maintain a huge industry for supplying us with it, employing myriads of workers day and night, and paying handsome dividends on immense capital. So that I have asked myself: "What is the secret of its fascination?"

I think it is partly accounted for by the instinct of curiosity. This is an inherited instinct. All animals are inquisitive; they are all "inquisitive monkeys."

Curiosity Pays!

They have to be. They have to poke and nose around. It pays them to know what their neighbours are doing. It is one of their defences in a precarious existence.

It is an instinct of high value to them in finding food, or in detecting the movements of a possible enemy. In the struggle for existence the not-inquisitive animal would be the first to go to the wall. Savages and young children have it highly developed. So, for another, have I!

In the days before newspapers this curiosity satisfied itself in the whispered gossip round the village pump; with some scandalmongering, no doubt, but for the most part a friendly inquisitiveness springing from sympathy rather than ill-will.

And in the evening at the village pub it was the same, under more

VILLAGE RADIO

A little bit of rural England, the picturesque effect of which is not affected by the inconspicuous aerial behind it that keeps the cottager in touch with town life.

genial influences (since good ale, say what you will, is better than water!), and with the added thrill that the stage-coach might stop as it passed through and bring news of happenings in the wider world.

"A Regular Nosey Parker"

And, since human nature remains pretty much the same in these matters, it is precisely the sort of thing they gossiped about at the pump and the pub which we of these days like to read about in our newspapers.

Personally, I am among the most curious of men. I hope I know my manners, but, short of this restraint, I love poking and prying in the friendliest and most harmless fashion into other people's affairs.

I am a regular nosey parker! If there is a crowd in the street, staring up at the sky or into a window, you may bet your shirt I am in it.

Show me a door which has "No Admittance" written on it in block letters, and that is the door I want to go in at, with whatever sort of a rush I may come out of it a minute later!

Are You Like This?

I would not for worlds open a letter marked "Private," but Oh! how I itch to know what is inside it! I like to look into people's gardens and see what they have made of them, or into their windows to see where they put their furniture and what their chintzes are like.

And when I am walking alone in the country and overtake another person walking alone, I join myself to him in hope that he may tell me the unexpurgated story of his private life!

So I like newspapers, as you do, because they satisfy this instinct. I admit that this isn't "news" properly so called.

Some people complain because "news" occupies so small a part in newspapers, which are full of gossip and information about people whom—bless their high brows!—they are not in the slightest degree interested in.

But it is precisely these parts that I like. I like the gossipy pages and the police pages, and to read about the desperate escapes of burglars, and the mix-ups in unhappy homes, and the tricks that some people resort to to make a living; anything which puts me inside the lives of other folks.

The Sense of Scope

It is not good for a man to live alone. It is good for him every now and again to be taken out of himself, to feel himself united with something that is splendid in its way and vital.

If you are in the Peace movement, any news from Geneva will flush you with living waters. If you have a scientific interest, the news of the discovery of a new star, or of a successful treatment of disease, or the spotting of a deadly microbe, will link you up with the great movement of experiment and inquiry.

The lives of most of us are, in themselves, rather petty and insignificant. We get release from them, and we gain the sense of scope and worth and meaning by this blessed thing we call News.

I think that "This is the National Programme" is a very dull call. I wish we could have the old call, "This is London!—London Calling the British Isles. Here is the news!"

IN THE GOOD OLD DAYS

Time was when Mine Host was the authority for local news, but nowadays the remotest village receives the "Six Pips" and keeps its eye on Big Ben.

Round the World with a Short-Waver

Going round the world is the latest fashion, and radio is always right up to date. You will find these details of the results obtained on a home-made short-wave set extremely interesting.

From a Correspondent

THE first stage of a journey which is to take us half-way across the world and back again has been completed and we are in Florida, after a 22-day trip from England.

During this stage of the journey a fairly extensive watch has been kept on short waves as well as on the medium and long waves used for ship and shore working, and several interesting points have been noticed. The most striking thing is the ratio of signal strength and distance on the short waves and on the long waves.

Shaking the Ship

Eindhoven on 31·3 and Huizen on 16·88, both using some 10 kw., are still coming in with a good punch, while Rugby (G B R), on 18,740 metres and having truly enormous power in his aerial, has fallen off to such an extent that 'phone reception is chancey, more so in daylight.

The short-waver which is in use is of our own construction and is not really efficient. It is the usual det. and 2 L.F., with 100 volts on the plate of the last valve and using a "straight" output circuit.

So far this has been a "light ship passage," that is, we have had no cargo and very little ballast, and the result is a continual vibration from the engines. Occasionally the propeller comes right out of the water and makes a revolution or two in the air at high speed, shaking the whole ship.

Rough on Valves

The wireless room is some forty feet above the water-line, so the wobble is at its worst there. It makes short-wave work somewhat difficult; imagine receiving 16 metres while someone is giving the set an occasional shake.

Air-spaced coils were found to be out of the question, and ribbed ebonite formers were used. Anti-microphonic valve-holders were also discarded, as the valves built up such a vibration that in one case the springs of the holder were fractured.

Aerial Too Big!

Another drawback has been the size of the aerial, a twin wire with horizontal spans of 220 feet. Of course it would be a simple matter to rig a smaller one for short-wave work, but in doing that we come up against the direction-finder.

All loops, whether earthed or open, cause errors by altering the direction of the incoming waves, and we have enough distortion from stays, ventilators, boat gear, etc., without adding to it. However, by keeping the coupling between the primary and grid coils as loose as possible with regard to signal strength, we can overcome this difficulty to some extent. And, no matter what we do, we are always encountering queer effects due to the aerial swinging as the vessel rolls.

All problems were, however, successfully met, and we finally switched in and listened around 30 metres, as near as we could judge. A little knob twiddling and we got a roaring signal which turned out to be Eindhoven on 31·3. The quality was really good.

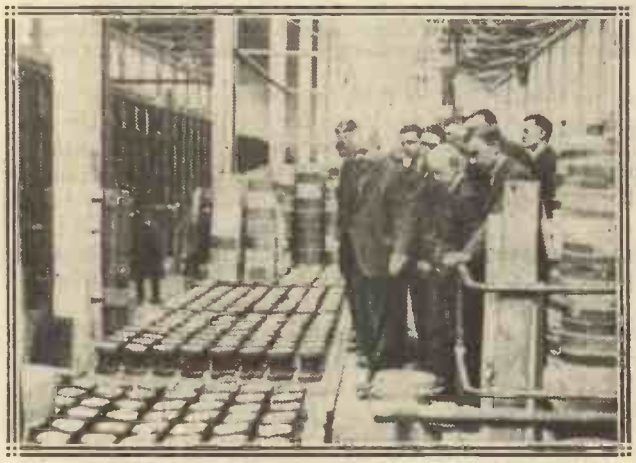
5 S W and P C J

One or two carriers were heard around this spot, but we did not waste any time with them, we looked for 5 S W. He was there all right, at full loud-speaker strength, but with rather poor quality. The time was 19.00 G.M.T., and the distance about 1,700 miles.

It was just on sunset with us and I suppose the Heaviside was getting a little "bumpy," for both stations were fading badly, and just as the sun dipped the quality began to vary. This lasted for about fifteen minutes, after which they resumed their normal.

A little later P C J was "captured," and this was quickly followed by W 2 X A F on 31·48, coming in at his usual strength, but fading somewhat. Of course, it was still daylight with him, and later, when the darkness

INSULATORS FOR ALL PURPOSES



Insulators play a very important part in radio, particularly on short waves, and great care has to be taken in making them. Here is a batch of high-tension insulators of the porcelain type being inspected in a special factory at Stourport.

had spread over the whole course and things had been ironed out a little, he was very steady.

A four-turn coil was then tried and several stations picked up, the giant among them being Huizen on 16·88. This station was absolutely overpowering, with no signs of fading or changes in quality. W 2 X A D on 19·6 was also coming in well, but not so steadily as on 31·48.

strength San Francisco (K E R). On the amateur band there was a splendid reproduction of a cat fight—there must have been hundreds of them. No time was spent in sorting them out, but W 9 A E, W 9 E C S, and W 1 M O were prominent. W 1 M O was calling a British station, but as his signals were very jumpy we did not get who it was.

Another station (telephone) which we have had at times is Heredia,

RADIO ON NEW YORK'S OFFICIAL "WELCOME BOAT"

The captain of the "Macom," the boat used by the New York municipal authorities for welcoming distinguished guests. This boat keeps in touch by radio with the vessel in which the guest is to arrive and thus is enabled to time its meeting almost to a second.

I don't know yet if this is a peculiarity of the receiver, but the difference in the two transmissions of this station is very marked, 31·48 always coming in with greater steadiness than the lower wave.

Any amount of Morse stations made their presence felt. On 18·34 was Konigswusterhausen, call-sign D I N, which is an excellent one, for he certainly was kicking up one. Nauen was represented by D F E on 30·582. and D H D on 30·272, both using 20 kw.

"A Cat Fight"

At the same time Nauen (D F Y), with a high-power rating on 18,060 metres, was not audible on the long-wave receiver.

X D A and X D B in Mexico were also coming in, and at slightly reduced

N R H, in Costa Rica. This is a good one for the DX fans to try for. He works on 30·30 metres with a power of 7½ watts. The announcer uses English and usually closes down by sending, in Morse, "N R H Heredia. Costa Rica amando cespedes marin." I don't know what it means, but he sends it.

5 S W kept up to standard for a distance of approximately 2,500 miles, after which he fell off rapidly and we have not had him at all since. I am hoping to pick him up again when we get in the Pacific. Zeesen, on 31·38 metres, also fell off, but Eindhoven and Huizen are still receivable on the speaker, although they are much weaker.

Searching around 19 metres one day I heard a station calling. It turned out to be our old friend W 2 X A D calling the yacht "Elettra." After about fifteen minutes calling he got the yacht and then began an interesting conversation.

An Interesting Test

The "Elettra" was off the west coast of Italy and was receiving W 2 X A D well and obviously the yacht was coming in well at W 2 X A D. Marquis Marconi himself was taking part in the conversations.

On arrival in port our vessel berthed alongside a large structure composed for the most part of corrugated iron, and short-wave reception immediately became almost impossible. The ever-present D F E was still to be found, and also, faintly, C J R X, Winnipeg, but no other station was audible.

This was annoying, for we had been hoping to get a spell during which we could work without the set shaking like a jelly.

However, we are taking cargo here, so that when we do get away again there will be less vibration than before.

Through the Canal

We are now on the west side of America, having passed through the Panama Canal and run north to Los Angeles. There has been very little of interest in the short-wave department since leaving the Canal. We have either been in a dead area, more or less, or something strange has happened to the set.

On medium and long waves the atmospherics have been particularly bad, and have been strong right down to 25 metres. Below that we have not heard any, except when in the immediate region of a storm, when, of course, the crashes break through on all waves.

Until our arrival at Colon, W 2X A D and W 2 X A F were coming in very well. One Sunday evening W 2 X A D was arriving with a tremendous punch, so we rigged a so-called "choke-output," consisting of the primary winding of an L.F. transformer and a 2-mfd. Mansbridge, and ran a long lead to the saloon and worked a big balanced-armature cone in series with the speaker in the wireless room.

A Successful Lash-Up

Only one wire was taken to the speaker in the saloon and the other side was connected to the ship's side, which, of course, constitutes our earth. This arrangement, which was a "lash-up" in its most violent form, worked very well and all hands enjoyed two hours of good music, supplied, mainly, by the Atwater

Effect of Damp Tarpaulin on the Frame

Kent Radio Co.'s programme. This company is, by the way, well known to American listeners as supplying really good programmes.

"Our Stock Rose"

This was when the atmospherics were at their worst on the medium waves and the multi-valve sets were worse than useless to their owners. We were acclaimed as magicians, and our stock rose considerably. To tell the truth, something of the sort was needed, as we were in somewhat bad odour about that time, having opposed very strongly the rigging of a permanent wooden awning directly over the frame aerial of the direction-finder. When the subject was first brought forward we asked for tests to be made. The awning was fixed and check bearings taken.

Nothing Extraordinary

Nothing extraordinary was found, although there was a slight effect on the sharpness of the minima. The awning was then thoroughly wetted to reproduce the conditions which would obtain in bad or rainy weather.

The Awning Affair

Then we found something had happened with a vengeance. Errors of eight and ten degrees had appeared, and as the awning dried off these errors were variable and could not therefore be compensated. That was enough for us. Our battle-cry became: "Not a board near the frame or a degree on the bearing."

As ships depend a good deal on D.F. work, and as this is the season of much fog around here, we won, but we were not looked upon too kindly by those whose ideas we had thwarted. However, the fact that we could produce good music when the other sets could give nothing but beastly noises proved that we knew something about our job and the awning affair was forgotten.

A Bad Spell

In Colon Bay W 2 X A D, W 3 X A L and K D K A were coming in well, but as soon as we entered the Canal the strength diminished very surprisingly. Since that time we have had nothing that could be called really good from any of them. Of course, the difference of time will account for some of this falling off, but even after darkness has spread right over the continent the signals are not as good as they were on the other side.

The distance has not altered much; a little, of course, but not sufficient to account for the attenuation. The probable explanation is the intervention of the mountainous country of Nicaragua and Mexico.

North of the Gulf of California there was certainly an improvement, but even now we do not get them with the "pep" we have been used to.

Is It Screening?

It was well known to wireless men for many years that it was only with the greatest difficulty that signals could be got across the sandy and hilly tract of land between the Red Sea and the Persian Gulf. There was an almost complete "wipe-out" in that area. Whether the same effect takes place on the higher frequencies we are not sure, but it seems reasonable to think so.

The long waves, too, seem to be affected in the area through which we have just passed. Rugby (G B R), on 18,740 metres, has been quite inaudible ever since leaving the canal, while Nagoya (J N D) is coming in well; W C I, at Tuckerton, New Jersey, is also poor, and he should be coming in quite well.

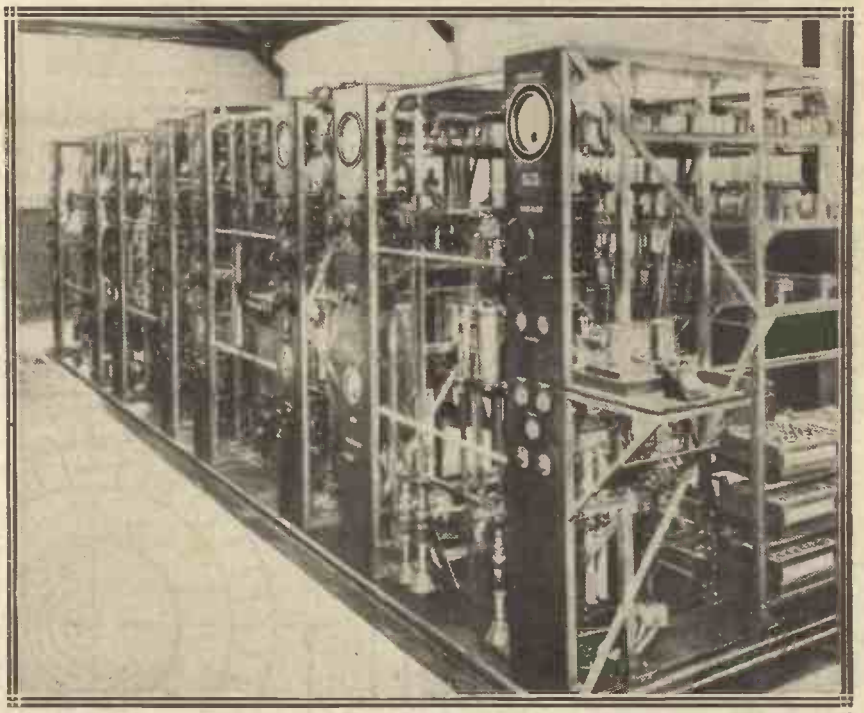
On the other hand, the Bodmin beam, working to Canada on 32·397 metres, came in with good strength for two nights, after which we lost him.

We are leaving Los Angeles shortly and will take the great circle track across the North Pacific to Korea.

RECEPTION WRINKLES

When the shape of neighbouring gardens is such that two aerials must run parallel to one another, it is an advantage if it can be arranged for one of the neighbours to slope his aerial "down" to the house, and the other aerial to slope "up."

WHERE THE POWER FOR THE BEAM ORIGINATES



A view of the powerful transmitter which is used for the high-speed beam telegraph service between Great Britain and Canada, and situated at Bodmin, in Cornwall.

The commonest causes of low-frequency howling are an unsuitable mains unit or a partly run-down H.T. battery.

* * *

If the coupling condenser is comparatively small the bass notes will not be reproduced properly.

* * *

Although filament resistances are not so commonly used nowadays for ordinary reception, they are frequently of great assistance in short-wave work.

* * *

A high value grid leak will often effect an improvement in the sensitivity of a short-wave set.

The M.W.

THE arrival of the powerful twin transmitter at Brookmans Park has complicated to an extraordinary degree the design of the simpler types of set in the matter of selectivity. Time was when a purely "local" receiver such as a crystal set required only a very low degree of selectivity, the main point in the design being to secure the greatest possible strength of signal; but that is no longer true in the London area. Here quite a considerable degree of selectivity is required; such a degree as is quite unnecessary and indeed undesirable in other localities.

A Difficult Task

The difficulty which arises is not so much a technical one, because methods were speedily devised for obtaining the desired degree of selectivity, but rather one of catering adequately for the needs of all of our various readers. Obviously, if we concentrated upon the design of sets of high selectivity, even where they are only intended for local work, we should be displeasing a large number of our readers in the localities where such selectivity is unnecessary. Were we to omit to provide such high-selectivity receivers we should equally get into hot water with our London readers, so you see that the lives of the designers whose duty it is to serve you have not become any easier of late!

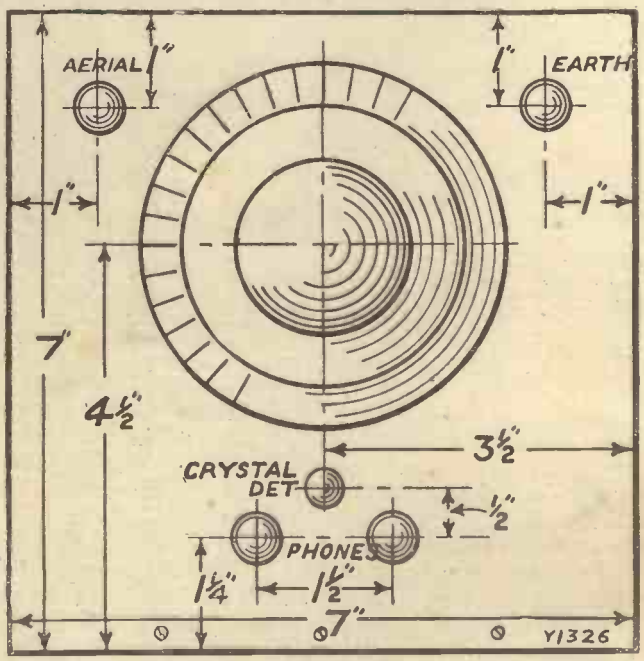
Not merely have we to go on striving to present you a well-balanced programme to receivers of all types, but we have to bear in mind that our readers are now divided much more completely than they used to be into two distinct classes which have almost opposite requirements, in so far as local sets are concerned.

The only way out seems to be the course which we have already adopted, as we pointed out recently, which is to produce two fairly sharply-differentiated types of receivers, one with the degree of selectivity necessary for the "Regional" conditions, and one of only normal selectivity for use where there is only one local transmission to be considered.

Great Sensitivity

We have recently produced and described a crystal set for the Regional conditions under the title of the "Star-Turn" Crystal Receiver, and this month we are presenting a design carefully worked out to give the kind of service required in other areas. This receiver is of an extremely simple nature, but it has been very carefully planned to give the greatest possible degree of signal strength obtainable with normal apparatus, since we realised that it will very likely be used not merely in localities where there is only one transmission to be considered, but also in the outer areas around London where the great distance from the Regional station will make very high selectivity unnecessary. High sensitivity, on the other hand, will in these cases be essential.

ALL ON THE PANEL



All the terminals and all controls are accessibly placed on the front panel, so that, once you have fixed on the coil tap positions that suit your particular conditions, you need not again refer to the interior of the receiver.

Very Simple

Fortunately, the design of a crystal set for maximum strength is a comparatively simple matter, and does not involve us in any particular complications. It is chiefly a matter of the use of a coil of reasonably low H.F. resistance, and the provision of suitable tapping points for the various couplings, i.e. the coupling of the aerial to the tuned circuit, and the rectifier circuit to the tuned circuit.

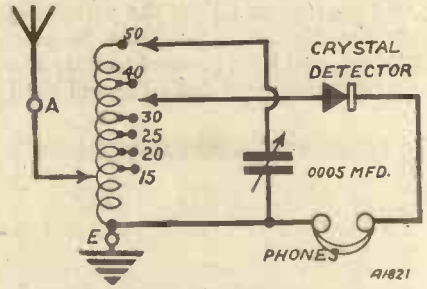
"Crystapower"

AN EASY-TO-MAKE CRYSTAL SET SPECIALLY DESIGNED TO GIVE THE MOST POWERFUL SIGNALS AT EXTREME DISTANCES FROM BROADCASTING STATIONS.

Designed and Described by the
"M.W." RESEARCH DEPT.

These coupling arrangements we have duly provided in the crystal set we are about to describe, with one other variable arrangement which will probably interest the reader because it enables him to obtain

COMPLETELY ADAPTABLE



The very maximum of power can be squeezed out of this efficient receiver by carefully varying the tapping clips on the coil.

exactly the right conditions to suit his own particular aerial.

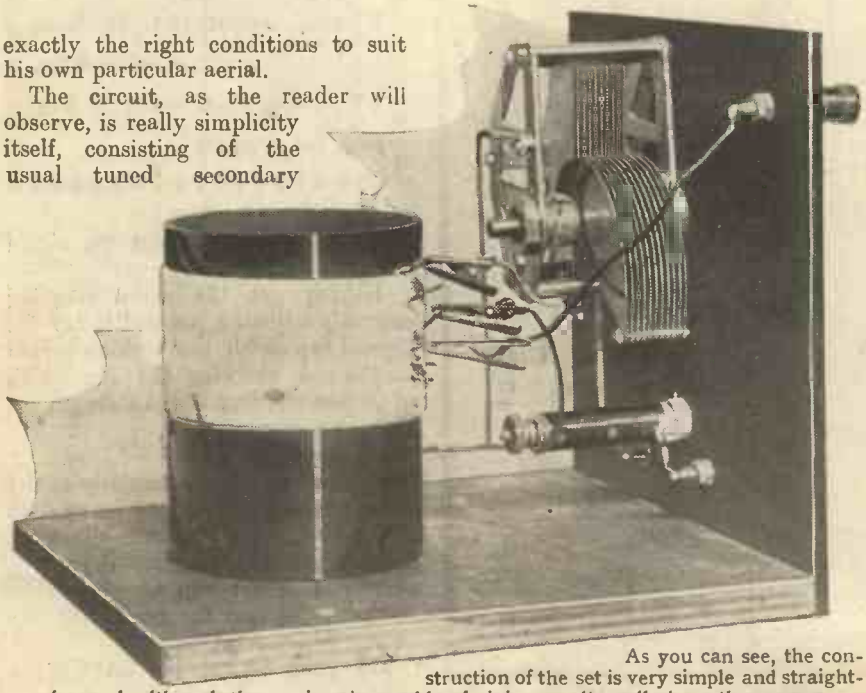
The circuit, as the reader will observe, is really simplicity itself, consisting of the usual tuned secondary circuit, a tapping device being provided, which enables the variable condenser to be connected across different parts of the coil for reasons which we shall be discussing presently, and auto-coupling for the aerial.

A "crystal tap" device is also arranged for, since it is found with the majority of detectors that if the rectifier circuit is tapped across only a portion of the coil slightly better strength is obtained, quite regardless of the higher selectivity which also results.

Noticeable Variations

This is a point which the beginner often finds a little difficult to understand, but he can rest assured that when the set is finished and he tries moving the crystal clip up and down the coil he will find the perceptible differences in strength.

Now let us get down to business, and see about the construction of the receiver. In the original instrument we adopted the conventional scheme of an ebonite front panel, a baseboard, and the ordinary cabinet, but there is obviously scope here for anyone who is fond of woodwork to construct his own cabinet, and to use a stained and polished wooden panel if he so desires.



As you can see, the construction of the set is very simple and straightforward, although the receiver is capable of giving results well above the average.

Wood Quite Suitable

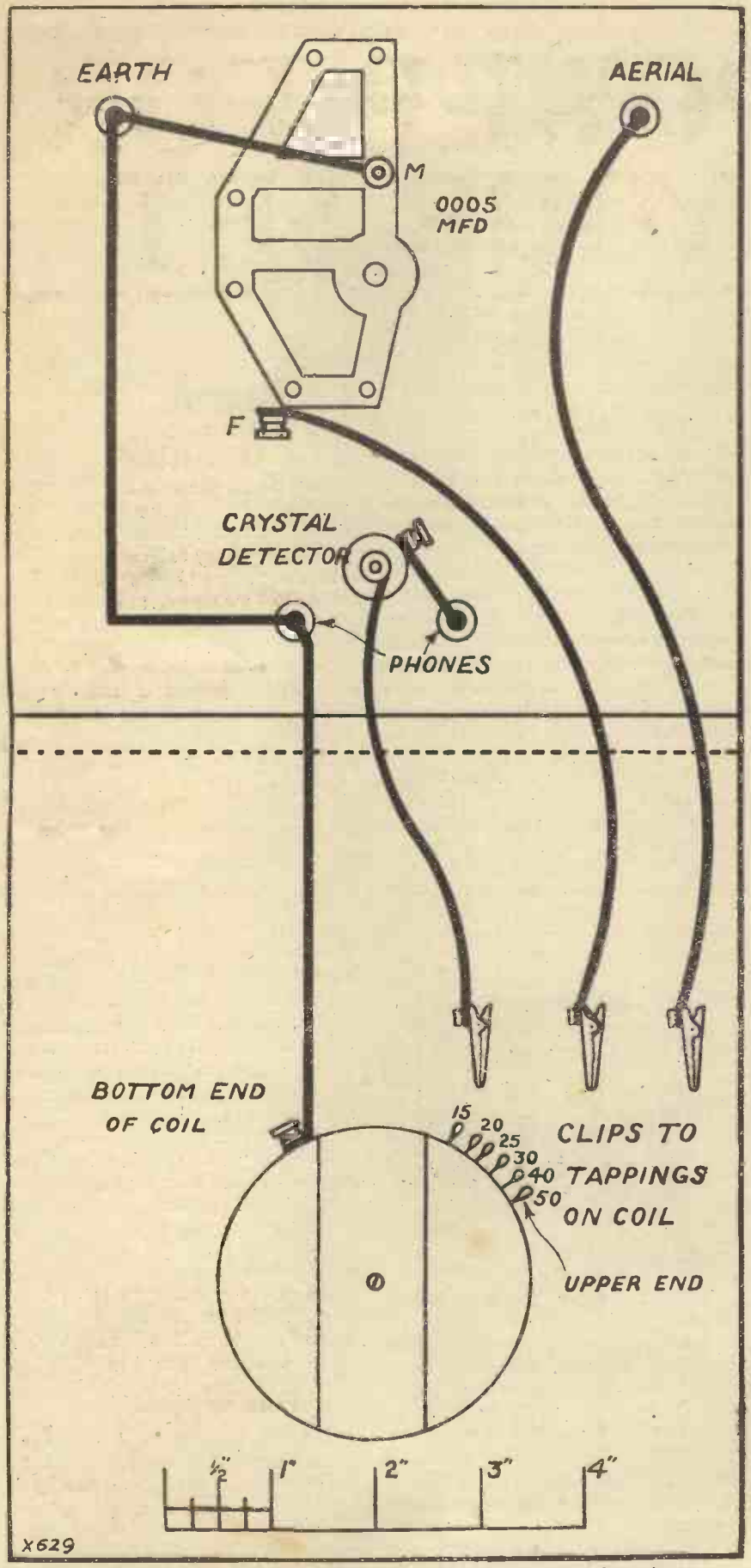
Such a panel is perfectly satisfactory in use provided that it is well dried. On the panel are to be mounted the variable condenser, the crystal detector, and two pairs of terminals, a suitable layout for these parts being indicated on a dimensioned diagram which will be found in these pages.

Naturally, there is nothing very critical about the layout of so simple a set as this, and the terminals could quite well be placed upon a strip at the back of the set if the constructor cares to do so. It hardly seems worth while to go to the extra trouble involved when only four terminals are concerned, however.

The baseboard carries only the coil, and you will require some instructions for winding this. It is a very simple job, since the tube only carries a single layer of wire which has five tappings on it. The tube should be of some good insulating material, a few examples being mentioned in the list of components, and its size should be 3 in. diam., with a length of either $3\frac{1}{2}$ or 4 in.

Preparing the Former

The coil former can be prepared for attachment to the baseboard by fixing into one end the usual small wooden cross-piece by means of brass screws passing into it through the walls of the tube. Attachment to the baseboard is carried out by passing



There is nothing difficult in the wiring, which will only take you a few minutes.

The M.W. "Crystapower"

—continued

one or two larger brass screws downwards through the cross-piece.

In the lower end of the tube a small terminal is fixed, and to this you should attach the beginning of the winding, then proceed to wind on the wire in a single layer, tapped as shown on the diagram. No. 24 D.C.C. wire is the correct material, and the complete coil has 50 turns.

Easy to Wire

The wiring process you will find to be very simple indeed.

To put the set into operation, all you have to do is to set the crystal detector to a sensitive adjustment, and to find the best positions for the tapping clips. Place the clip from the variable condenser on the upper end of the coil, the crystal clip on the 40-turn tap, and then the aerial clip on the 20-turn tap. Tune in your station, and then proceed to vary the aerial clip up and down the coil until you find the best point for signal strength.

PARTS YOU NEED

- 1 Panel, 7 × 7 in. (Paxolin, or Trolite, Lissen, etc.).
- 1 Cabinet, with baseboard 8 in. deep to fit (Pickett, or Camco, Lock, Osborne, etc.).
- 1 ·0005-mfd. variable condenser (J.B., or Lissen, Lotus, Dubilier, Ready Radio, Ormond, etc.).
- 1 Crystal detector (R.I., or Jewel, Brownie, etc.).
- 4 Terminals (Igranic, or Belling & Lee, Eelex, etc.).
- 1 Tube, 3 in. diam. and 3½ or 3 in. long.
- Wire, flex, clips, etc.

Having got the aerial coupling correctly adjusted, proceed to try the crystal tap on all the various points on the coil, choosing the one which gives you the best signal strength.

Small Aerials

On small aerials, particularly of the indoor variety which may be used at only short distances from the local station, you may find that it pays to place your aerial clip at about the 30-turn point and the condenser clip on the same point.

Try your crystal tap on various points on the coil as before.

POWER FOR YOUR SET

THE L.T., H.T. and G.B. supplies of a set represent its most important sections from the points of view of both its operation and maintenance.

Unless a receiver is adequately equipped in regard to its power it cannot give good results.

Also, its running costs can be either comparatively heavy or attractively light in accordance with the unwise or wise choice and use of its power elements.

Therefore, it is quite clear that it is well worth the amateur's while to review the whole question of power supplies at frequent intervals so as to ensure that he is not missing something good or harbouring something in the way of a method or actual piece of gear that has been more or less superseded.

Here, in this special supplement, the whole matter is reviewed in detail, and many valuable hints on H.T., L.T., and G.B. batteries, H.T. mains units, chargers and rectifiers are given, and most of the leading makes of power accessories are illustrated.

BUYING AN H.T. BATTERY

THE ordinary not-too-expert amateur may imagine that radio stores are staffed by experts. They are not, as a general rule, for the simple reason that radio experts, being rather rare, can generally command much better jobs than those of shop assistants.

However, there are exceptions, and we will imagine that a listener in search of H.T. batteries has "struck lucky."

We find him leaning on the counter with a cigarette in one hand, his other hand toying with the money in his pocket.

A 1½-volt grid-bias battery with a special base, enabling it to be screwed or pinned down to a baseboard.

"I want two H.T. batteries, please," he says.

"Yes, sir," says the shop assistant cheerily, "what voltage and what type?"

The Different Types

"Well, ninety-nine volts, both of them—ordinary type, I suppose. Don't want to pay any fancy prices, you know."

"Of course you don't. Anyway, we don't charge fancy prices here, sir. But what I mean by type is this. We have three kinds of H.T. batteries of various makes in stock: ordinary, double, and triple capacities. Actually, these are not necessarily the various makers' own classifications. Most of the better-known manufacturers group their products in more or less that order, but there are others who sell 'super' capacity types.

"Now 'super' may mean, in the case of one of the more reputable makes, a 'super' or extra capacity, whereas in some other make it is merely a colourful adjective stuck in

A point to watch: the wander plugs of G.B. and H.T. batteries should make clean, efficient contacts.

An ingenious "Regentone" combination of H.T. unit and charger, especially suitable for portable sets

Special Power Supplement—contd.

front of a battery that is of just the ordinary small capacity."

"Is there no standardisation in the radio industry?" asks the customer wonderingly.

"Things are getting ironed out," continues the shop assistant, "but there is still a fearful lot of looseness, especially in the descriptions of things. And these H.T. batteries are a good, or I ought to say, I suppose, bad example. However, you can trust us to give you a fair deal, sir. We stock all makes and have grouped them properly.

An excellent alternative to dry batteries, especially for sets needing moderately heavy H.T. currents, is the "wet" type such as is made by the Standard Battery Co. Here is a single cell of such a battery.

"Naturally, all ordinary capacities are not identical in their probable actual outputs. For instance, I have an 'XYZ' here at 7s. 9d. which is excellent value for money, but you wouldn't expect to get quite the service from it as with this 'ABC' at 10s. 3d."

Explaining Capacity

"I say," says the customer, "would you mind telling me exactly what this 'capacity' is that you keep talking about. That is, if you can spare the time."

The top battery has a greater voltage than the largest battery in this group, the latter being of *quadruple* capacity.

"Certainly, sir, we are always prepared to assist our customers to the best of our ability in such a manner. The capacity of a battery is its current output potentialities. Voltage means pressure, just as does 'pounds per square inch' in water engineering. An H.T. battery has to provide a certain amount of current, and its capacity indicates how long it will deliver that current before it packs up.

Current Requirements

Roughly speaking, you can think of a double-capacity H.T. battery as being able to deliver twice the current of an ordinary type for the same amount of time, or the same current for twice the length of time. Three times in each case for a triple-capacity type. There is one reservation I must make, and that is a mighty important one. I will explain it in some detail if I won't bore you."

"No, go on, this is most interesting."

Of Danish origin, the Hellesen has a name for dependability and good life.

"An ordinary kind of two-valve set will take, in the way of H.T. current, about seven milliamperes. Most of the ordinary capacity types of H.T. battery can cope with seven milliamperes. Now a double-capacity H.T. battery used with such a set might be expected to last exactly twice as long, mightn't it?

When Deterioration Starts

"But that is not necessarily so, because you must never forget that all the time an H.T. battery is deteriorating by itself quite apart from its current-supplying job. The moment an H.T. battery is made it begins to deteriorate. That is why we mark on them the dates of delivery to us from the makers of all our H.T. batteries. The customer then has a visual indication that he has not bought a battery that has been in stock for five or six months.—perhaps for three months of that in a hot window—and is on its last legs. He——"

"But," interrupts the customer, remembering something he has read somewhere, "won't the voltage of the battery have fallen a lot and show it on a test meter?"

This Columbia H.T. battery has ingenious spring clips instead of the more usual sockets.

"It may not have fallen appreciably, and yet you can see it is obvious that the battery can only have a much shorter useful life. But, on the other hand, it might have fallen quite a bit and yet not show itself on the voltmeter.

"You see, so many cells are required for so many volts. Each cell provides a voltage of about one and a half, so that there will be sixty-six cells in a ninety-nine volt battery. But supposing a manufacturer put seventy cells in a battery and labelled it 'ninety-nine volts'—you can see that you have a margin of six volts against a drop due to depreciation.

Not Really "Dry"

"And this trick is one that is practised quite a bit by the foreigner. There is yet a further point to remember, and that is that a battery may not be made of as perfect materials as some others and its paste may dry more quickly.

The "Obeta" is one of the really reliable German batteries sold in this country.

"The 'dry' battery is not really dry, you know; it ought really to be called 'unspillable.' The H.T. battery has its cells filled with a paste material, and if this paste dries up the battery ceases to be a battery! By the way,

The Capacities and Lives of H.T. Batteries

you shouldn't keep your batteries in a warm place for that reason.

"Anyway, you will have gathered that 'shelf life,' as we call it, must be reckoned with, just as must this drying effect while a battery is in use in a customer's home. Mind you, we have records of H.T. bat-

This "Parmeco" H.T. unit (Partridge and Mee) has particularly accessible fuses.

teries that have retained most of their voltages for periods running up to about two years.

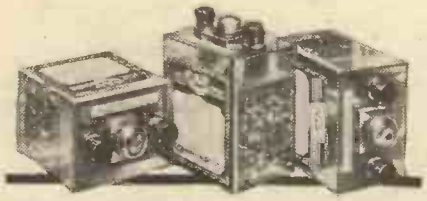
"And the average battery of good make will do its six, nine or twelve months quite comfortably."

"This is all awfully good of you, but do forgive me if I ask you what proof there is that you date your batteries properly?"

Shelf Life

"You can take our word that the dates are absolutely above suspicion. But if you won't do that, you can always send the battery to the makers for confirmation. Most makers of repute 'key' their batteries, while some actually date them with the date of manufacture.

"Mind you, sir, unless I could trust the retailer, as I hope you will always trust us, I would never buy my batteries from a shop. I would always send for them direct from the makers. There must be an awful lot of 'shelf-life' in those little shops that don't do a very big trade."



This photo illustrates the "unspillable nature" of one of the C.A.V. accumulator types.

"I suppose a week or two doesn't make any real difference?"

"Oh, no, you want to guard yourself against buying a battery that was made perhaps a year ago."

"Tell me, what do you do when you find you have a lot of batteries of some particular make on hand that have been in stock for a long time?"

"We never find ourselves in that position, sir, at least except for an odd two or three now and then, which we ourselves use up for our demonstration sets. You see, we always underorder on H.T. batteries, preferring to miss a sale or two rather than find ourselves overstocked."

Taking Expert Advice

"By jove, I am glad I happened to strike this shop."

"So am I, sir, and I am sure that you will 'strike' it again, having learnt that we give a square deal to every customer. Now you said you wanted two H.T. batteries, sir, each of ninety-nine volts. Have you any preference as to make?"

The condensers that figure in H.T. smoothing and by-pass circuits need to be of particularly robust electrical construction.

"I leave it entirely to you, for I see that I can safely do that. How silly it is for people to buy such stuff as wireless without either going to a shop they know is trustworthy or taking expert advice. Carry on, Mister Drage."

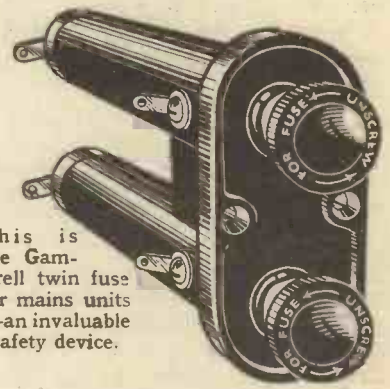
"My name is Jones, sir, but that is by the way. For what do you require these batteries, may I ask?"

"One is for a two-valve set and the other is for a five-valve set."

Current Limits

"Well, as you probably know, you mustn't expect to get good service from a battery if you ask it to give much more current than six or seven milliamperes in the case of the ordinary capacity types. But your two-valve set won't take much more anode current than that.

"However, the double-capacity types do not cost twice as much and such a current is 'easy-meat' for them, so I think you will find one of those the more economical proposition. Don't expect exactly twice the life, although, on the other hand, you might get it and a bit to spare if you care to take one of these well-known 'ABC's.'"



This is the Gam-Brell twin fuse for mains units—an invaluable safety device.

"I'll leave it to you, the price seems reasonable."

"Right, sir. Now as to that five-valve set. Is it a modern receiver?"

"Yes, quite. It is a 'JKL.'"

"Using the proper valves, as of course you are, that means some twenty-five milliamperes. Now, that is a lot for an H.T. battery, and a 'triple' will be essential. The little ones will give you no life at all. By the way, ninety-nine volts isn't enough for that set, you know."

"I've always used ninety-nine, and it seems to work quite well."

Use More H.T.

"Use one-hundred and fifty, and it will work much better."

"But look at the cost of batteries."

"Well, why not consider an accumulator H.T. battery or a mains unit. Either of these would prove quite satisfactory alternatives."

A stout metal casing and adequate ventilation are commendable features of this H.T. unit.

Special Power Supplement—contd.

"Well, if you don't mind, I'll carry on with a 'ninety-nine' battery, and think that over. I really must be getting along, and thank you ever so much for your kind assistance."

"Not at all, sir, delighted to be of service to you."

MAINS UNITS

A novel presentation of some practical pointers.

You have read about the adventures of an inexpert listener. Now let us imagine an expert goes to a typical suburban radio shop to buy a mains unit. We will suppose that he is doing this for an inexpert acquaintance—an expert would, of

One of the earlier Maintens of which there are excellent models being sold these days.

course, string up his own mains gear, unless he were a very rich expert, in which case he might have his private mechanic.

"I want an H.T. unit."

"Certainly, sir. We have a very cheap line in H.T. units. Here is a fine one. Gives you six different voltages."

Perfectly Safe!

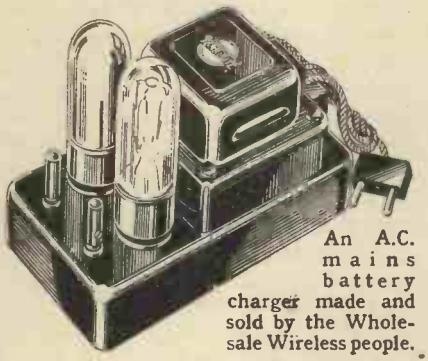
"Humph! Very 'tishy.' That doesn't conform with the I.E.E. recommendations, that is a cert. Wooden case puts 'paid' to that, right away."

"Metal inside, sir. I assure you it is perfectly safe. Just as safe as any domestic electric appliance."

"You read that in a book, my friend. That unit is about as safe as a Mills bomb with the pin out. And how do they reckon to get any smoothing? The thing's as light as a matchbox—can't have any decent chokes in it."

"Smoothing, sir? The unit is as smooth as silk."

"Maybe; but I reckon the current that manages to squeeze through it, and that won't be much, will be about as rough as the Bay of Biscay when there's a real storm on."



An A.C. mains battery charger made and sold by the Wholesale Wireless people.

"Of course, sir, there will always be a tiny hum—the mains in this district are so bad."

"Oh, yes! Let me tell you, my friend, that that tale started when Marconi filed his first patent. The mains in any town are as rough as the radio shops like to make 'em. Anyway, what do you folk reckon a mains unit is supposed to do? Break down the volts, eh? Well, take it from me, Professor Fleming, a real mains unit works out the volts and trims off the current bumps as well.

Hum Not Inevitable

"It makes me mad to see the 'hum' finding a general roosting place in the stately homes of Britain. With a couple of screened grids and a pentode and a mains-field moving coil all working from A.C. mains,

A good H.T. unit is as simple and safe as an H.T. battery.

you can say 'pass, friend' to a tiny hum that is only just audible when there's no speech and music going, but with a simple D.C. H.T.—pshaw! Should be as silent as Einstein's outer edge of space."

"Excuse me, sir, I think I hear the telephone bell."

The Very Model!

The shop-assistant disappears, and presently an elderly, red-faced man arrives behind the counter. He is the result of an obvious S.O.S. Undoubtedly he is the proprietor. With a "I'll show you" blow of the nose, he opens fire.

"Want to buy a mains unit, sir?"

"Rather, that's what I've been hanging about for."

"We've got some 'Phiri's' in stock. Can't beat 'em."

Much of the success of a unit depends upon the efficiency of its individual components. Here is a well-designed mains transformer.

"Yes, I believe they are very good. I want one to give up to thirty milliamps. at at least 150 volts."

"A.C. or D.C., and what voltage mains, sir?"

"D.C. 225."

"Here is the very model. Only £5."

"I know their outputs are good—plenty of smoothing, etc., but do you know if they provide adequate separation?"

"Absolutely. Look at the name."

Guaranteed Against Breakdown

"The name doesn't go for much on that. You see, this unit is wanted for a high-efficiency four-valve set that won't look kindly at any coupling in a mains unit."

"We have never had any complaints about this make, sir."

"Um! You mayn't ever have sold

Why Units Should Give "Adequate Separation"

one to anybody with a set exactly like that."

"I don't quite understand, sir. The unit is guaranteed."

Exide accumulators are very well made.

"Yes, guaranteed against breakdown, no doubt. But that's no good. I want a unit guaranteed to work properly with this particular set."

"You can always write the makers, sir. They will always advise you."

"Who wants to write to makers and get advice? I don't. I want a unit that I can give my friend to put on his set, get his thanks and hear no more about it. I don't know much about these proprietary makes, worse luck, except that some are very good and some are frightfully bad. But for your information I'll explain my point in detail.

Question of Resistance

"An H.T. battery has, if it is a good one, in good condition, comparatively little internal resistance. More than an accumulator, but still it isn't great. Now a D.C. mains unit has the job of breaking down voltages, and it does this with either a potentiometer or series resistances. And there are chokes which, in cases, have high resistances.

"All this means that the unit may provide quite efficient couplings between the anode circuits served by the various 'tappings,' unless special steps are taken to provide adequate electrical separation.

"The very nature of a smoothing system makes it 'separate' to some extent, but often that extent is not enough. I maintain that a good unit will give no more coupling than an H.T. battery, and a very good unit much less. Now I want to know in what category one can place this 'Phiri.' I know it is a good make, but that might only mean that it has adequate smoothing, is perfectly safe, and delivers its specified output."

The grid bias is, in its way, every bit as important as the H.T. and L.T., and should be supplied from a reliable source.

The Maker's Leaflet

"Here is the makers' leaflet, and you can see what they say, sir."

Here you can see the shunt resistances that provide "adequate separation" in this Ferranti H.T. unit.

"As I half expected, they don't mention that point. However, I can see that I should have written to one of the well-known makers and asked them for their assurance. But I can take this unit and try it—or, at least, let my friend try it—and bring it back for exchange if it is not suitable?"

"That's Your Protection!"

"Certainly, sir. I will write that on the invoice."

"Thanks. By the way, you wireless shop people don't seem to know much about wireless, if you don't mind me saying so."

Note the space left at the bottom to accommodate sediment.

"We know enough for most people, sir. 'Tisn't often we get a real expert in."

"That's your protection, I suppose?"

"Well, we can't afford to have an ornamental scientist hanging about shop, sir. Besides, we only stock the the good stuff."

"They Are Cheap!"

"What you think is good, you mean? What about those loud speakers over there? They are bad, rank bad, you know, as speakers go these days."

"They are cheap, sir, and we don't get any complaints."

"No, that is the trouble, the poor

The Dr. Nesper Tekade battery charger for A.C. mains employs a special rectifier of the "dry" type.

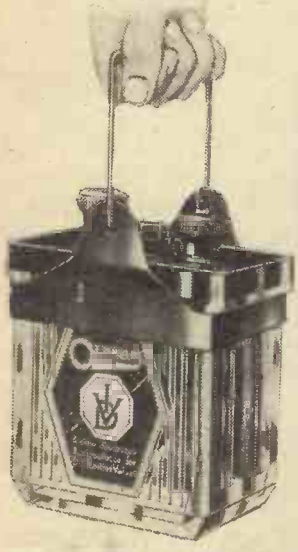
Special Power Supplement—contd.

old public has got to be an expert before it can start getting good gear."

"You will have your joke, sir. Good-afternoon, and don't forget to bring the unit back if it doesn't do the trick."

"Good-afternoon."

The vendor disappears into the dark recesses of the rear of his



This Oldham accumulator is supplied complete with a novel carrier that fits around a shoulder in the glass case. It is a holder that will never "let you down."

establishment, while our friend the expert slowly wends his way to the door, looking at the radio objects displayed to the right and left of him as he goes. He is nearly at the door when a man enters.

Useful Advice

"Hallo!" says this man. "Fancy meeting you here! Been buying gadgets? I'm just going to buy one of those H.T. unit things. Can you give me any tips?"

"I only give those to waiters, old lad. But I'll tell you one thing."

"What's that?"

"You were going to buy a mains unit; my advice is, don't. At least, not here, now. This radio is a murky business, you take it from me. There are snakes in the grass, and there are smooth-tongued villains waiting for little blue-eyed innocence at the cross-roads.

Combined Units

"Pay me a fee of one guinea and I'll put you right. I'd tell you to take MODERN WIRELESS regularly, or to write to their queries department for advice, but I know I'm only a fictitious character built and assembled by 'M.W.' itself for a special mains unit article. And that reminds me, I've only prospected for an H.T. unit. What about those units that give you both H.T. and L.T.? 'M.W.' readers will want to know all about those. Suppose you don't want a thing of that kind, do you?"

"Sorry, old man! Afraid I only want an H.T. unit."

An accumulator having plates of a novel construction. Note the internal form of the glass casing.

"That's a pity. I'd like to start on these shop people with something a little more complicated. That old chap *would* be at sea. He'd sink. However, I don't mind saying that I myself would go for a combined H.T. unit and trickle charger. That always seems a worthy proposition to me. You only want a tiny accumulator—it's no trouble, and it is economical."

You can charge your accumulator with D.C. mains by using this simple Ward and Goldstone device.

"Excuse me looking like Mr. Question and Answer in a pill advertisement, old chap, but what do you know about valve and metal rectifiers? And how do your thoughts revolve on the question of chargers of the ordinary kind?"

"I'll write you a book about those. In the meantime turn over a page or two of this present issue of MODERN WIRELESS and you will learn a few home truths."

Local Interference

There is a loud, exaggerated cough. Both turn towards the counter, where they see the shop's proprietor smiling oilily.

"Gentlemen, would you mind getting off the mat? The door-bell keeps ringing while you stand on it. Not that I mind, but my son Alfred is just getting America on his latest 'M.W.' short-waver, and he says the bell jams him—whatever that might mean."

Some of the products of Tannoy Products, a firm which makes a fine range of reasonably priced mains units and chargers.

ARRANGING YOUR GRID BIAS

THAT a grid-bias battery has to supply no current is no reason why it should be absurdly small in its capacity. The mere fact that the capacity of a primary cell is

Test Your Grid-Bias Batteries Regularly

determined by the size of its elements means that a higher-capacity battery will, other things being equal, be larger in size.

And that indicates that there will be a greater bulk of paste material and the possibility that this will take longer to dry up.

The life of a battery, in the case of at least a large number of grid-bias batteries, is determined by the life of its paste. As soon as that paste becomes a solid substance the battery "packs up."

Thus we have a very good argument in favour of respectably-sized grid-bias batteries of good make.

The death of a grid-bias battery may be attended by greater troubles than attends that of an H.T. battery. In the latter case the worst that can happen is that distortion creeps in.

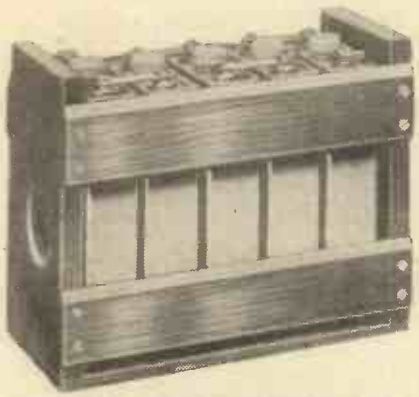
Ruining a Valve

But it must never be forgotten that a grid-bias battery acts as a sort of limiter of the H.T. current. Take away the grid bias from a power valve and the H.T. current may leap up from, say, 7 milliamps. to 30 milliamps. or more. The result of that might be a ruined valve.

Anyway, it would shorten the life of the H.T. battery, which is a much more expensive item than is a little G.B. battery.

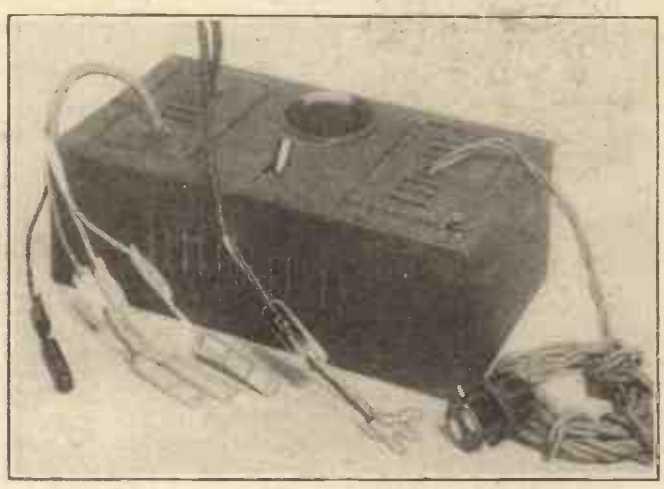
And all that is a very good argument in favour of treating the G.B., not as a component that is tucked away inside a set, when a set is bought

Substantial terminals and a properly designed vent plug are essential if an accumulator is to give reliable service.



A block of "NI-FE" accumulator cells designed specially for radio H.T. purposes.

or built, and then forgotten, but as a battery that has to be periodically tested and maintained in good fettle just as should the H.T. or L.T. battery.



One of those popular "Ekco" units. The "Ekco" slogan is "safe, silent, and sound," and it is evident from their success that they manage to carry it into practice.

We are frequently asked whether we advise amateurs who have mains to derive G.B. from such as well as H.T.

That is the sort of question that is difficult to answer in a few words.

G.B. from Mains

G.B. from the mains is, of course, a perfectly practical scheme; and, indeed, you find it in most of the commercial mains sets. But what must not be forgotten is that you find silent backgrounds in mighty few commercial mains sets. Indeed, it would sometimes appear that it is widely accepted that a certain amount of hum is inevitable.

Be that as it may, the fact remains that to get G.B. from the mains as well as H.T. makes it more difficult to get humless results.

Also, the further complication of the power wiring must not be forgotten.

Further, there is that fact that a grid-bias battery costs at most only a shilling or two, and lasts for months.

Therefore, the battery seems to have as much, if not more, in its favour then the mains for at least G.B. purposes. Indeed, we should say that unless you have in mind some dependable all-from-the-mains set design or sufficient electrical and radio knowledge and experience to enable you to hook-up one such for yourself, H.T. is as far as you ought to go with the mains. We are, of course, excepting charging from this, which is quite within an ordinary amateur's province so long as he goes about it with some circumspection.

Robbing H.T.

You can create a grid-biasing voltage by inserting a resistance in series with the anode circuit of the valve concerned and tapping the filament

An accumulator battery provides an excellent alternative as an H.T. supply, where fairly heavy current is required.

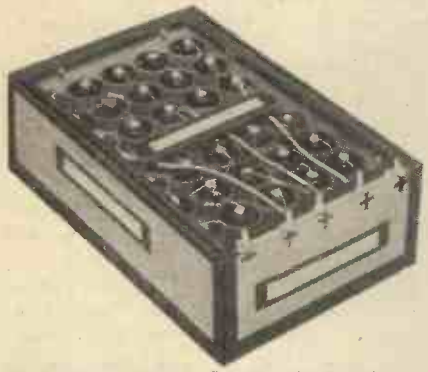
Special Power Supplement—contd.

return and grid across this. But the voltage is stolen from the H.T. battery, so there is little gain in the end.

The same thing applies to the H.T. battery that is equipped with grid-bias taps. These taps are not clear gains, because the cells concerned are devoted to nothing but the G.B., and they are not doing a double job in any way.

BUYING AN ACCUMULATOR

ACCUMULATORS decidedly are not simple assemblies of lead and celluloid or glass. Through a fairly wide acceptance of the quite wrong idea that they are, thousands of cells have been sold that are not, by a long way, up to the standard set by the more reputable manufacturers.



This Leyton Battery Co. H.T. battery has a glass protecting cover and its sockets brought out to one end. It is supplied in parts for home assembly.

Properly maintained, an accumulator will have a long life, providing it starts off by being constructed scientifically. That is obviously the first very important requirement.

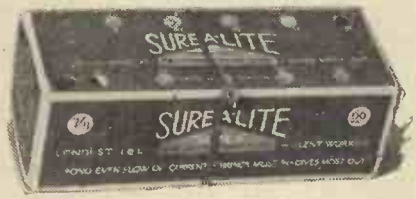
All sorts of claims have been made for batteries that are in fact pretty poor articles. There is a fairly direct indication of an accumulator's general efficiency that, apparently, is ignored to a very large extent. And that is its "input-output" efficiency.

A Vital Factor

It takes a certain amount of current in ampere hours to bring a cell to its fully-charged condition, and a measure of the cell's efficiency is shown by the ampere-hour output that is the reward.

But even if a cell shows up very well in that respect it does not necessarily follow that it will stand up to ordinary usage as long as will some others. And this is a vital factor from the amateur's point of view.

For while an "input-output" efficiency of an exceptionally high degree may be obtained, that in itself is only an indication that the battery has been well designed in the one



A scheme that inspires confidence: this battery has a sealed case.

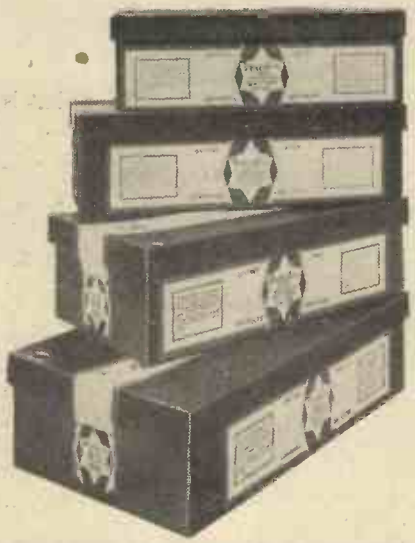
respect. Nevertheless, as we have suggested, that is some indication that it may have been, in general, constructed carefully.

However, the amateur pays just as much for the charging of an inefficient battery as for one of the same capacity and voltage that is very efficient. If he does his own charging there will naturally be a gain if there is less loss in the processes of charging.

When the Paste Loosens

Very great skill and care have to be exercised in the making of accumulators if they are to have long lives in the hands of the not-too-careful user. A fault frequently encountered in the less-reputable cell is an early loosening of the paste that is pressed into the plates.

The big accumulator people adopt



Brief hints on the use of the batteries are printed on the sides of these Brandes'.

special schemes—sometimes secret processes—to prevent the paste from loosening early in the careers of their cells. Ingenious honeycomb and grid patterns of plates, into which the paste is pressed at terrific pressures, are some of the steps that are taken.

But whatever the precautions, a loosening of the paste is inevitable, or practically so, with most makes after a long and faithful service. But a slight amount of paste break-away will not render the accumulator useless, providing there is ample clearance at the bottoms of each cell to take the sediment that forms in the acid solution, so as to prevent this from short-circuiting the plates.

Cause of Sulphation

By the way, an argument greatly in favour of some of the "solidified" electrolytes that have been produced is that they tend to hold the paste in position even after it has worked loose. That also applies to the employment of glass wool—a scheme frequently adopted to render an accumulator unspillable.

Another thing that militates

A battery that bears the name of a firm with easily-remembered initials.

against the long life of an accumulator is sulphation. Sulphation is generally caused by a failure to keep the cells in a properly charged condition. The voltage per cell should never be allowed to drop below 1·8 volts, even when the battery is not being used.

And besides voltage tests the hydrometer should be used frequently to test the condition of the acid.

A Dangerous Fluid

The terminals of an accumulator have to do more work than the average radio set terminal, and their work becomes difficult if the acid can attack them and cause corrosion. In such circumstances they are liable to "bind" up. The terminals of all accumulators ought to be absolutely acid-proof. But they aren't, worse luck!

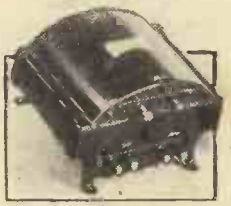
Sulphuric acid, which, of course, figures in practically all secondary batteries, is a most dangerous fluid.

How to Make your Accumulator Last Longer

That is probably fairly generally realised these days, but a reminder that it can send off dangerous fumes may be justifiable in this present instance.

Replacing a Vent Plug

Such fumes are often highly explosive, and can cause nasty accidents if ignited by a naked light brought near to them. Also, such fumes may be corrosive, like the acid from which



One of those most efficient but reasonably priced Heayberd mains transformers.

they originate, although generally corrosion over space is due to the spraying that frequently follows charging.

The dangers of this kind of thing are vastly minimised by the provision of carefully designed vent plugs. And if a plug is lost or mislaid it should always be replaced at the earliest possible opportunity. Not by paper or wood or anything else that can be eaten away by the acid, but by another proper vent or plug or by a rubber stopper with a small hole pierced through it.

The Type of Case

From many points of view glass cases are preferable to celluloid cases for accumulators. Some celluloid is liable to introduce impurities into acid solutions and to crack and allow acid solution to leak out. But on account of its weight and comparative fragility, glass is not a very practical material for the purpose for accumulators for portable sets.

So much for the constructional aspects of the accumulator.

When you are buying one of these accessories you should carefully inquire as to its capacity. The capacity of an accumulator in ampere hours will vary with its output.

Checking the Rating

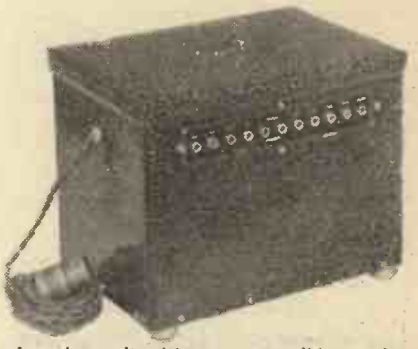
Thus an accumulator will last relatively longer per charge if it is asked to give small currents for short periods than if it is asked to provide hefty amperages for long, continuous periods.

Two first-class rectifier valves are shown here: the Osram U10 and the Six-Sixty SSW462.

An accumulator's capacity is rated in ampere hours, but it is advisable to find out whether or not the rating has been arrived at with a current figure round about that which it will have to give when in use.

You must not take it for granted that an accumulator rated at 20 ampere hours will give you two amperes for 10 hours, or one ampere for 20 hours. The rating may have been based on a discharge of only a quarter of an ampere maximum, or an even smaller current.

Such a capacity then may well



A mains unit with very accessible tapping sockets—an "Efesca" due to Falk, Stadelmann and Co., Ltd.

come within the category of an "ignition" rating. And such an ignition rating indicates that you might get only about half the specified output if you used the cells to supply something—like a radio set, for instance—needing an ampere or more for periods as great as three hours at a time.

Preventing Evaporation

It is generally recommended that the first charge given to a new accumulator should be a slow one carefully applied. But there are several makes that do not require such special treatment, as their plates have been "formed" and rendered ready for immediate active service.

Evaporation of electrolyte and a certain amount of acid "creeping" can be prevented by pouring into the

One of the many fine R.I. mains unit components—the L.T. transformer for metal rectifiers.

The "Lotus" mains unit which is dealt with in detail in other pages in this issue of "M W"

Special Power Supplement—contd.

cells small quantities of one or other of the special accumulator oils that are available. We would always recommend this practice to the

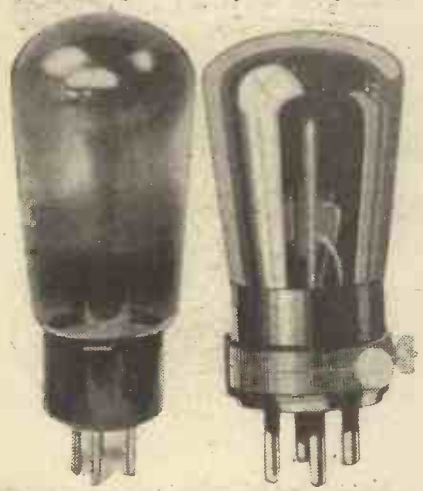
Fixed condensers for mains units should always be of a type tested at voltages well above those they will have to stand up against.

amateur. It makes for cleanliness and tends to prevent terminal and lead corrosion.

Mind Those Mains

When an accumulator is used with a set that derives its H.T. from the mains the accumulator takes its place in the mains circuit to a smaller or greater degree. It may well happen that it is actually raised to a high potential. In such circumstances it is distinctly advisable to enclose it in a wooden box, the interior of which has been well covered with some acid-resisting paint or enamel, or lined with lead. Such a box must have a ventilation vent.

Great care ought to be exercised in the selection of a charging station. Local garages are only too frequently



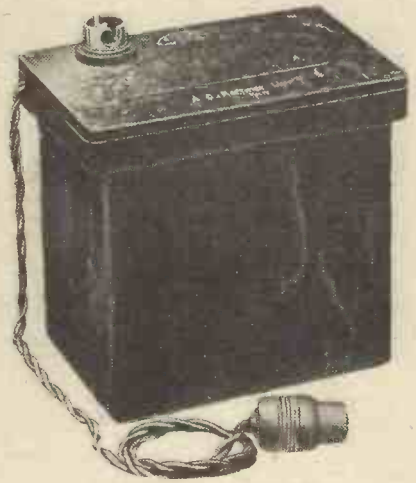
On the left is a Vatea rectifier made by Abbey Radio, and on the right a Dario rectifier valve.

apt to connect small radio cells in series with great car batteries, and give the poor little articles enormous charging currents. Damage may be caused by such treatment, not so much through that plate buckling that one used to hear a lot about, but through the excessive heat caused by the too-heavy currents. The small cells used for wireless purposes are not generally built on the robust lines of car batteries.

A Yearly Overhaul

In most instances a maximum charging rate is specified by the maker of an accumulator, but it is only too seldom that charging stations handling all sorts and sizes of batteries keep to within such limits.

It is a good plan to have an accumu-



A Dubilier rectifier unit.

lator cleaned out every year or so, and new acid solution put in.

Do not buy too big a battery. It is better to have one that will just run three or four weeks to every charge than one that could function for two or three months. The more frequent and regular charging is a healthier existence for a battery. But never, in any circumstances, succumb to the temptation to squeeze the last bit out of the cells; never let them drop below that 1·8 volts per cell.

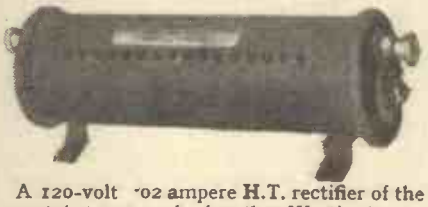
Regular Tests Essential

Most modern valves will continue to operate quite well with much smaller filament currents than their actual ratings. Perhaps the power output of your set will not diminish appreciably when the accumulator has dropped below its safety level. Thus if you wait till your set starts

This Jelectro accumulator is quite unspillable as it employs a paste electrolyte.

to sound weak before you begin to think about the next accumulator charge you may be doing your battery a very serious disservice. The voltmeter should be run over the set once or twice a week.

When an accumulator begins to fail to hold its charge for the expected periods it may be that sulphation has begun to set in. This is generally discernible as a whitish deposit forming in irregular patches on the



A 120-volt ·02 ampere H.T. rectifier of the metal type made by the Westinghouse people.

plates. Caught in its early stages sulphation sometimes yields to skilled treatment, and this respectable charging stations can give it.

Valve Voltages

There is little to be done to a battery that is badly sulphated and has much of its paste falling away from the plates.

When choosing valves remember that 4-volt L.T. supplies are cheaper, from all points of view, than 6, and

Climax Radio Electric, Ltd., make efficient and reliable mains components.

Home-Charging is Cheap and Easy to Carry Out

2 cheaper than 4. Also remember that the higher the capacity of the accumulator the higher the charging costs, so that economical valves, whatever their voltage rating, have a direct bearing on the running costs of a set.

BATTERY CHARGERS

It is often cheaper and always more convenient to charge your own accumulator than to have it done elsewhere.

THE owner of an ordinary receiver who also has the mains in his house invariably considers the question at some time or other—" What about using the mains for the set ? "

Well, why not ? There is nothing difficult in using the mains, especially if you are on A.C. D.C. mains provide H.T. which is reliable and easily used, and can also be used for charging an L.T. battery. With A.C., however, it is a very easy thing to arrange to charge the batteries as well. In the case of D.C. you have to use resistances to cut down your voltage so that the accumulator is not charged too rapidly, and in these circumstances a certain loss of power occurs.

The Rectifier

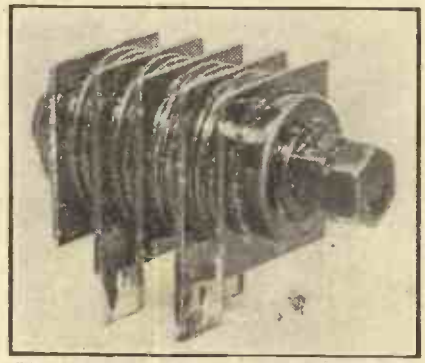
In the case of A.C. you insert a transformer between your rectifying valve or dry rectifier, which, of course,

One of S. Smith & Sons' " indicating " batteries. Note that the three indicators are " sunk," showing the battery is very badly run down.

must be used to turn the A.C. into D.C. for charging purposes, and this transformer brings the voltage to the right value for you, so that waste in resistance does not occur.

There is a certain amount of loss of power, of course, through the transfer through this transformer, but as a rule the cost of running an A.C. mains trickle charger is much less than that of the D.C. variety. Both, however, are easily practicable, and should be carefully considered by the man who has a set in a house supplied with electricity.

Chargers divide themselves up into two main groups, ordinary chargers and trickle chargers. The trickle charger is of a variety which will pass a current into your accumulator at a very slow rate, say about quarter to



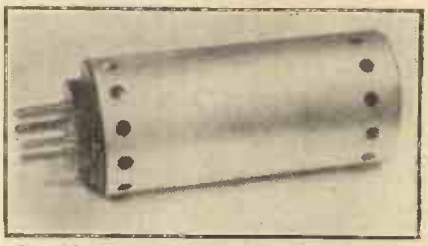
The type B12 B-L rectifying element. This is a full-wave rectifier providing 2½ amps. for battery charging. (Rothermel).

half an amp., and the use of it is to keep the accumulator up to scratch.

If you use your set for three hours each evening and you take out from it a current of ·75 amp., for the three hours you take out about 2·25 ampere-hours. Now during the night you can have your trickle charger on, giving quarter of an amp., and you can replace all that electric power in nine hours. So the next day when you come to use your set the battery is again up to scratch.

A Simple Scheme

The trickle charger, as a rule, is switched off when the programme is on, then switched on when the programme is over, and left on overnight or until the next programme, depending, of course, on how much current you are taking from your set. If the trickle charger gives you an amperage of a third of that taken by the valves in the set, then it must be on three times as long as the set in order



One of the Igranic Elka dry-rectifier H.T. units. This plugs into a valve holder like a valve.

to replace the power you have used from the battery. That is very simple, isn't it ?

The other charger type is one which will charge at one or two amps., and this is useful for very large batteries when a considerable amount of current is taken from the battery for the set. As a rule this class of charger is not of any use to the ordinary man and does not concern us here.

More Expensive

The trickle charger in the case of D.C. is a rather uneconomical business, but, as we said before, it can be done with resistances (lamps, or wire-wound resistances) in series with the mains and your accumulator. The trickle charger for A.C., however, is a very sound proposition. It consists essentially of a transformer and a rectifier, and possibly a " barretter " or control resistance.

The rectifier can be of the ordinary valve type, which usually is a mercury arc or some form of gas-filled rectifier, or it can be of the dry rectifier

Another battery that utilises indicators to show the state of the cell. In this case it is fully charged. (Nat. Acc. Co.).

Special Power Supplement—contd.

One of the large Mazda valves—the U65/550 half-wave rectifier.

variety. In the case of the former a barreter is usually placed to limit the current so that the valve is not over-run, and, of course, the unit is especiallyquiet in working.

All you do is to switch it on, when there is a little flash in the valve, if one of these is used, and a greeny-blue glow appears, and thecharger goes on working as long as it is switched on. In the case of the dry rectifier variety, you can use one of the ordinary dry rectifiers, in conjunction with a transformer, and you can get out anything up to an amp. or more, according to the size of rectifier employed.

No Smoothing Required

Nothing is simpler than the use of a trickle charger. There *are* other types, which we have not mentioned—the liquid type and the vibrating reed type—neither of which have had any very great popularity, and we will not discuss them here.

Whatever type you use, however, there is no need for the slightest smoothing. It is more economical to run a full-wave trickle charger than the half-wave, for obviously you get twice the amount of current for your battery.

Smooth control of detector voltage from 0-100 is provided by this Atlas mains unit.

Tungsram and Marconi double-wave rectifiers.

There is one thing to watch if you do your own trickle charging, and you can very easily overlook this point, and that is the ventilation of the rectifier. This should be so placed that a certain amount of ventilation is provided, and especially is this important if it is of the metal rectifier type. If the metal rectifier gets too hot its life is seriously shortened and its efficiency impaired. In the case of the valve rectifier, dissipation of heat, which is comparatively considerable—you cannot bear your hands on the valve when it is working—must be provided for, in order that overheating shall not take place.

The Barreter

The barreter, if such is used—and it is sometimes rather an important item—usually consists of either a resistance placed in the circuit of the rectifier, or a resistance in a vacuum plugging in like another valve.

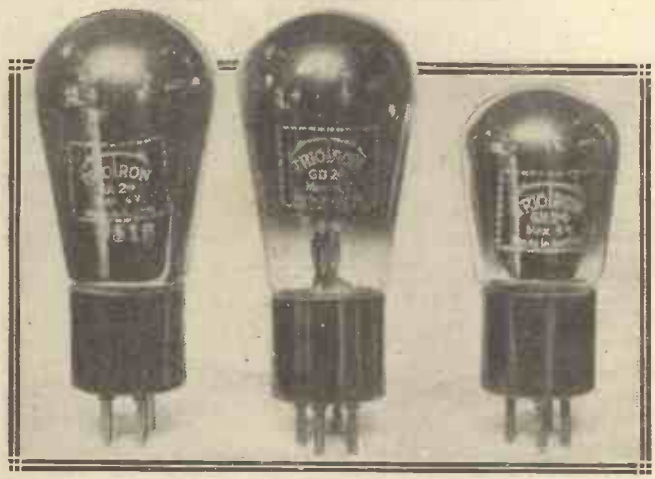
Many commercial mains units incorporate trickle chargers with the H.T. unit, so that when you have finished with the set you switch off the H.T. and switch on the trickle charger, and the battery is immediatelyplaced on charge, to be ready for the next day's work. It is, of course, a matter of personal convenience whether the combined mains unit and trickle charger, or the separate unit and separate charger be used.

This valve is a full-wave 60 m.a. rectifier.

Whatever type be employed, however, we should like to advise our readers who are using L.T. battery-driven sets, where mains are available, to try trickle charging their accumulators. They will find it saves a tremendous amount of bother in taking the battery to the charging station, and it is particularly simple in operation and cheap in maintenance.

A trickle-charger valve rectifier will last a very long time indeed, a life of several thousands of hours not being uncommon. We ourselves have had one in operation now for over three years,

THREE "FULL-WAVERS"



A selection of Triotron rectifying valves. They all take a filament pressure of 4 volts.

Here is the Burndept H.T. mains unit.

A Rectifier for Every Type of Mains Unit

going nearly every night and sometimes working continuously all through the week-end. The same valve is still in use, and even if it had not lasted all this time it is not a particularly expensive item to replace, costing only a few shillings. The dry rectifier should last very much longer, of course.

Trickle charging is really worth while, and we recommend all our readers who have not tried it, and who can do so, to cut out those terrible journeys to the charging station.

MAINS RECTIFIERS

Interesting details concerning various rectifiers used in modern mains apparatus.

You have read all about H.T. mains units in one of the breezy little articles that preceded this, but so far nothing has been said about the little gadget that makes the use of H.T. from the mains possible when A.C. electric supply systems are to be employed.

We refer, of course, to the rectifier, that little row of metal plates, or that valve which starts taking the lumps off the A.C. current by twisting the current round so that it flows all in one direction, instead of reversing direction every half-cycle. The start in the obtaining of steady D.C.

Let us have a look at the dry rectifier first. This consists of a series of discs or plates of metal with an oxide or similar metallic salt in contact with it. This system prevents current, or very nearly prevents it, from flowing in one direction and lets it through in the other.

The output rating of this Mullard valve is 60 milliamps. at 250 volts.

Ventilation

The great advantage of this type of rectifier is that it is extremely compact, but it must be so housed that plenty of ventilation is provided, for if the metal rectifier runs too hot it is liable to be damaged.

Valve rectifiers also should be fairly well ventilated, for overheating here is also detrimental to the valve's operation. Rectifiers can be obtained to suit all purposes, to provide full- or half-wave rectification at either high or low voltages and to provide large or small currents. Trickle chargers, "full" L.T. chargers, H.T. units, or grid-bias supply systems.

Various Types

Of course, a particular type of rectifier has to be chosen for each particular purpose. For instance, it would be useless to expect a full-wave H.T. rectifier of the U.5 class to be any good for charging an L.T. accumulator, though it could be used for very slow charging of an H.T. accumulator—rather an uneconomical method — but it would be useful as a rectifier for supplying D.C. to a moving-coil loudspeaker pot of the high-resistance 50-m.a. type.

One of the Lissen rectifiers.

In choosing a rectifier for any particular purpose it should be remembered that a certain factor of safety should be considered. A mains unit should never be asked to provide all the current it can.

If a rectifier is put on full load the voltage at which it supplies the load falls rapidly, as can be seen by a study of the curves of any rectifier valve.

Similarly, the fixed condenser placed across the rectifier valve itself should not exceed 4 mfd., the value with which most valve output curves are taken. If a larger capacity is used it puts an unnecessary strain on the valve. A higher value condenser can be used farther on through the mains unit if required, but the one next to the valve (across H.T.+ and H.T.−) should not exceed 4 mfd.

When choosing a rectifier, and the transformer to go with it, we have to make sure we are going to get sufficient voltage and current from it.

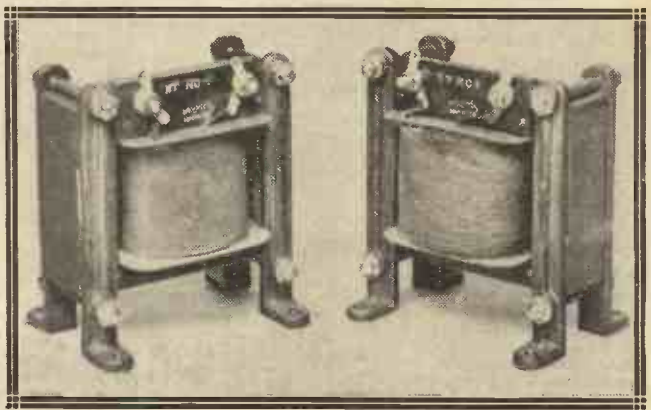
The smoothing of a half-wave rectified current is no more difficult than in the case of the full-wave.

One of the new Cossor full-wave rectifying valves for H.T. work.

Safety Factor

There is not much more that can be said in this short space about rectifiers except to emphasise the importance of keeping a fairly large factor of safety. It is not too much to keep a quarter of the current out of any rectifier in reserve, as it were.

Thus if you have a unit that *can* give 120 milliamps., never call upon it to deliver more than 80 or 90. Otherwise the voltage drop will become badly noticeable in most cases, besides the fact that in a great many cases, where smoothing is not too well carried out, mains hum will begin to make itself heard, due to the lowering of the inductance of the chokes by the passage of the high value of current.



Two useful mains H.T. chokes made by Messrs. Wright & Weaire.

By the Technical Editor

New

Magnum Components

THOSE enterprising manufacturers, Burne-Jones & Co., Ltd., appear to be exceptionally active of late. This month we have to chronicle the arrival of samples of no less than four new Magnum components.

There is, first of all, a grid-leak holder of quite simple but completely

A special feature of the Magnum neutralising condenser is that it has a double-ended support for the moving vanes.

effective design that is available at 6d. It comprises a small bakelite base upon which are mounted two efficient clips capable of taking any standard grid leak, and two of the famous Burne-Jones slotted hexagonal terminals. No radio experimenter should be without a few of these handy little holders.

Then there is the Magnum wire-wound potentiometer. This is available in the following resistance values: 5,000, 10,000, 25,000, and 50,000 ohms, at 7s. 6d each, and the component will safely carry as much as 10 milliamperes.

The movement of this Magnum potentiometer is particularly smooth, and the adjustment is certainly definite. A special floating disc contact arrangement is employed, and this, incidentally, imposes no wear on the fine wire of the winding.

The third new Magnum component is a decoupling resistance. This is a simple non-inductively-wound coil provided with Magnum standard slotted terminals on the side, and it can be fixed to the baseboard by means of one single screw passing through the centre of the article. Very simple, but, from any angle, quite adequate.

Useful Items

It is available in either 600 or 1,000 ohms, at 1s. 6d. It has its special uses in decoupling arrangements, although, of course, it has other applications, and should achieve some considerable popularity. An odd 600 or 1,000 ohms capable of carrying a good many milliamps. is very useful to have about.

The fourth Burne-Jones item is the Magnum neutralising condenser

The D.C. Regentone H.T. unit and charger employs a lamp resistance which is accommodated in the socket that can be seen in the foreground.

of improved design. Its special feature is that it has a two-ended support for the moving vanes, and this ensures rigidity and makes it practically impossible for a short-circuit to occur between the elements of the article.

This is a very important advantage for such a condenser to possess, in view of the position it usually occupies in a circuit.

The price of this new Magnum neutralising condenser is 5s., and at this we consider it is quite good value for money.

Mains Units for Portables

We believe the Regent Radio people, with their special Regentone units, were first in the field with A.C.-H.T. outfits designed to replace the H.T. batteries in portables when these are used indoors. And it is interesting to note that there are now available Regentone combined H.T. mains units and L.T. chargers for all portables and all popular three- and four-valve receivers. They really are remarkably compact units, for they actually

The Magnum wire-wound potentiometer will handle 10 milliamperes.

fit inside portable sets and turn these into all-mains outfits.

The combination of H.T. from the mains and trickle-charging is a particularly attractive and practical one, but, as the Regent Radio people say, by reason of its compact nature and extreme sensitivity a portable receiver is liable to be unstable.

They have therefore taken special precautions in regard to the Regentone combined units to prevent the possibility of an external field.

Each unit is also enclosed, as an extra precaution, in a handsomely finished maroon-coloured earthed metal case—an extremely important point this.

The D.C. model for use on 200-250-volt mains provides an H.T. output of 130 volts at 20 milliamps. with two continuously variable tappings. This

Components

Magnum, Regentone, Amplion and Blue Spot products are described and illustrated this month.

model charges a 2-, 4-, or 6-volt accumulator at ½ to 1 ampere without any alteration to existing wiring. The price of the D.C. unit is £4 15s.

The A.C. model, which is very similar, costs £5 17s. 6d. The physical dimensions of both the D.C. and A.C. models are 9 in. by 5 in. by 3½ in.

The A.C. Regentone combined H.T. unit and charger.

Readers may wonder whether adequate smoothing is possible in such a small unit. However, on test we found the Regentones completely satisfactory in this respect.

The running costs of an A.C. mains unit are practically negligible, while those of the D.C. outfit work out at a small figure, so that the replacing of ordinary batteries by such devices when portables are used in the home is a most economical practice.

New Amplion Loud Speaker

Messrs. Amplion must owe much of their success to their now famous Amplion after-sales service, for they guarantee their Amplion products for one year against failure or breakdown of any kind that may be attributable to defective material or faulty workmanship.

Such a scheme would go a long way towards consolidating the reputation of any firm, but in an application of radio it becomes of even greater value.

Radio is still young as a trade, and the public have not yet forgotten its exploitation, in the early days of broadcasting, by those many firms that rushed in to take advantage of the "boom."

But an after-sales service can never prove an economic success unless it is carried out in connection with high-class, reliable goods, and it does not need us to say that such a description applies to Amplion loud speakers.

The latest addition to the world-famous Amplion family is the A.B.41, which is a senior brother of the balanced-armature standard type A.B.6. The A.B.41 costs £5 15s. in oak and six guineas in mahogany. It is a large and handsome instrument, full-toned and dignified. It takes the symphony orchestra just as comfortably as it handles a solo soprano.

There is also now available the Amplion A.B.45 which employs the same kind of unit and diaphragm as the A.B.41. But it has a larger cabinet and there is an efficient baffle filling the space.

The A.B.45 costs £7 7s. in mohogany and £6 15s. in oak.

Blue Spot Loud-Speaker Unit

Messrs. F. A. Hughes & Co., Ltd., have sent us samples of two new types of Blue Spot loud-speaker units that are now available. These are the 66P and the 66R. While they are similar in design and appearance, the 66R is the larger of the two.

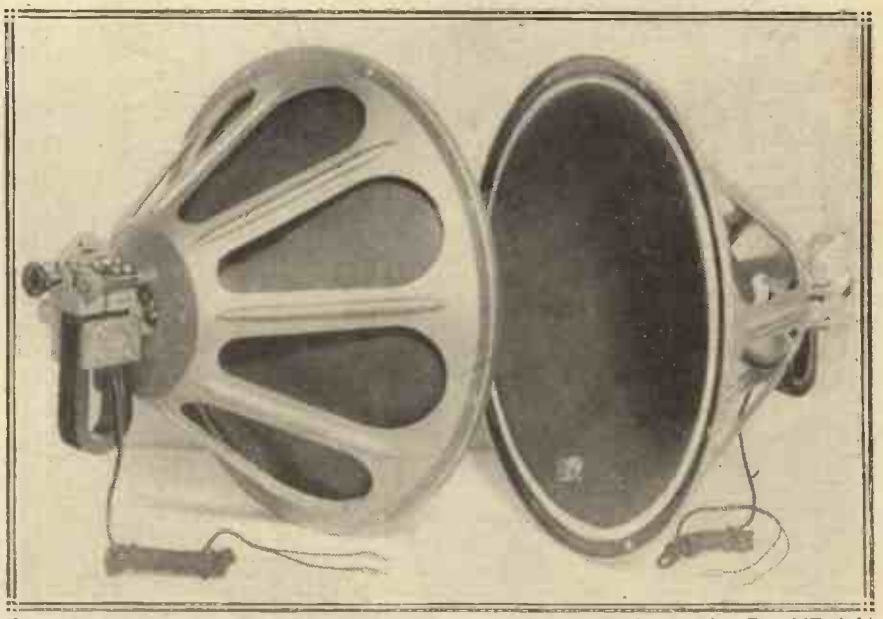
It is unnecessary for us to say that they are good units, for the Blue Spot people would have to go back a good way on their original productions for them to be anything else.

The type A.B.41 Amplion loud speaker.

The new Blue Spots have all the acknowledged good Blue Spot points with even better responses. They are very sensitive and, being able to handle heavy inputs, there is, of course, no appreciable trace of that objectionable amplitude distortion that is noticeable particularly in some moving-coil speakers.

You will notice how free the Blue Spots are from this blemish on speech or when vocal choruses are being sung by the vocalists of dance bands, and the words come out crisply and clearly, with no muffling or hang-over.

The chassis supplied with the Blue Spot units are of quite satisfactory design. They are robust and light, and the largish cones are held by a free material.



These are the two new Blue Spot loud-speaker units fitted to their chassis. The 66R (left) has the larger movement and diaphragm.

QUESTIONS ANSWERED

By the "Modern Wireless" Query Department.

Microphonic Howling

N. H. (Weybridge) has a portable set consisting of an H.F., det. and one L.F., the loud speaker being placed in the cabinet beneath the receiver itself. He is troubled with a howl which tends to build up in strength until it completely drowns the broadcast programme, when he is compelled to switch off the set.

This sounds very much like a microphonic howl, and is probably caused by the sound waves from the loud speaker inpinging upon the detector valve. You can overcome the trouble by wrapping a quantity of cotton wool round the glass bulb of the detector, thus shielding it from the loud speaker. You will have to determine the amount of cotton wool required by experiment, and you can easily attach it to the bulb with the aid of a little cotton or thread.

First or Second Stage?

S. D. (Sutton) has two transformers, one of them having a ratio of 3-1 and the other a ratio of 3·5-1. He asks us which of them he should use in the first stage.

It is quite immaterial which of the two instruments is used in the first stage of the amplifier. The modern low-ratio transformer is suitable for any position in the set, and it is unusual to specify any one particular type for the first stage.

There is one point, however, which is sometimes of importance. If the circuit incorporates a reaction condenser, but no radio-frequency choke, then it is undesirable to use a transformer immediately following the detector valve which has a small fixed condenser connected across its primary winding. Naturally, in such a case the action of this condenser would be to by-pass the H.F. currents in the anode circuit of the detector valve, and in consequence no reaction would be obtained unless a radio choke was inserted in series between the transformer and the anode of the detector valve.

Resistance Capacity Values

S. M. (Colchester).—"I have a cone type loud speaker of the balanced-armature pattern, and wish to make up an amplifier incorporating a stage of R.C. coupling. What value coupling condenser and grid leak would be suitable?"

Since your cone speaker will not respond to the very low musical frequencies, there is little point in designing the amplifier to give you any bass below about 70 cycles. A ·01 coupling condenser in conjunction with a 2-megohm leak should give you adequate low-note response, and, in fact, you may find that you can cut down the size of the coupling condenser to ·006 without any appreciable difference aurally

A Decrease in Range

D. T. R. (Westcombe Park) is using a two-valver which has been giving excellent results on the medium waveband. He now finds that while the powerful B.B.C. transmissions still come in at good volume, he is unable to bring in Continental transmissions until about 10 o'clock at night. He asks us whether this is due to a fault in his set, and says that he has cleaned his aerial and earth connections with no improvement.

This falling-off in signal strength on the distant transmissions is quite usual at this time of the year, and the majority of moderate-sized receivers fail to give the results in the summer which were obtained with ease during the winter months. Reception is always better during the hours of darkness, and that is why the Continentals begin to come in at about 10 o'clock.

Filter Condensers

J. R. (Tonbridge).—"I notice that the 'Full-Tone Amplifier'—'M.W.' Blueprint No. 5—has two 2-mfd. condensers in the filter output circuit. Is it essential to use these two condensers, because I notice that in some cases with output filters only one condenser is employed?"

The object of having a large condenser on each side of the loud-speaker is to provide complete isolation, which is a very desirable feature in connection with amplifiers which are used in conjunction with a mains unit.

If the set or amplifier is only to be used with battery or accumulator H.T., then it is not essential to use more than one condenser, but when mains units are employed, then complete isolation is very important.

You will understand that the "Full-Tone Amplifier" was designed so that it could be used with any form of H.T. supply.

AN "ATLAS" MAINS UNIT

The well-known Manchester firm who make "Atlas" components have long been famous for their mains units, so that particular interest is attached to this description.

THOSE who have electric-light mains laid on to their houses are often the envy of radio enthusiasts who are less fortunate in this respect. But, strange though it may seem, there are many radio users who have electric light who do not derive even their H.T. supply from the mains.

Probably the usual reason for this is that some mains units seem very complicated, and appear to necessitate a considerable number of connections. It should be possible to disconnect an H.T. battery and join up an H.T. mains unit in its place as easily as wiring up a fresh battery.

An H.T. mains unit wants to be just as simple externally as an ordinary H.T. battery. This is certainly the case with the "Atlas" A.C.38 Unit which we have been putting through its paces, and have tried on many types of receivers.

Real Simplicity

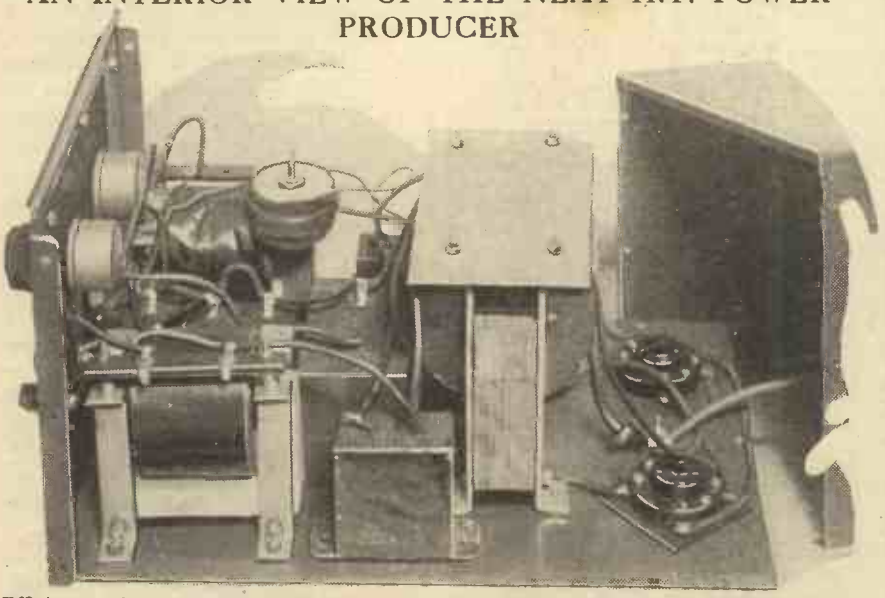
As you can see from the photographs, externally it is the simplest thing possible. It is contained in a dark-green metal case which thoroughly conforms with the regulations regarding mains units.

On its panel there are four output terminals, and two neat little knobs for voltage adjustments. At the back of the top of the containing cabinet is a large slot through which the rectifier valve or valves are inserted.

A sliding panel is arranged to cover this up and protect the valves, and it has a number of holes in it to ensure that the hot air generated has an easy escape. A long length of stout flexible wire, with an adaptor plug which will fit into any ordinary electric bulb holder, is provided for connecting up to the mains.

Reference has just been made to "rectifier valve or valves," and it may not be apparent why one or two can be used. The reason is that by an ingenious method of wiring it is possible to use one double-wave rectifying valve or two half-wave rectifying valves (although a full-wave valve is supplied with the unit) without making any alterations whatever.

AN INTERIOR VIEW OF THE NEAT H.T. POWER PRODUCER



Efficiency of component disposition is the most striking feature of the inside of this "Atlas" H.T. mains unit. It will be noted that the transformer and L.F chokes are at right angles to one another.

A Large Output

The unit is suitable for practically any type of home receiver, for it is capable of giving an output up to a maximum of 50 milliamperes. Also, it has three positive taps, one fixed at the maximum voltage of 180 volts, and the other two variable between 0 and 150 volts.

When a receiver has more than three plus terminals for H.T. it is an easy matter to arrange certain of them in parallel. The makers point out that whenever possible it is advisable to have a separate tap for each valve, otherwise decoupling resistances and condensers are desirable in the set.

Wide Voltage Limits

The model we actually tested was for mains voltages from 200 to 250, with frequencies between 40 and 120 cycles. This is quite a wide range for an instrument to cover without any taps on the transformer or similar points requiring adjustment.

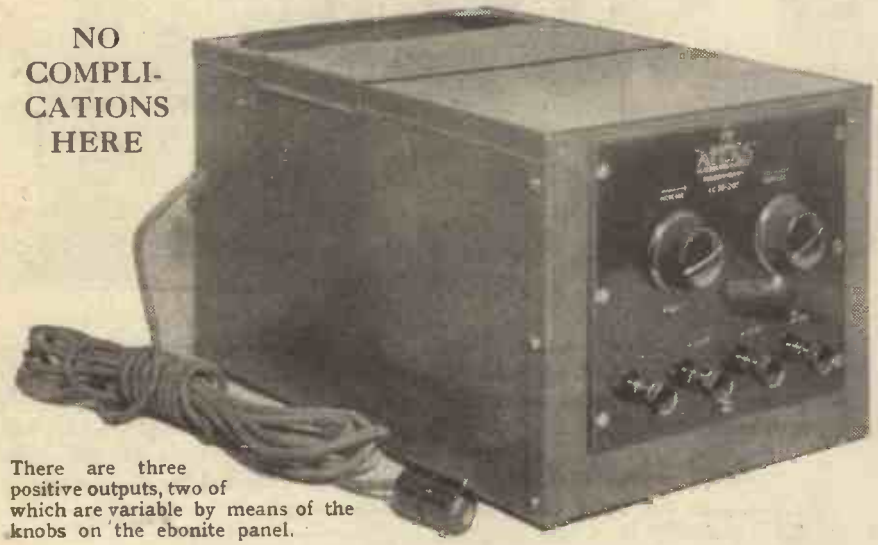
A similar instrument, but intended for use on mains voltages between

Simplicity is the Keynote of the Unit

100 and 125, is available. This covers the same frequency range as the A.C.38, and is known as the A.C.39. Models in both voltage ranges and suitable for 25-cycle mains can also be supplied to special order.

There is not much to report about the unit in operation, except that on all the sets with which it was tried there was no trace of any annoying hum, and plenty of power was always available. What impressed us most was its sheer simplicity.

NO COMPLICATIONS HERE



There are three positive outputs, two of which are variable by means of the knobs on the ebonite panel.

It could be connected up in a few moments and completely forgotten. Actually it is really simpler than a dry battery, because turning a knob to adjust the voltage is easier than plugging small wander plugs into different voltage taps on a battery.

In connection with these voltage adjusters it must be mentioned that they worked very smoothly and had a nice silky action. It was thus possible to find the best voltages for a particulat set quite rapidly.

Fully Guaranteed

Altogether the unit proved very satisfactory, and is a product of which any manufacturer could be really proud, and it is obtainable complete with valve for £9 12s. 6d.

Incidentally, it is very interesting to note that the makers say that the unit has been officially approved by Messrs. Mullards for use in their "Orgola Senior Receiver," and a blue-print was sent showing a slight adaptation of the set which is necessary and has been approved by Messrs. Mullards.

This mains unit and all the others supplied by Messrs. H. Clarke & Co., Ltd. (which are quite numerous), are fully guaranteed against defective workmanship or materials for a period of one year from the date of despatch from their factory or an authorised service station.

ATMOSPHERICS AND FRAME AERIALS

By A. S. CLARK.

RADIO experts have been trying for a long time to invent apparatus of some sort which will eliminate atmospherics. Many gadgets for this purpose have been introduced from time to time.

They have only proved partial remedies, for unfortunately when an atmospheric is generated it covers a tremendously wide wave-length range.

There is one point about atmospherics though which has made it possible to reduce their effect by means of a frame aerial. That point is the fact that they generally come from a definite direction.

Directional Properties

To explain the way in which the frame aerial is utilised it will be necessary to consider the directional properties which it possesses. It is well known that a frame aerial gives maximum signal strength from a given station when it is pointing straight at that station.

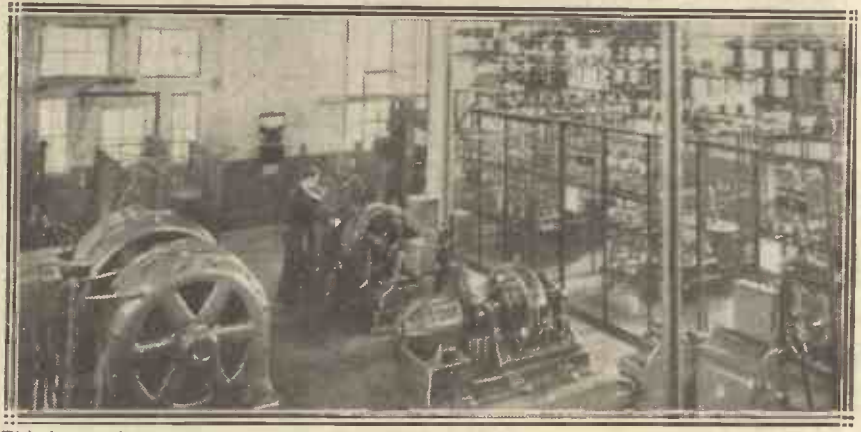
Also, the position for minimum, or in many cases zero, reception is at right angles to the direction in which the station lies. But the maximum position is not nearly so marked as the minimum.

It is therefore possible to have the frame pointing a fair way to one side of the direction of a station and yet for it to pick up a considerable amount of power from that station.

All it is necessary to do is to set the frame at right angles to the unwanted transmission and use a little more amplification to bring signals up to the desired loudness.

Atmospherics can be treated in the same way as the unwanted station, and thus their power considerably reduced.

STILL MORE POWERFUL BROADCAST STATIONS



This is not the power-house for a large town, but merely the generators and rectifiers for one broadcasting station. It is the new station at Schenectady, where experimenting with a power of 200 kw. has been taking place.

AND NOW 200 K.W.!

An American station that shakes the ether with a truly colossal power.

By Our Special Correspondent.

WE are getting quite used to reading of broadcasting stations which use colossal power, but even so it is somewhat of a surprise to learn that W G Y recently carried out tests with a power of 200 kilowatts.

The transmitter was operated under a special licence, and used the call W 2 X A G.

The new transmitter was so powerful that it could not be used immediately for the regular broadcasts. It is contended that such high power will spread in the ether and overlap other channels, thus causing interference.

Vast Area Served

However, the engineers at W G Y are confident that with the latest devices they can control this mighty newcomer so that it will render great public service over a vast area, serving all listeners within its wide range with excellent signal strength.

The engineers pointed out that tests on 200 kilowatts have been reached by easy stages on progressively high power. In July, 1925, W G Y was the first station to work on 50 kilowatts, and since that date many stations have been licensed to use what was once regarded as super-power on their regular programmes at all hours.

In August, 1927, W G Y advanced to the next stage—100 kilowatts. Early in January this year, without any prior announcement and without informing listeners what power was being used, W G Y, on its licence W 2 X A G broadcast a series of record programmes on 150 kilowatts.

Letters were received from hundreds of listeners in the Far West, particularly on the Pacific coast, reporting an unusual strength and clarity. A listener of Hilo, Hawaii, stated that the signal strength was equal to the output of a Pacific coast station.

The production of apparatus capable of handling 200 kilowatts of power was preceded by years of exhaustive investigation and a slow progress from low to high power. Probably the greatest single impetus to the art of high-powered broadcasting was the development of the 100-kilowatt water-cooled valve.

100-kw. Valves

Instead of complicating the design by endeavouring to produce the high power through the medium of many 20-kilowatt water-cooled valves, the design was simplified by the use of a few 100-kilowatt valves.

In the 200-kilowatt transmitter there are six 100-kilowatt power valves. Each tube is 5 ft. long, or 7½ ft. when its water jacket is included.

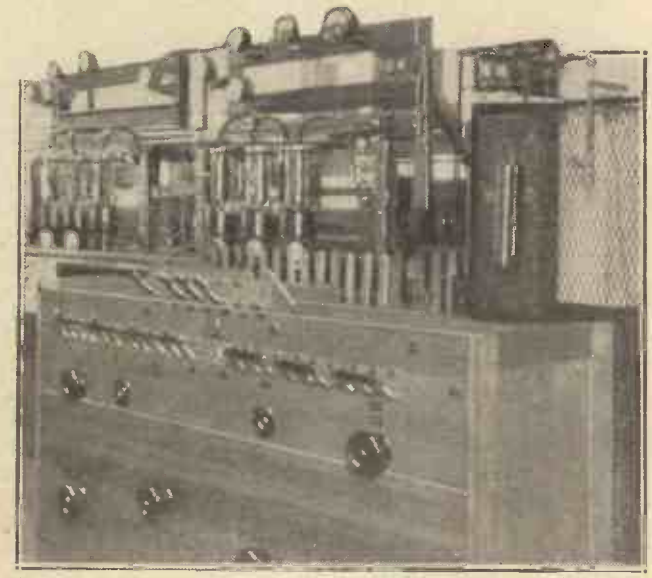
The 200-kilowatt power amplifier is driven by a 5-kilowatt intermediate power amplifier very similar to the commercial 5-kilowatt broadcast transmitter, and uses two 20-kilowatt water-cooled valves in a push-pull circuit. The aerial current is 92 amperes.

Crystal Control

The frequency of the transmitter is controlled by a 790-kilocycle piezo-electric quartz crystal maintained at constant temperature. The deviation from 790 kilocycles is never more than a few cycles.

A recent measurement of the overall frequency characteristic shows a departure from ideal transmission of only 2 per cent at frequencies corresponding to the lowest notes produced by any musical instrument, and but slightly greater reduction at 10,000 cycles.

PRODUCING THE POWER



The intermediate power amplifier used during the 200-kw. tests at W G Y

The

ELSEWHERE in this issue of MODERN WIRELESS you will find a design for a very useful two-valve low-frequency amplifier, which it is suggested might form the basis for a very flexible and interesting complete receiving equipment.

Apart from the value of such an instrument for general experimental work, as a gramophone amplifier, and so on, it is a great help to the man who likes to try as many different types of receivers as he can with the minimum of expense and trouble.

Saving Time and Trouble

If he has an amplifier of suitable design always at hand it means that he need build only the H.F. and detector portion of any circuit he wants to try, with a quite obvious economy in time and materials.

At the same time, few of us can afford to keep a separate outfit for such work, and so means must be devised for making it part of our regular receiving equipment.

What that really means, of course, is that you want a good H.F. and detector unit for normal use with your amplifier, so that you will always have a complete outfit available for routine reception of the programmes.

A Flexible Outfit

Then, when you want to try out something, you can replace your standard receiver unit with the experimental one and go back to it after your tests are finished.

The result, of course, is a four-valve outfit which can be of high performance if suitably designed and well made, and should satisfy most people, including even the confirmed long-distance enthusiast.

Regarded purely as a utility instrument, quite apart from its appeal to the experimenter, it has yet another advantage from the economy point of view, concerned with the possibility of a future still bigger outfit.

Good as is the performance which can be obtained from the modern screened-grid valve, there is always the possibility that growing ambition may eventually make you want two H.F. stages.

If that day ever comes it will be much less of an undertaking to build just the necessary "two H.F. and detector" unit than to scrap a complete four-valver and build a "five." The basis for such an enlarged unit, of course, you can get by taking just the "front end," so to speak, of any good five-valve design.

Again, if you like to begin in a smaller way you can always start with the amplifier and any good single-valver, and progress later to a unit of the H.F. and detector class. In this case you will be well advised to preserve this copy of "M.W." carefully for future reference.

Whatever method you adopt you are pretty sure to require sooner or later an "H.F. and det." instrument, so we have prepared the present design to meet the case. Some careful planning has been devoted to this receiver, for not merely did we wish to ensure for it the high standard of performance expected from all present-day sets, but also certain special characteristics called for by the needs of the particular circumstances.

Good, but Simple

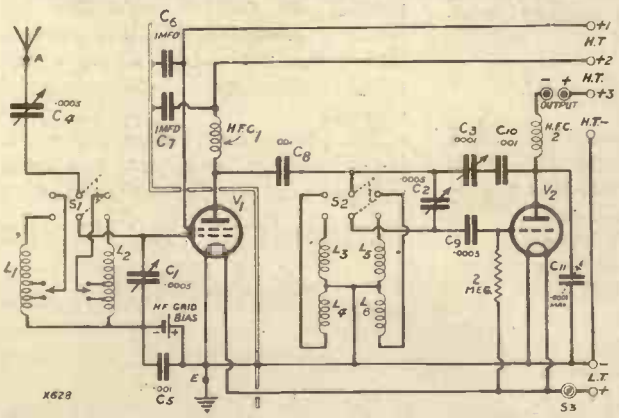
For example, although it had to give results of the best, yet it ought obviously to be sufficiently simple and straightforward to build, so that the owner should not feel tied down to it in future.

On the contrary, if he should come upon something he likes better in the course of time (sets are always improving, after all) he should feel free from any qualms in scrapping his standard unit and building another.

The questions of cost and future usefulness of components are obviously involved here, and much of the time spent in working out the design was devoted to these points. If you examine the photos of our original instrument you will see that, remembering its high performance, it shows a marked economy in the total number of parts, and that they are practically all of a perfectly standard nature.

The only possible exceptions are the two wave-change switches, and even these are of a very useful type which are quite likely to come in handy some day. Even if they do not, they are not unduly expensive, and they are probably the only parts which any experimenter with a fair

RECEIVES FROM FAR AND WIDE

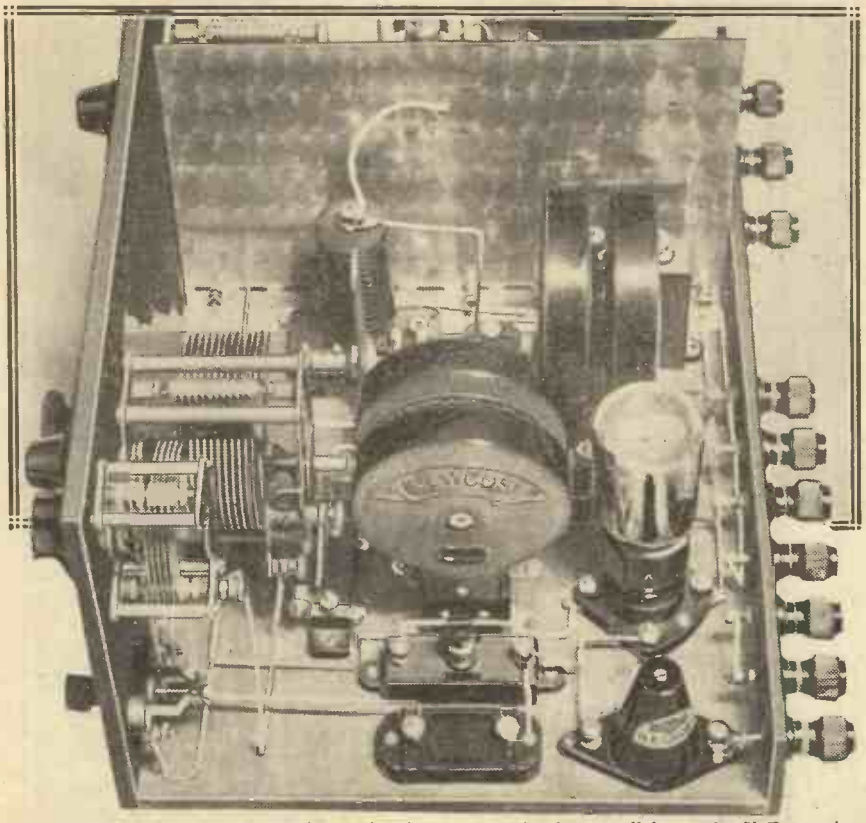


Two double-pole change-over switches provide simple and efficient wave-changing. Grid bias for the S.G. valve and a series aerial condenser help to ensure ample selectivity, and the condenser C_{11} keeps volume up to scratch by providing an escape path for the H.F. impulses in the detector anode circuit.

"Two-Range" Two

An extremely efficient H.F. and Detector receiver which will give real long-distance reception on both the high and low broadcast ranges. When used in conjunction with the "Dual" Amplifier described elsewhere in this issue you have a fine 4-valve outfit of surprising power.

Designed and Described by the "M.W." RESEARCH DEPT.



The detector valve and its associated circuits are completely cut off from the H.F. portion of the set by a simple static screen. This view shows how the grid and reaction coils for one wave-band are placed at right angles to those of the other band to avoid interaction between them.

stock of components is likely to have to buy.

All the rest are such as he is very likely to have on hand, and since the design is far from critical he can "make do" by quite free substitution of equivalent types for those used in the original. Just a little discretion is called for in doing so, naturally, but only in a quite obvious way.

Tuning and Coupling Circuits

The system of tuning in a unit like this calls for a good deal of consideration, bearing in mind our requirements of the best possible results, economy and simplicity, which are not always too easy to combine.

We actually tried out one or two other schemes, but we finally decided to come back to a method of arranging the circuit with perfectly standard plug-in coils which we have found to give particularly good results, and to lend itself very conveniently to wave-change switching.

This circuit is a little unusual, so we may as well run over its main details before we go any farther. The aerial and first tuned grid circuit are quite normal, using a coil of the "X" type, and with wave-change switching of the form which utilises a double-pole double-throw switch to give a complete change over from the low-wave to the high-wave coil. This method, of course, is hard to beat for efficiency. The only special feature here is the variable condenser C_4, in series in the aerial lead. This component is of the inexpensive solid-dielectric type, and functions as a control of selectivity.

It will normally be kept set at maximum, but if ever you want a specially high degree of selectivity you can get it by reducing the capacity here. Actually, the selectivity which can be obtained in this way is quite exceptional, and will enable the receiver to cope successfully with the arduous "regional" conditions.

Special Coupling Method

It is in the intervalve circuit that you will come upon our special scheme. We have here what is really a form of Hartley circuit, in which it may be remembered that a tap is connected to filament and one portion of the coil is used for coupling purposes.

It is customary to arrange this circuit with a centre-tapped coil, but we found in the present case that better results could be obtained by using a tap considerably displaced from the centre. Instead of employing specially wound coils we got the desired effect by placing two coils of unequal size in series.

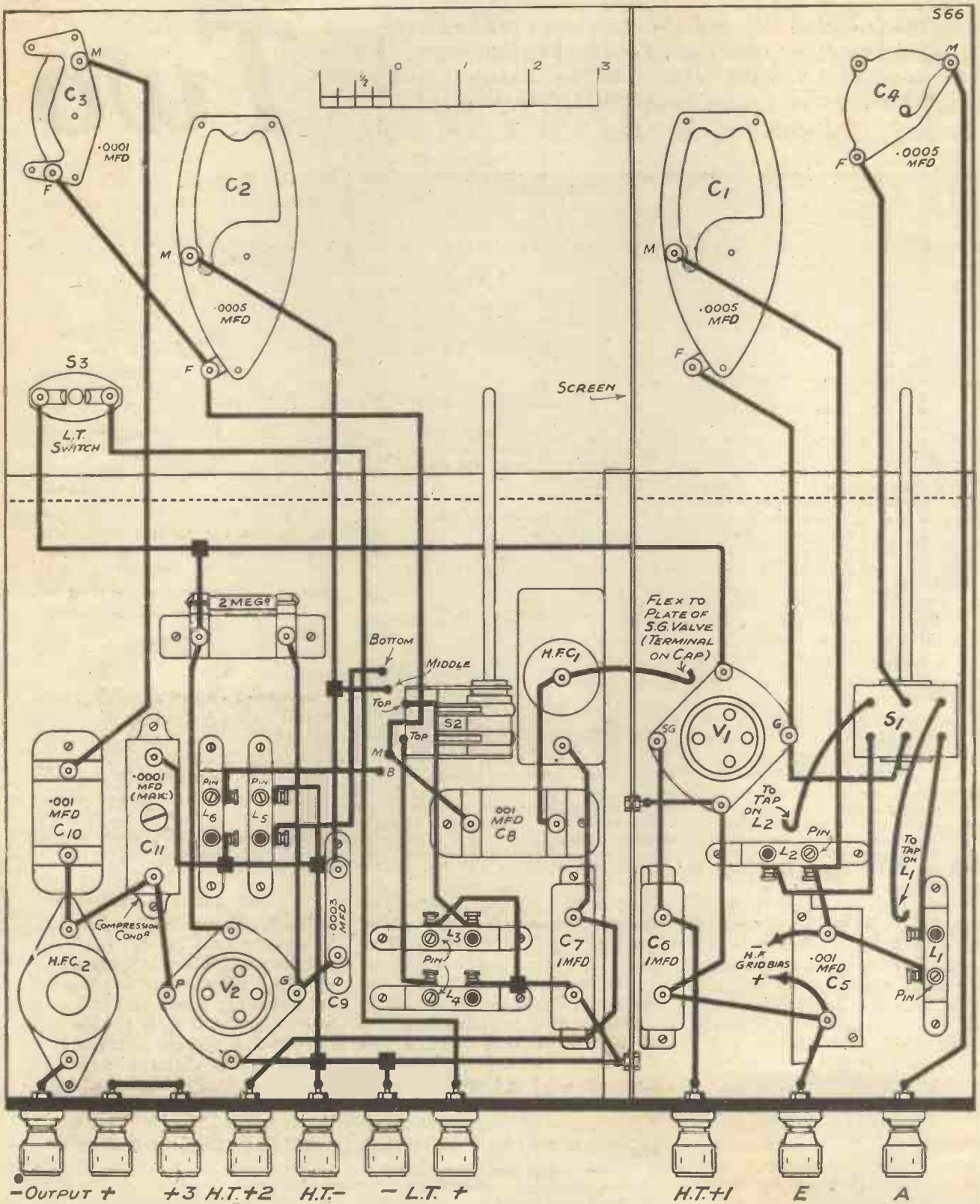
Standard Coils

The junction point between them then becomes our "de-centred" tap, and although it means using a pair of coils for low waves and another for high, they are of standard sizes which everyone is likely to have, and the switching remains quite simple.

The resulting circuit is one of high efficiency and very pleasant behaviour which we found extremely effective in the course of our usual series of tests. It put up a particularly good show, as a matter of fact, and brought in a longer string of foreigners at better strength than is usually to be expected from a single H.F. stage.

Using the Hartley method of coupling it is not as a rule possible to employ differential reaction to good effect, so we have incorporated the older plain type. To prevent the loss of sensitivity normally associated with this form of reaction we have embodied our standard scheme of an adjustable plate-to-filament by-pass capacity for the detector valve.

This is the semi-variable condenser C_{11}, and while we are mentioning it we may as well tell you how to use it. It only requires adjustment when the set is first put into operation, or when the detector valve is changed, so it does not complicate the actual operation of the receiver at all.



Keep to the positions of the components as shown in this diagram as closely as possible. This layout was arrived at after very careful consideration, both from the point of view of easy wiring with short leads as well as the efficiency of the set. The two leads which pass through the screen must be properly insulated, otherwise serious short-circuits may occur.

Efficient Wave-Change with Ordinary Coils

What you do is to start with C_{11} at minimum (knob fully unscrewed) and then gradually increase its capacity until you find that you can only just get sufficient reaction with the reaction condenser nearly full in. It is advisable to make the test for this, of course, at that point on the tuning range where the set oscillates least easily, which is usually the top of the dials on long waves.

By the way, it may help the reader to understand exactly how the circuit works if we explain which coil is which amongst the group controlled by S_2. Well, the low-wave coils are L_3 and L_4, and of these L_4 is the smaller, serving to give intervalve coupling and reaction. Coils L_5 and L_6 are the long-wave ones, with L_6 used for coupling as before.

Special Constructional Points

Now we can take a look at the constructional work. It is particularly straightforward for a receiver of the capabilities of the present one, but there are just one or two details about which we must warn you to be a little careful.

The first concerns the various groups of coils. These were placed carefully to eliminate certain risks of trouble, and you should take pains to make a reasonably close copy of the layout seen in the photos and wiring diagrams.

THE COMPONENTS YOU WILL NEED TO BUILD THIS SET

1 Panel, 14 in. × 7 in. (Lissen, or Trolite, Paxolin, etc.).
1 Cabinet to fit, with baseboard 10 in. deep (Camco, or Pickett, etc.).
2 ·0005-mfd. variable condensers (Lissen, or Formo, J.B., Lotus, Ready Radio, Ormond, Polar, Igranic, etc.).
2 Vernier dials (if condensers not of slow-motion type) (Igranic, or Lotus, Lissen, J.B., Ormond, Brownie, Formo, etc.).
1 ·0005-mfd. "Brookmans" condenser (Ready Radio).
1 ·0001- or ·00015-mfd. plain (not differential) reaction condenser (Polar, or Lissen, J.B., Magnum, Ormond, Lotus, Formo, Bulgin, Ready Radio, etc.).
1 L.T. switch (Lotus, or Benjamin, Lissen, Igranic, Magnum, Bulgin, Jewel, Junit, Ready Radio, Wearite, Pioneer, etc.).
2 Sprung valve holders (Benjamin, or W.B., Igranic, Lotus, Lissen, Magnum, Formo, Wearite, etc.).
6 Single coil holders (Lotus, or Magnum, Lissen, Igranic, Wearite, etc.).
3 ·001-mfd. fixed condensers (Dubilier and Lissen, or T.C.C., Igranic, Ferranti, Ediswan, Ormond, Mullard, etc.).
1 ·0003-mfd. fixed condenser (T.C.C., or Lissen, Mullard, Ormond, Ediswan, Ferranti, Igranic, Dubilier, etc.).
2 1-mfd. condensers (any capacity from ·1-mfd. upwards will serve for these) (T.C.C., or Lissen, Dubilier, Hydra, Mullard, etc.).
2 Double-pole double-throw switches, with baseboard-mounting brackets and extension spindles about 3½ in. long (Wearite, or Utility, etc.).
1 Standard "M.W." screen, 10 in. × 6 in. (Magnum, or Paroussi, Ready Radio, Wearite, etc.).
2 H.F. chokes (Lewcos and Magnum, or R.I., Lotus, Varley, Lissen, Dubilier, Ready Radio, Keystone, Wearite, etc.).
1 2-meg. grid leak and holder (Dubilier, or Ediswan, Lissen, Igranic, Mullard, etc.).
1 ·0001-mfd. (max.) compression-type semi-variable condenser (Formo, or Lewcos, R.I., Lissen, Rothermel, Polar, etc.).
1 Terminal strip, 14 in. × 2 in.
10 Terminals (Belling and Lee, or Igranic, Eelex, etc.).
Wire, screws, flex, etc.

Then there are the wave-change switches. The second of these may at first glance look a little complicated, but you will find it simple enough to follow out when you have the switch before you. It is just a matter of a little care in identifying the various contacts, and you will find this easy enough if you compare the photos with the wiring diagram, noting that S_2 is placed on its side.

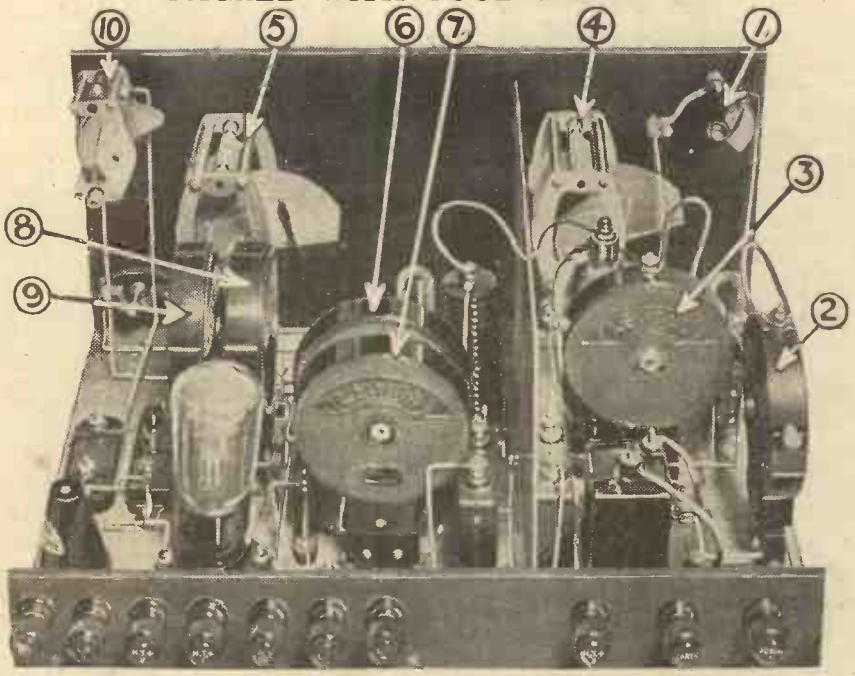
The only wiring points we have to cover concern the screen, for all the rest of the work is quite clear in the diagram. Note first that connections are made to the screen itself at two points, one near the terminal strip and one near the V_1 valve socket.

Coils and Valves to Use

Also observe that the lead to one filament terminal of V_1 passes through one of the perforations in the lower edge of the screen, and this wire must be insulated, whatever material is used for the rest of the wiring. The plate lead of V_1 also passes through the screen. This is of flex, and goes through a hole fairly high up.

Now you want some operating data, and then our task is done. The coil sizes should be these: L_1, No. 60X; L_2, No. 250X; L_3, No. 50; L_4, No. 25; L_5, No. 150; L_6, No. 100. Various pairs of sizes can be tried out for L_3 and L_4, and for L_5 and L_6 with

PACKED WITH GOOD FEATURES



The arrows on this illustration indicate: 1. The series aerial condenser; 2 and 3, the two aerial coils of the "X" type; 4 and 5, the aerial tuning condenser, and the detector grid-circuit tuning condenser respectively; 6 and 7, grid and reaction coils for one wave-band, and 8 and 9 for the other; 10 is the reaction condenser

Standard Components are Used Throughout

varying results, but those given represent a good average.

The valves should be one screened-grid for V_1, and one H.F. or special detector type for V_2. The H.T. voltages will be approximately as follow: On H.T. + 1 about 60 to 80 volts, on H.T. + 2 about 120 to 130 volts, and on H.T. + 3 some 60 to 80 volts adjusted for the smoothest reaction control. Grid bias on the H.F. valve will normally be 1½ volts.

Taking a final look over the diagrams in search of any little constructional points which would be the better for further explanation, we have just noticed something about the wave-change switches S_1 and S_2. This concerns the wiring to their various connection points, which we have already referred to as calling for a little care.

A Switching Point

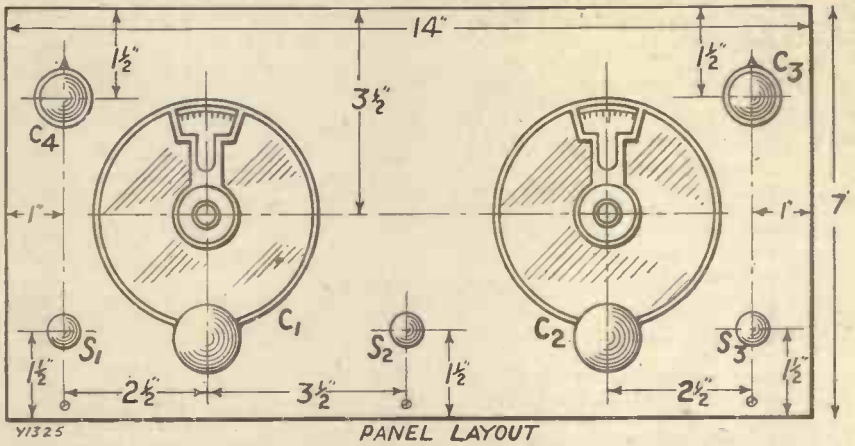
When you examine the actual switches you will find that each has eight points to which connections can be soldered, whereas on the wiring diagram it appears that there are only six on each. This is because electrically there are really only six points, and the eight are reduced to six by bending the middle ones and soldering them together in pairs.

If you examine the photo on this page carefully with the actual switch before you it will probably make the point quite clear to you so far as S_1 is concerned. The other switch (S_2), which performs the wave-changing operation in the intervalve circuits, is treated in exactly the same way.

In the case of this latter component, by the way, it is as well to perform the necessary bending and soldering together operation before the switch is mounted up in position in the set, because once this is done the contact points become rather less accessible.

The photo below will also help you to understand the method of mounting these switches. The brackets require to be screwed down in line with holes in the panel of the set as the first step. Then the switches are fixed to the brackets at a suitable height in the slots by means of their fixing nuts, with just a little final adjustment of height to get the operating rods to run nicely in the holes in the panel.

SYMMETRICAL, SIMPLE AND SOUND

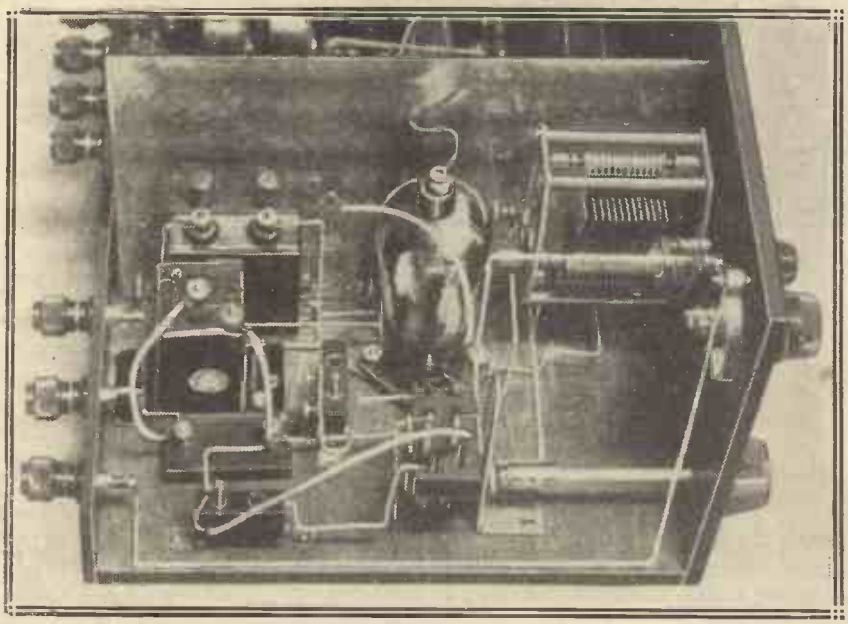


PANEL LAYOUT

When arranging the panel layout the question of efficiency must always come first. But, as you can see, in spite of this a pleasing and completely balanced effect has been obtained.

Now one final point: the wave-change switches should be turned to the left for low waves and to the right for long. With that we can leave you, just reminding you in parting that you will find the Foreign Programmes section of "M.W." a great help when you make a search amongst the foreigners.

THE END WHICH PICKS OUT THE FOREIGNERS



The H.F. end of the set, which contains the S.G. valve, the flex lead to the anode of which can be seen passing through the metal screen. In the foreground is one of the wave-change switches, while the G.B. battery can be seen to the left.

RADIO ODDS AND ENDS

The Chelmsford short-wave station, 5 S W, although employing high power, is not received strongly in most parts of this country, owing to skip-distance effects.

* * *

If a six-turn coil is employed in the grid circuit, a two-turn coil should usually be placed in the aerial circuit for short-wave working.

* * *

If you are using two condensers which keep "in step" but which have different readings, do not forget that it is a very easy matter to re-adjust one until it matches the other, when they will read more or less alike throughout their travel.

The "LOTUS" ALL-MAINS TRANSPORTABLE

The advent of the indirectly-heated A.C. valve has enabled a new class of home-receiver to be produced—the high-quality, high-magnification "Transportable." Here is an account of our experiences with one of the latest all-mains receivers of this type.

WE were busy at work in the MODERN WIRELESS Research Dept. the other day when the 'phone bell rang and a voice asked us whether we would like to try the latest Lotus all-mains transportable set and the latest all-mains power unit.

The Set Arrives

As we were not well acquainted with either instrument, we naturally suggested to Messrs. Garnett, Whiteley, Ltd., on whose behalf the 'phone call was made, that they should send along one of their sets and one of the mains units and leave it for a few weeks so that we could run through our usual tests, both in the laboratory and outside.

A few days later a handsome mahogany cabinet arrived, accompanied by an extremely neat black box with a big hole in the top The cabinet turned out to contain the all-mains transportable, while the black box was the power unit. But let us deal with them one at a time, for there is no connection between the two, other than that they come from the Lotus works.

The all-mains transportable can be obtained in oak, walnut or mahogany, and contains one stage of screened-grid, transformer-coupled to a detector with a transformer-coupled pentode. The whole lot works off the mains, the model sent to us employing Mazda A.C. valves for the first two stages and a directly-heated four-volt pentode in the output position.

Reasonable Price

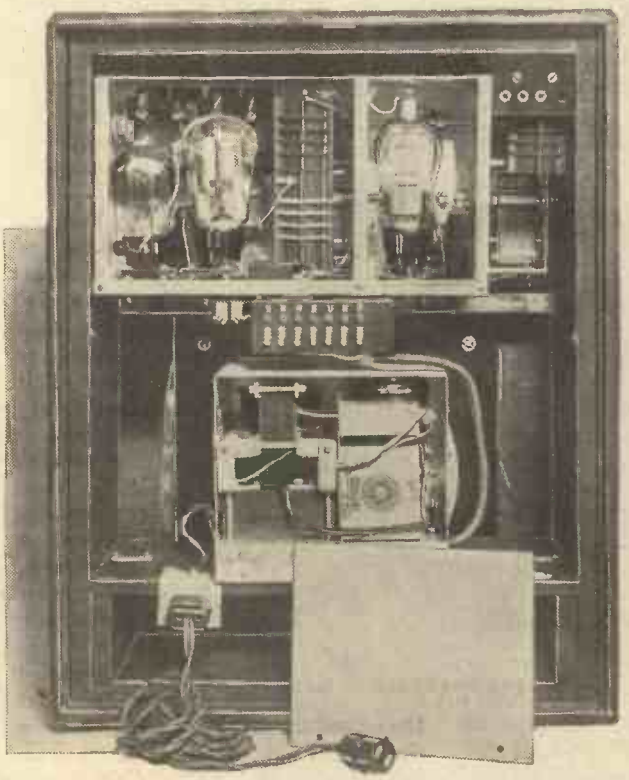
The set is adaptable for use with mains of either 100 to 115 or 200 to 250 volts, and has a wave-change device covering 200 to 550 metres and 1,000 to 2,000 metres. It weighs between 30 and 35 pounds, and costs 24 guineas in oak, and 25 guineas in mahogany or walnut.

The three controls are mounted on a panel above the speaker, two hinged doors being arranged to close over the panel when the set is not in use.

Sockets at the back enable outside aerial and earth to be put on.

It was not long before we had the set on the mains. We allowed a period of about half a minute for the valves, which are of the indirectly-heated type, to heat up, and then we started to tune in stations, using the frame aerial.

BEHIND THE SCENES



Showing the set with the back and the metal coverings of the set and mains unit section removed.

The Midland regional, 5 G B, in addition to Brookmans Park, came in beautifully in the heart of London in broad sunlight, while on the longer range we could hear Radio-Paris and 5 X X. With an outdoor aerial reception was not very much better as regards range, owing to the fact that the aerial used was not a particularly efficient one; and, moreover, it was a very, very bright day, and we were listening in the heart of London.

"Active" Receiver

But the sensitivity and "activeness" of the set gave us quite enough enthusiasm for us to look forward to a test in the open country; and, accordingly, a couple of days later the set was packed up and taken out to Hertfordshire, where tests were made first on the frame, and then on an outdoor aerial.

In all the tests the Lotus all-mains transportable acquitted itself extremely well. Plenty of stations came in on the frame aerial, and there was not the slightest trace of hum from the mains, while the tone was exceedingly good.

Outdoor Aerial

On the outdoor aerial, of course, sensitivity increased tremendously, and all the usual well-known continentals were available on the loud speaker after sunset, and on the high waves 5 X X and Radio-Paris had added to them Eiffel Tower, Zeesen, and Motala, though this latter was rather faint.

Selectivity without the outdoor aerial was quite sufficient for all

Silent and Sensitive in Operation

ordinary purposes, and, though it was within quite a short distance of Brookmans Park, the two London stations were cut out; though, of course, this was not quite so easy, as the set was operating nearly in the swamp area.

Inside, the set is one of the neatest we have seen. The job is workmanlike and efficient, and the spacing of the parts and the valves is extremely well thought out. The valves and their circuits are mounted on the baseboard fairly high up behind the panel; and behind the speaker, which is of the Mullard cone type, is a metallic box containing the rectifier and the mains unit. All exceedingly compact and quite adequately smoothed.

The All-Power Unit

And talking about smoothing brings us to the Lotus all-power unit, which is primarily intended for use with radio receivers equipped with indirectly-heated A.C. valves. Apart from this, however, it can be used as a high-tension supply for battery valves in sets. The output is really considerable for the size of the unit, being no less than 40 milliamps. at 210 volts, and 25 milliamps. at 250 volts.

A Mazda double-wave rectifier is employed, and the unit is available at the remarkably low price of seven guineas. It is encased in a crystalline-finished metal case, and presents a most handsome appearance. Standing upon four rubber legs, it has a row of terminals in front by which the voltages for the different stages in the set can be obtained, in addition to the L.T.-A.C. supply and grid bias.

There are five H.T. terminals and the H.T. negative. There is a terminal for the screening grid of the S.G. valve and a terminal for the plate of the S.G., a detector terminal, first L.F. and a last stage for the power. Grid bias is supplied for the last stage only and has six tappings, while the unit is so designed to cope with all receivers whether or not they employ output devices.

Output Filter Circuit

If the receiver is not fitted with any such device the loud-speaker terminals on the receiver should be shorted and the speaker connected via the unit. In the case of receivers fitted with an output circuit, the speaker can be connected as usual and the terminals on the unit can be shorted.

Naturally, the grid bias depends upon the anode current flowing, and no definite details can therefore be given The L.T. side of the unit supplies sufficient low-tension current at 4 volts for five valves, while H.T. voltages of over 200 are quite sufficient, even for large sets operating moving-coil speakers.

The whole of the working of the unit is completely safeguarded, so that it is impossible to get a shock off it unless one is very careless indeed in playing about with the H.T. terminals when the mains are on. A useful switch, however, is supplied with the unit, so that one has not the slightest excuse to alter the adjustments when the power from the electric light mains is switched on to the unit

THE LOTUS ALL-POWER MAINS UNIT

This unit gives H.T., L.T., and grid bias from A.C. mains.

A Useful Rectifier

There is no doubt the Lotus transportable set and the all-mains unit are two very fine productions, and are worthy of their places amongst the very best of radio apparatus on the market.

In addition to the two pieces of mains apparatus discussed above, however, we should like to draw readers' attention to yet another most interesting Lotus mains unit.

This is the Power Rectifier Unit, consisting of a transformer, rectifying valve, condenser, and smoothing choke, and it is particularly useful for the conversion of D.C. H.T. units for use with A.C. mains.

A HANDSOME SET

The "Transportable" with the doors shut.

Also, of course, it can be applied to the energising of moving-coil loud speakers. It is capable of supplying 250 volts at 60 milliamps., and uses the Mazda U.U.60/250 rectifier.

The output figures given are for the smoothed output, the transformer being available with windings supplying up to 300 + 300 R.M.S. volts.

It can also be obtained with a special L.T. winding for the operation of indirectly-heated cathode valves, or for supplying the filament current for directly-heated 4-volt super-power valves. The unit costs £5, and measures 6¾ in. by 5¼ in., with a height of 6¼ in.

TELEPHONE TIPS

Do not hang up the 'phones by the cords, as this is a certain way of ultimately causing poor contact.

* * *

Telephones are liable to become rusty through lying about, but any experienced listener can carefully remove the cap, slide off the diaphragm and clean it. Before replacing it lightly coat it with petroleum jelly to prevent a repetition of the trouble.

CANCELLED COUPLINGS

By H. A. R. BAXTER.

Who has some interesting things to say about fixed condensers, chokes and "by-passing."

THERE never was a more misunderstood component than the fixed condenser. Unless it be the choke, either of the H.F. or L.F. variety. By the way, do you realise that there is no basic difference between an "H.F." and an "L.F." choke? That the only practical difference is that of inductance value?

What Chokes Do

Don't start in with a "but an H.F. choke is air-cored and an L.F. choke iron-cored," because that would be quite wrong. You can have an H.F. choke with an iron core (such is often to be found in the super-het) or an L.F. choke with an air core.

Actually, of course, the job of either an H.F. or L.F. choke is to offer a high impedance to the kind of currents with which it is expected to deal.

You can raise a high impedance to H.F. with a comparatively small inductance, but the lower in frequency

SHUNTED?

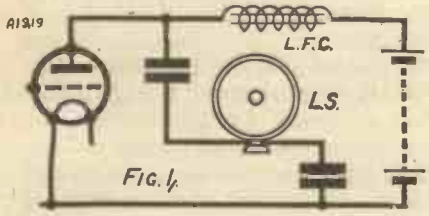


FIG. 1.

Two fixed condensers are shown to emphasise the point.

you go the greater has to be the inductance of the choke to scrape up an equal impedance. Thus the L.F. choke with its iron core and bulky winding, and the H.F. choke with its air core and moderately small winding.

I must not forget to add that as capacity does not matter so much down on the lower frequencies, the L.F. choke can, and, of course, does, have much more self-capacity than an H.F. choke. You see, the higher the frequency the more capacity matters. That is why a choke required for a short-wave set has to be of extremely careful construction. Quite a minute self-capacity can render it practically useless.

And it is really capacity upon which I was focussing my attention when I started this article.

I have called the fixed condenser a misunderstood component for the following very good reason. It seems to be fairly widely thought that by connecting a fixed condenser across two points in a circuit you can provide a by-pass path to which certain currents will confine all their wanderings.

It would seem that the idea is abroad that a fixed condenser can lure current of a certain kind away from all other quarters. This is quite wrong.

Probably most "M.W." readers will know that. But do they realise that even if you insert a choke in the original path, the "by-pass" still does not take all the traffic?

The confusion that may arise here is no doubt due to the rather unhappy name "choke." At least, I perhaps should have said to the rather loose interpretation of it that sometimes prevails.

Battery Coupling

Neither H.F. nor L.F. chokes are "cut-outs." They act as throttles without having the power to switch right off. Think of chokes as resistances and you won't go far wrong. The better the choke (generally speaking) the higher its resistance or impedance to alternating current or to the fluctuations of a direct current that is varying in strength.

It is sometimes said that a choke-condenser output filter prevents battery coupling. That is wrong. It can but reduce it, though it is only fair to add that in cases it can reduce it to almost negligible proportions.

Have a look at Fig. 1. Because of the L.F. choke it is said that the low-frequency impulses are barred from the battery path and are confined to the condenser-loud-speaker path. But from where do the L.F. impulses come?

Not a Complete By-Pass

The L.F. impulses are, of course, variations in the current drawn from the H.T. battery itself! But as the choke has a high impedance the potential differences developed across the battery (which will be of comparatively small impedance) are reduced considerably.

Glance at Fig. 2. Placing a large condenser "C" across the H.T. battery does not prevent potential differences occurring across the battery. But "C" being in parallel with it reduces its impedance somewhat. If you were to place a choke in series at X it would not be correct to say that L.F. impulses could not flow around that part of the circuit and

CUT-OUT?

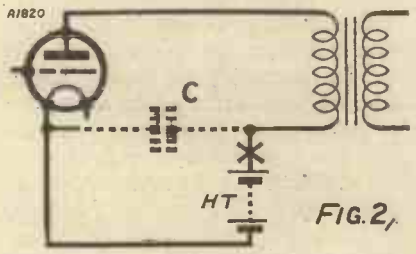


FIG. 2.

This illustrates another interesting point raised by our contributor.

that they would all be by-passed across the condenser "C."

If a choke were a "cut-out" how is it that any L.F. impulses at all exist in such a circuit, in view of the fact that the primary of the L.F. transformer is in series with everything and may be a better L.F. choke than any ordinary L.F. chokes that are made?

For the time being I will leave it at that! Think it over.

The

"More money has been spent on programmes, enabling better artistes to appear, and to appear more often." Here we see Cicely Courtneidge and Jack Hulbert, two well-known broadcasters, listening-in during a leisure half-hour between turns.

THE B.B.C.'s report for the year ended December 31st, 1929, which was published recently, is definitely one of the most interesting of its kind yet published. The main feature of interest is this: broadcasting in this country is still on the up-grade. There are no signs of "marking time," let alone a tendency to slip backward; and those who, in the past, forecast that interest in broadcasting would wane, that, in fact, it was a novelty that would inevitably wear off, must now feel themselves very poor prophets.

"No Precedents."

To quote the foreword to the report:

"Broadcasting is still in its early years, and there are no precedents to assist in forecasting its development. Once it appeared likely that a saturation point in the number of licences would soon be reached, and it was often said that as the novelty wore off the country would grow weary of this new invention, and especially might resent an educational bias.

A Good Beginning

"Statistics seem to indicate that these apprehensions were groundless. So far development has been rapid all along the line, and there are no signs of retrogression. It is, moreover, noteworthy that leading men and women in every branch of work and thought have, to an increasing degree, given the B.B.C. their support, both at the microphone itself and in many other ways."

Would that all reports could open in such a favourable manner!

The point about the support given to the B.B.C. by leading men and women in every branch of work is of especial interest. Not so long ago there were quite a number of well-known people who professed a die-hard aversion to broadcasting. Sir Thomas Beecham and Mr. H. G. Wells, for example. But both have capitulated. Sir Thomas—who not so long ago could not find hard words enough to condemn broadcasting—has conducted a good deal for the B.B.C. True, he has lately had a "difference of opinion" with Savoy Hill, but we hope that in due course he will again give his valuable assistance; and Mr. H. G. Wells, who once said he would have nothing to do with the B.B.C., has recently made a great microphone success Indeed, we progress, and the B.B.C. has every reason to be pleased with its record of successful and progressive endeavour.

THE NIGHTINGALE

As usual, the nightingale has been a great success this year. Here is the amplifier in wait for the little songster in the woods, near Pangbourne.

Some Telling Figures

The report mentions that during the year 881 S.O.S. messages (130 more than in 1928) were broadcast, of which 367 were successful, 475 unsuccessful and in 39 cases the result was unknown.

Under the Appeals Advisory Committee appeals were more systematic in range and better designed to cover the field of charity. While for some years the annual return had been approximately £40,000, the forty-eight national appeals in 1929 yielded, as far as was known, nearly £60,000, and approximately a further £4,000 resulted from the various local appeals.

The number of licences issued during 1929 was 2,956,736, an increase on the previous year of 328,344. The licences issued to the blind totalled 15,964, an increase of about 1,900.

With regard to the B.B.C. publications, it is stated that the "Listener" has secured a substantial and steady circulation. The "Radio Times" has an increased weekly circulation of 171,000 copies, with the sales of the Christmas number 1,388,000. The weekly circulation of "World Radio" has advanced by 26,000, and the various supplementary publications, such as operas and plays, school and adult pamphlets, etc., aggregated 2,290,972.

Programme Development

The capital account had been increased during the year to £565,639 by an appropriation from revenue of £146,425 8s. 6d. There was a balance of £164,398 2s. 2d. available for future capital expenditure on the regional scheme. Expenditure increased by £77,019 3s. 0d. on 1928, the increase on programmes being £9,685 6s. 0d. That, however, did not represent the extent of programme development during the year, as

B.B.C. Report

"Broadcasting in this country is still on the up-grade. There are no signs of 'marking-time,' let alone a tendency to slip backward." Such are one's inevitable conclusions on the study of the latest B.B.C. report which is reviewed in this analytical article.

By THE EDITOR.

Miss Sybil Thorndike, our greatest tragedienne, before the microphone at Savoy Hill.

increased expenditure had been largely off-set by economies effected by centralisation.

The Break-Down Record

The income for licences during 1929 was £1,470,000, compared with £1,307,000 the previous year. The Post Office percentage charge in 1929 absorbed £183,750, the Treasury received £341,949, and the B.B.C. £944,301 against £871,764 in 1928.

The average break-down per station, with 66,435 programme hours, was ·05 per cent. This was slightly higher than the previous year, due mainly to a fire at Bradford.

"The significance of adult education in 1929," the report states, "lay in the development of the work under the guidance of the Central Council for Broadcast Adult Education. Under the chairmanship first of Lord Sankey, and, on his resignation, of the Archbishop of York, the Central Council developed rapidly along the lines envisaged in Sir Henry Hadow's report of 1928.

"Area Councils for regional development at the listener's end were set up in the West Midlands, in Yorkshire and in the North-West (Lancashire, Cheshire and Westmorland). The formation of these councils is evidence of the increasing co-operation of other bodies in the development of this work. Several local education authorities have purchased sets for pioneer work in their areas, and a number of voluntary bodies, such as the Workers' Educational Association and National Adult School Union, have made effective use of broadcast programmes in conjunction with their own schemes of work.

Quality and Scope

During the year no effort was spared to maintain the quality and scope of the programmes. The alternative programme service of Daventry 5 G B and 5 X X was continued and developed, and the new plans for Regional broadcasting formulated. The first Regional transmitter at Brookmans Park took the place of the old single-wave transmitter in Oxford Street. The preliminary contract for the foundation work of the new headquarters in Portland Place was given in June, 1929, and was due for completion early in 1930. The contract for the superstructure was also placed. The building should be ready for occupation about the end of 1931.

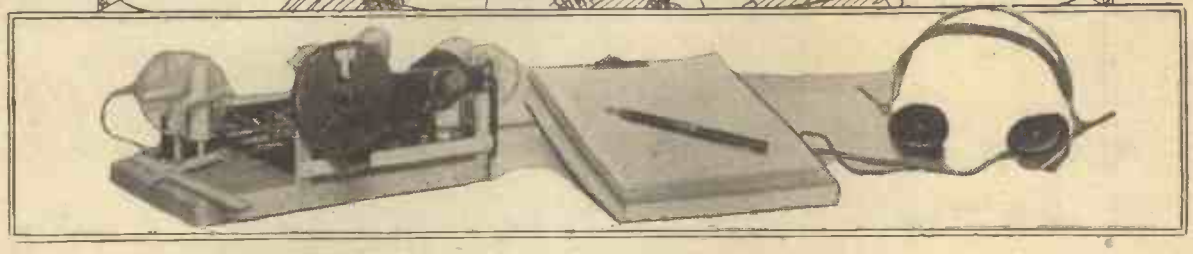
Best in the World

The "development" of the alternative programme service we are inclined to query. A good many people find it hard to note much progress in this direction! Still, the B.B.C. no doubt has its own interpretation of the word alternative; and, with such a nice and satisfactory report before one, it is perhaps a little ungenerous to find fault. So we will close by congratulating the B.B.C. on the production of a report which undoubtedly proves once again that the system of British broadcasting is not only the best in the world, but shows every sign of proving more and more successful each succeeding year.

A MINOR "CAT-ASTROPHE"

During the recent broadcasting of a play, the cat, whose music was necessary to the sound effects, held up the proceedings by doggedly maintaining silence!

ON THE SHORT WAVES



A page of interesting news and hints for those interested in short-wave work, including up-to-date schedules of some popular short-wave stations.

By W.L.S.

I DON'T anticipate contradiction from readers when I place it on record that, up to the present, 1930 has been "the worst year ever" for short-wave work. Even now, when DX should be petering out for the summer period, it has not even begun to arrive.

Whether the year is going to make up for itself later on I naturally can't say, but I am inclined to the view that it is the year itself that is bad, as a whole, and not merely a poor period.

The "G5BD Effect"

Here is another variety of the "G5BD effect." An Oxford reader is using a straight two-valver with choke filter output. On 40 metres there are no hand-capacity effects, but below signals shift on the slightest movement of the 'phone cords.

The insertion of H.F. chokes in the 'phone leads cured this, but now the effect is the reverse; bad on 40 metres, and all right below. In this particular case the cure was to use two chokes of different construction.

I have the following short-wave schedules, which are quite authentic and right up-to-date:

W G Y (Schenectady)

W2XAD, on 19·56 metres, on Mondays, Wednesdays, Fridays and Saturdays, from 11 p.m. till 6 a.m. Also on Friday from 8 p.m. onwards, and on Sunday from 8.30 p.m. till 5.45 a.m.

W2XAF, on 31·48 metres, on Mondays, Tuesdays, Thursdays, Fridays and Saturdays, from 11 p.m. till 6 a.m. All times are in B.S.T.

KA1XR (Radio Manila)

Works on 26·3 metres (also occasionally on 48·8, 31·66 and 24·45 metres).

Sundays, 03.30, 08.00 to 09.00, 11.00 to 15.00.

Tuesdays, 09.00 to 16.00, with intervals.

Wednesdays, 09.00 to 15.30.

Thursdays, 09.00 to 15.30.

Fridays, 09.00 to 16.00.

Saturdays, 09.00 to 17.00. All times, again, in B.S.T.

For the latter I am indebted to another Indian reader, according to whom the only transmissions worth listening for out there are Manila, Bangkok, Bandoeng, Huizen and Zeesen. He says: "5SW is a complete wash-out, and, anyway, who would want to listen to talks if they *did* come through?

FROM SHIP TO SHORE

No one could wish for neater-looking apparatus than this telephone transmitter installed on the White Star liner "Homeric."

"I have heard persistent rumours that the B.B.C. is thinking of establishing a real short-wave station instead of 5SW, which is, of course, only an experimental affair. One knows what rumours are, though."

Proper Station Wanted

Assuming that the B.B.C. could afford the extra expenditure, there is no doubt that a really good and powerful "Empire Link Station" in place of the present 5SW would be of the greatest value and would add enormously to the prestige of the B.B.C. and the radio industry in this country. The number of short-wave enthusiasts in "outposts of Empire" who would buy a short-waver if there were an infallible British programme to listen to, judging from my correspondence alone, is enormous.

I was assured by a friend from Canada a few nights ago that our static, which I thought was rather bad at the time, is nothing compared with the general level even in Canada, which is not much nearer the Equator than we are ourselves.

Interesting Experiments

Some interesting experiments in local conditions can be carried out with a portable receiver and a short-wave adaptor. I have done something of the kind recently, taking out an ordinary broadcast portable into some of the Surrey hills, and plugging in a short-wave adaptor.

The complete absence of background noises and "man-made static" gives one the impression that one has landed in heaven, even if the mags. of passing cars bring back a suggestion of earth for a few seconds!

I am, for this reason, regarding mains at the moment as a mixed blessing.

The SECRET PROCESS that puts power into your set!

There is a secret process and a new chemical combination used only in the Lissen Battery which puts new power into your radio set. It gives to your reproduction of dance music a new liveliness, makes speech distinct, song clear and true.

The current of a Lissen Battery flows smoothly, steadily, sustainedly throughout the longest programme. The large cells have a great oxygen content which gives the battery long life and produces all the time pure power, with never a trace of ripple in it, never a sign of hum.

You want pure power for your radio ; any good wireless dealer will supply you with the Lissen Battery that will give it to you.

MADE IN ENGLAND.

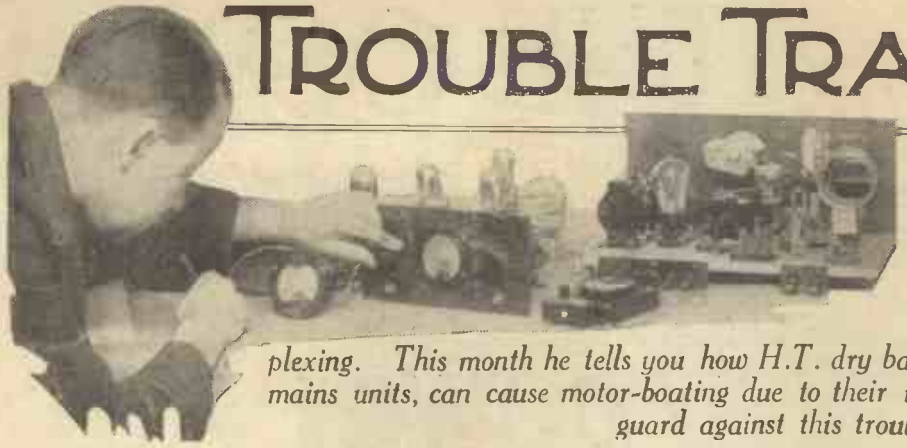
DIRECT FROM FACTORY TO DEALERS SHOPS every Lissen Battery is fresh when you get it!

PRICES:			
60 volt (reads 66) ..	7/11	60 volt (Super Power)	13/6
100 volt (reads 108) ..	12/11	100 volt „ „	22/-
120 volt	15/10	4½ volt Grid Bias ..	10d.
36 volt	4/6	9 volt „ „	1/6
60 volt (For Portable Receivers)	7/11	16 volt „ „ ..	2/9
		4½ volt Pocket Battery 5d. each (4/6 doz.)	
99 volt (For Portable Receivers)	12/6	Single Cell Torch Battery	4½d.

7/11

LISSEN LIMITED, Worple Road, Isleworth, Middlesex. (Managing Director: T. N. COLE) Factories also at Richmond (Surrey) and Edmonton.

TROUBLE TRACKING



On this page the Chief of the "M.W." Query Dept. discusses, month by month, some of those common difficulties and troubles which can be so perplexing. This month he tells you how H.T. dry batteries, accumulators, and even mains units, can cause motor-boating due to their internal resistance, and how to guard against this trouble.

LAST month I said a few words about that very common trouble motor-boating and L.F. howling. I also mentioned that the use of an "anti-motor-boating" device, together with an output filter, was a method which in nine cases out of ten would render the amplifier immune from faults of this type.

More Difficult Cases

There are occasions, however, when even these precautions are of no avail, in which case it becomes necessary to try other "dodges" in the hope of remedying the trouble.

If in spite of the fact that a suitable "anti-motor-boating" device and a filter output are used the amplifier still persists in giving distorted results, or in howling, it is advisable to try reversing the leads to the secondary terminals of the L.F. transformers, and also of earthing the cores of both instruments. Another "dodge" is to connect a ·25-megohm grid leak across one of the secondary windings, but it must be remembered that this procedure cuts down the strength a little.

Great Magnification

You will ask: "Why should a well-designed amplifier give all this trouble?" The answer is: "Because the modern L.F. stage gives such a very high degree of magnification, owing to the efficiency of the present-day valve and transformer." Therefore, if there is any slight coupling effect in the H.T. circuit, there is every likelihood of instability resulting.

This coupling effect, as I have said before, is produced by external resistances, such as those of a dry cell H.T. battery, or of a sulphated or partly run-down H.T. accumulator. A mains unit will also cause instability.

Any reasonable resistance is dealt with by the "anti-motor-boating" device, and it is only when the value increases beyond a certain point that other precautionary measures have to be taken.

Watch Those Batteries

In the case of battery H.T., the proper method to adopt is to make sure that the batteries themselves are always in the "pink of condition." With dry cells there is little that can be done beyond employing those batteries of the double- or triple-capacity type, and of discarding them when the voltage begins to drop to an excessive extent.

With H.T. accumulators a careful watch should be kept on the condition of the cells. The battery should be charged at regular intervals, and the specific gravity maintained at its proper value. In connection with specific gravity, a hydrometer of the suction type is exceedingly valuable. One can suck up a little of the acid from the cell, and determine at a glance whether the battery is in a fully or partly charged condition. These remarks also apply to the L.T. accumulator.

"A DROP IN TIME—"

All accumulators, whether H.T. or L.T., require topping-up with distilled water occasionally. It can quite conveniently be carried out with the aid of a hydrometer.

"Topping-Up"

At this time of the year there is a tendency for the water in the acid to evaporate, and the cells should be topped-up at regular intervals with a little distilled water, which in the case of H.T. accumulators can be "fed" into the cell with the aid of a fountain-pen filler. Sulphation can easily be detected by the white, patchy appearance of the plates. There is, in fact, an unhealthy look about them which at once indicates that they are not in a satisfactory condition.

If you are using dry-cell H.T., be careful not to take more current from the cells than they are intended to supply.

For instance, if you have a super-power valve in the set it is quite probable that the anode current required will be 15 or even 20 milliamps for a three valve set, or 25 milliamps for a four-valver.

Mains Units

Mains units require careful treatment. Firstly, when you purchase an eliminator make sure that it is suitable for your particular set. I frequently hear of cases where the eliminator is designed to give something like 20 milliamps and the valves which it is expected to supply take 25 milliamps or so. Obviously the results cannot be satisfactory.

Don't cut down cost in buying mains units. Choose the very best you can afford.

THE OSRAM "MUSIC MAGNET"

The "kit" set has rightly achieved very great popularity, and it will therefore be of interest to our readers to follow this account of the building and testing of one of the most popular kit sets of the year.

IF the average listener had to define the ideal home receiver his specification would almost certainly lay stress on the need of the following qualities.

It would *have* to be capable of good reception of foreign stations. There would be only one easily manipulated tuning control, and the volume and quality of local station reception beyond reproach.

The First Requirement

To this the average *constructor* would raise the objection that the first requirement called for at least one efficient stage of H.F., and that this precluded the realisation of the second condition because an H.F. stage implies two tuning controls.

Only, he would say, by ganged control—which is a factory job—could the thing be done. And, to get good quality as well, the set would cost money.

At one time this would have been a perfectly true statement, but the General Electric Co., Ltd., have, by producing the "Osram Music Magnet," provided a very emphatic denial to this objection.

Efficient Three-Valver

In this "kit of parts" the home constructor will find the materials for constructing an efficient three-valve receiver (H.F., Det., L.F.) with ganged tuning of the aerial and H.F. circuits, wave-length calibration, wave-band switching and a well-designed L.F. stage. The complete outfit, including valves and cabinet, costs only £9.

An inspection of the theoretical diagram of the "Music Magnet" reveals that the circuit consists of the usual arrangement of S.G. H.F. stage, detector, and one L.F.

There are, however, several novel features. At first sight, for instance, it is difficult to see how the H.F. stage is coupled to the detector. *Apparently* plain tuned-anode is used, and yet one side of the H.F. tuning condenser is connected to earth.

Actually, the condenser is connected to the coil via the screen and the 1-mfd. by-pass condenser. This is an ingenious way of overcoming the disadvantages of ordinary tuned anode, and undoubtedly contributes to the completely successful ganged tuning.

Variable selectivity is another commendable feature of the circuit, and the fact that this has been achieved without affecting tuning on any adjustment speaks well for the designer of the aerial coil.

Soon Built

The writer, to whom was allotted the pleasant task of constructing a version of the "Music Magnet," found that with the aid of the very complete instructions which accompanied the kit the whole assembly occupied some three hours.

If the exact recommended sequence of operations is adhered to no "snags" whatever are encountered. The work, however, would have been accomplished in less time had there been included in the kit of parts a small double-ended 2 and 3 B.A. spanner. Occasionally it was found difficult to tighten some of the

HOW THE VARIOUS COMPONENTS ARRIVE

The complete kit, as unpacked from the box, ready for unwrapping and putting together. Three hours later the set was built and working.

Novel Method of Wave-Change Coil Construction

connections with the sole aid of the screwdriver which is stated to be the only tool required.

The prospective constructor of the set would be well advised to cut his wire very accurately in accordance with the chart. The supply of Glazite is limited, as it was found that although no errors were made in cutting the prescribed lengths, slightly less than a foot of wire remained when the set was completely wired—a rather small margin.

Smooth Reaction

On completion of the constructional work the set was equipped with the necessary batteries and attached to a moderately efficient aerial some fifteen miles from Brookmans Park.

A first test was made of the reaction control, which was found to be progressively smooth and entirely free from "backlash" on the medium wave-band. On the long-wave adjustment reaction was slightly less good, but beyond reasonable criticism.

Selective and Sensitive

With the aerial adjusted to minimum selectivity and maximum sensitivity (terminal A_3), the two Brookmans Park transmissions were received without interference with excellent volume and good quality. When the aerial was connected to the A_1 terminal, each Brookmans "Twin" occupied no more than two or three degrees of the dial.

In spite of the test being carried out in daylight, many of the more powerful Continental stations were received at good strength. If they were well removed from either Brookmans Park transmission, volume could be considerably increased by adjusting the aerial to either of the less-selective terminals (A_2 or A_3).

With the set in an oscillating condition hardly a degree of the dial was free from a carrier, which was sufficient evidence of the enjoyment which could be derived under more favourable conditions.

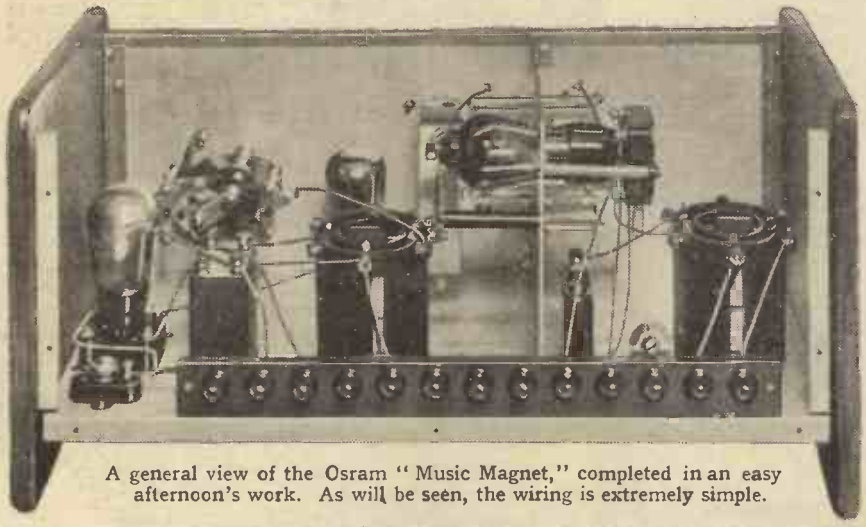
Long-Wave Reception

On the long waves conditions were even better, as at some 70 miles from 5XX that station did not interfere with Continental reception on any of the aerial adjustments.

Wave-change is effected by means of small roller switches on the coils themselves. It is, therefore, necessary to open the lid of the cabinet to alter the wave-band. Although panel switching would provide convenience in operating, it would unduly complicate assembly, and the arrangement adopted is therefore beyond justifiable criticism.

In fact, there is very little to criticise in the receiver. It amply fulfills all reasonable requirements for a domestic receiver. It is easily constructed, cheap to buy, and inexpensive to maintain. Its appearance is beyond reproach, and the handsome oak cabinet and tasteful panel would harmonise with the most luxurious surroundings.

AFTER ONLY THREE HOURS' WORK



A general view of the Osram "Music Magnet," completed in an easy afternoon's work. As will be seen, the wiring is extremely simple.

A BOLTON "WANDERER"

A reader discusses Capt. Eckersley's article on "Distant Listening."

Sir,—With reference to Captain Eckersley's article on "Distant Listening" ("M.W." May issue) it is my experience that reception of distant transmissions is entirely dependent on local conditions. During seven years dabbling in wireless I have lived in five houses in this district. In four of these "atmospherics" (or whatever they might be) have been a constant nuisance, though in two cases there was nothing visible that could be blamed for them.

Free From Interference

Since moving into our present home a few weeks ago reception has been amazingly free from interference. We have received dozens of continental programmes without any audible background. Under these conditions distant listening is certainly worth while.

Foreign stations do fade; we sometimes get atmospherics, even here, but English stations are not perfect. Reception from the best continental stations is often equal to that from the nearer English stations, and they are sometimes giving better programmes, especially late at night (when our stations are sending out a type of "music" which I don't care to listen to), and they give items which can never be heard in England.

There is no question that the general standard of music on the continent is much higher than in England, a fact the B.B.C. can never alter, though they may be able to balance it, at a price, by giving more of our best.

Valuable Alternatives

Under the conditions I am enjoying at present I consider several of the continental stations as valuable alternatives to Manchester and Daventry.

Thanking you for a paper which has been invaluable since the days atmospherics delighted us, if they had a foreign accent!

Yours faithfully,

T. E.

Bolton.

SIMPLIFYING SEARCHING

By M. L. CROSS.

How do you set about searching? No matter what kind of valve set you use there is a certain best order in which the adjustments should be made.

IF you have never noticed how an "old hand" sets about searching it will pay you to watch him tune in one day, to discover his secret. He nearly always has a regular little routine of his own which takes him but a minute to follow, and yet saves him hours!

The Routine Test

Before laying a hand on it he *looks* at the set. He just "gives it the optical once-over" to see that no minor accident has affected it in his absence.

If the external leads appear to be all right, he glances at the panel controls. One switch turned over to "long waves" and the other one on the short-wave position would "hit him in the eye" at once, for he knows the look of his set as well as he knows the feel of it.

The real routine-test begins when he switches on. Does the set *sound* all right?

What is required is a test of sensitivity, smooth reaction control, and, if possible, an inkling as to what conditions are like. None of these can be ascertained easily from listening to the local station, so the "old hand" uses a medium-distance station for the purpose.

By getting accustomed to listening frequently to one not-too-near station, any listener can automatically check his set's pulling powers by it. By switching on and tuning-in to this "test station" he learns something about the prevailing conditions of reception.

Checking Conditions

Good conditions will be shown up by increased strength in a way that no local-station transmission could possibly provide. Poor conditions, on the other hand, will be even more marked in their effect upon the strength from a well-chosen "test-station."

At this stage reaction control can be checked, the slow turning of this knob being the first real operating test of the dials. If the set glides smoothly in and out of oscillation, all well and good; but, if not, the detector's H.T. plug may need to be moved a little higher or lower on the H.T. battery.

When reaction control is perfectly satisfactory the ordinary Det. and L.F. set is ready to reach out. But if you employ an H.F. stage, and in front of the detector an S.G. valve is used, this may need attention.

Such valves are often critical in their response to H.T. Volts on the anode are usually less critical than volts applied to the screen, so if a variable control here allows adjustment of volume, it should be set to give maximum strength before attempting to tune in the wanted programme.

The final preliminary adjustment is that for selectivity, and, having chosen a suitable aerial coupling, the set is ready for "DX" (long-distance) work. When a calibration chart is available—and nearly every "old hand" uses such a tuning chart to simplify searching—the dial-reading for any given wave-length can be forecast to within a couple of degrees.

Some Final Hints

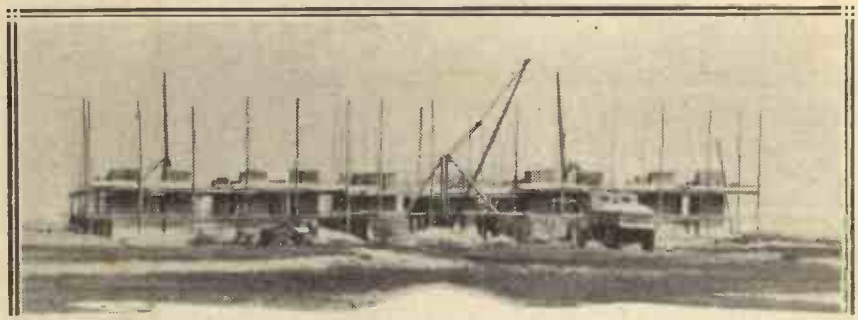
"Tuning-in" then becomes a matter of merely setting the dial for the required wave-length, varying it slightly to pick up the carrier, and keeping the set "lively" with a little reaction.

When no calibration chart is used a section of the dial must be searched over. Or, if no station-positions are known, the whole dial must be investigated. In any case, it is important to make a note of the tuning dial readings of all stations tuned in and identified, for such dial-readings act as "radio finger-posts," to point where the wave-lengths lie.

Finally, you will notice that the "old hand" generally tunes *down* the dial, and not *up* it. He usually sets it to maximum wave-length to begin, and slowly works down to lower wave-lengths.

The reason for this is that it is usually easier to keep reaction nearer the oscillation point when tuning-down than when tuning-up.

NEW REGIONAL IN FULL SWING



The building of the Northern Regional station at Slaithwaite is now in full swing, as this recent view of the site shows.

Silent "Sounds"

It is so easy to deceive the ear that one has to be particularly careful not to be "led up the garden" when carrying out aural tests of receivers or speakers. The so-called "standing waves" and silent "sounds" are typical examples of the unreliability of aural tests, and this article by K. D. Rogers shows how easy it is for the ear to be deceived.

THE reproduction of radio and radio-gramophone programmes is so obviously wrapped up in the various physical phenomena of sound that I make no apology for a short article on this subject.

As most of us know, sound is merely the effect on the ear of the vibration of particles. They may be of air, of metal, of water, etc., or of paper, such as is used in the diaphragm of a cone type loud speaker.

Particle Vibration

In radio reproduction we are, of course, not only concerned with the vibration of air particles, but in order to give rise to these vibrations our loud speakers or our telephones have to employ a diaphragm, which has to vibrate, and when this diaphragm is made to vibrate the material of which it is composed pushes or "pulls" the surrounding air particles in accordance with its own vibrations.

In other words, it sets up sound waves which are *duplicates* of its own vibrations, however distorted these may be, transferred to the surrounding air. These waves on reaching the ear cause the ear drum to vibrate, and "sound" is the result.

Piston Effect

The vibrating particles of air do not fly right across the room, "carrying" the sound. They are merely set into vibration, and thereby create a sort of pressure wave through the air.

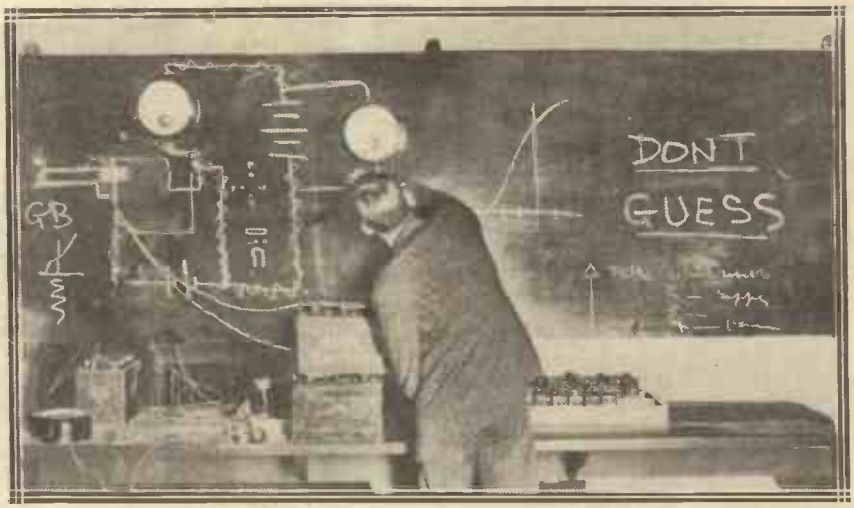
You can look upon the whole effect from each tiny area of the diaphragm as a sort of piston effect. When the loud-speaker diaphragm moves forward (or outward) the air particles are compressed, and when the diaphragm comes backwards the air particles also come back, and as a result a partial vacuum or "rarefaction" is caused by this action. So we get alternate compressions and rarefactions every so many times a second, according to the note being played.

The waves travel across the room, but there come positions in the room where, due to reflection or to other waves from other sources, certain sound waves wash each other out. A rarefaction may meet a compression, so to speak, resulting in a still portion of the air, or a portion so comparatively still that the ear will hear nothing.

"Standing" Waves

These are called "standing" waves (or they might easily be termed silent "sounds"), and when you are listening to your loud speaker, and trying to compare its reproduction with perhaps that of another loud speaker, do not forget that you must move about, or at least move your head about, quite considerably in order to avoid the possibility of standing waves giving you the impression that the loud speaker is

H.M.V.'s "MAGIC" BLACKBOARD



The special blackboard used in "His Master's Voice" Dealers' Training School at Hayes, Middlesex. Chalk diagrams drawn on the board become "electrically alive," the rubbing out of a line cuts the circuit, two chalk lines connected as a short-circuit cause fuses to blow, lines light lamps, a "battery" drawn in chalk works, and a chalk line can be "picked off the board" to be used as a live wire.

Why Harmonics are so Very Important

either very weak, or even lacking, on certain notes.

Also, sound waves in a room may add together to give you an extra amount of sound, and you may think the loud speaker is rather " peaky " on certain frequencies. So when testing your speaker do not forget that moving about the room is absolutely essential to avoid these effects.

Unsatisfactory Tests

Aural tests are usually rather unsatisfactory, owing to the fact that not only is the ear insensitive to certain frequencies—particularly the low frequencies and the very high ones—but it has a capacity for " supplying " the fundamental.

How it does it is open to argument. It is said that the ear, having received certain harmonics, which are multiples in frequency of the fundamental, gives the effect of receiving the fundamental.

Thus there would appear to be a certain sort of heterodyne effect, the adjacent harmonics combining to form the fundamental. But whether this takes place at the ear drum, or in the diaphragm of the loud speaker, or in the air, is still a matter for investigation.

Change of Pitch

It is also known that the ear is sensitive to a change of *pitch*, but very insensitive to changes in *intensity*; it is found that there are two thesholds of intensity, depending on the individual, below and above which sound is not heard at all.

Another interesting point is that the lower the frequency the more energy required to produce the same apparent sound effect in the air, and that eventually you come down to such a low frequency that instead of getting a sound you get more of a feeling than a sound. This is familiar to many, as it occurs very often in the case of very large organ pipes where very deep bass notes are produced. It is also noted at the top end of the scale, where very high whistles can be *felt*, rather than *heard*.

Two Thresholds

Something as low as 20 cycles is required before the feeling becomes stronger than the sound at the lower end of the scale; or, at the upper limit, something like 8,000 cycles before the feeling becomes very strong.

Thus there is at very high and very low frequencies a " threshold," so to speak, of hearing and feeling, where the two meet each other, and the sensations of hearing and feeling become merged so that it is difficult to distinguish between them.

Here again, the "feeling" is a certain type of silent sound, if such a term can be allowed. Technically, if the " sound " is not *heard* it is really not a *sound* but merely an air vibration of the type that normally produces sound.

Here are some further interesting facts about sound. The naturalness of reproduction of a loud speaker depends on the balance of the various frequencies it reproduces.

For instance, it is found that if we transmit only the frequency range from 500 to about 2,500 cycles, we reproduce speech which can be easily

THE MODERN METHOD

The new method of reproducing records by means of electrical amplifiers and loud speakers provides a much better sound effect than the old mechanical gramophone.

understood, but from the point of view of *naturalness* the reproduction is very lacking. Good intelligibility and natural reproduction need a frequency range of about 100 to 3,000 cycles, while if we extend this frequency range up to 4,000 or 5,000 cycles the naturalness increases because we have more harmonics.

Below about 300 or so sound waves tend to give " body " or volume. So if our reproduced music is to be anything like the real thing we must have a goodly proportion of bass. Otherwise, although we have intelligibility we shall not get naturalness.

On the other hand, if we have too much bass we shall tend to lose intelligibility, as is shown if we have a boomy loud speaker, when it becomes very difficult to understand what the announcer is saying.

Why Instruments Differ

In order that our loud speaker shall reproduce sound in a really natural manner it is, of course, essential that the set and the speaker shall reproduce properly the various harmonics.

As we stated before, the harmonics are the multiples of the fundamentals.

Many of the various musical instruments obviously play the same *notes*, and it is only by the balance of the harmonics with the fundamental notes that we can tell one instrument from another. For instance, if we take the piano, playing a fundamental of a certain strength, and if we take the violin, playing the same note, with a fundamental of the same strength being given out. How can we tell between the two ?

There are several ways, which are inextricably mixed. The first is the various proportion of harmonics given out with this fundamental by the two instruments, and the lack or exclusion of certain harmonics.

For instance, the piano is extremely rich in harmonics of the third, fourth, fifth, sixth, seventh, eighth, ninth and tenth order. With the violin the number is limited, and so we get a tremendously different tone.

The Organ

Then, again, if we take the organ we find that the reproduction of the harmonics is very different from that of the piano. Whereas in the piano the fundamental note is the most powerful, in the organ this is not always so. In the very deep bass notes it is quite likely that the second harmonic will be several times as powerful as the fundamental. In fact, in the organ it is not unusual to find that the third and fourth harmonics are both more powerful than the fundamental.

Of transients, or inharmonics, we can say nothing here, but the study of sound is an exceedingly fascinating one, and I would advise all readers who are interested in loud-speaker reproduction to get hold of some book on the subject and to read it through carefully, when they will realise how very fascinating the subject of radio reproduction can be.

THE INTERWAVE SYSTEM

Here at last is a really simple but effective solution of one of the most difficult problems in modern radio. It is the result of a long series of experiments upon the cause and cure of interference on long waves from the local station.

By the "M. W." RESEARCH DEPT.

A GREAT deal has been written and said about selectivity of late, under the powerful stimulus of the arrival of "regional" broadcasting in London and the promise (or threat!) of it elsewhere.

One aspect of the matter, however, seems to be getting singularly little attention, perhaps because this particular nuisance has come to be accepted as an incurable evil.

Almost Normal!

We have all heard of it; it's just that old problem of a low-wave local station breaking through and causing interference all over the lower portion of the dial on long waves.

It seems to happen so commonly that it has been considered almost normal when a set with only a single tuned circuit is used on a fair-sized aerial close to the local.

The absurd and irritating part of it is that it may afflict even quite selective sets of this type, so that you have the annoying experience of finding that the local station spreads over a greater portion of the dial on long waves than on its own proper wave-band!

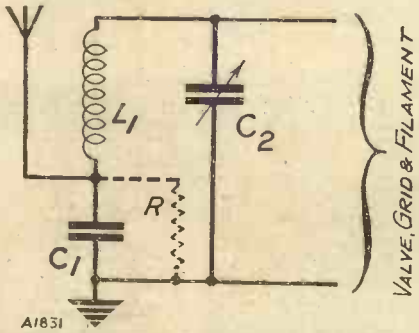
Things like this have occurred for years now, ever since, in fact, the present types of auto-coupled and semi-aperiodic aerial circuits came into use, and it is to be feared that they have not received the serious attention they deserved.

Tolerating the Nuisance

The usual attitude seemed to assume that they only happened at quite short distances from the local station, and therefore there was no need to worry, because in such positions a rejector or wave-trap would be used in any case; the type of set which suffered from this trouble (the kind with only one tuned circuit), it was argued, was just the one to be certain to require such external assistance on the lower wave-band also.

There is certainly common sense in this view of the matter, but unfortunately it does not take into account quite all the facts. Although it may be normal for the trouble to occur only at comparatively short distances from the local station, experience has shown that there is quite a noteworthy proportion of cases in which it happens at greater ranges.

STRIKING SIMPLICITY



This is one of the simplest forms of the Interwave method of aerial coupling. For long-wave work C_1 may be of .001 or .002, and R about 10,000 to 20,000 ohms.

Our own experiences and reports from our readers have proved that this phenomena may occur at quite considerable distances, more particularly when the local station works on a wave near the upper limit of the band.

The acuteness of the difficulty has been very greatly increased by the high power used in regional broadcasting, and we find that interference of this kind now occurs over quite a wide area in London, and is even making its appearance in receivers with more than one tuned circuit.

With the extension of the regional system other areas will no doubt be affected similarly, and so the problem becomes of pressing importance.

It is one upon which we have been working for some time, and we have collected a great deal of information as to the conditions which provoke it in its worst forms, and believe that we have located its main causes.

New Method of Coupling Wanted

With these matters we have not on this occasion space to deal, for that is not the chief purpose of this article. We must just explain that these causes are chiefly concerned with the usual methods of coupling the aerial on long waves, and then give our conclusion, which is to the effect that a radically different system was wanted for long-wave use in the simpler kind of set in these difficult areas.

This method we have developed, and the reader will see in future issues that the "Interwave" system will have important effects on our designs for sets of this type.

The little diagram on this page shows its simplest form, and you will see that it consists in the introduction of a suitable fixed capacity in series in the tuned circuit in such a fashion that it is also included in series between aerial and earth. Its reactance is thus common to both circuits and so serves to couple them together.

Exit the Local

By choosing its capacity carefully we can find such a figure as will give adequate coupling for the long-wave signals and practically zero coupling for the much higher frequency of the low-wave local station.

Making Small Transformers

— by DR J. H. T. ROBERTS, F. INST. P.

Here are some interesting details for the construction of the ordinary power transformer.

ALTHOUGH the design and construction of small power-transformers for wireless and similar purposes is commonly supposed to be a simple matter, many experimenters, when they propose to build up a transformer, find themselves at a loss for actual figures and dimensions for the particular case in question. Therefore, it may be useful to have some numerical data to go upon and also some general hints as to what to do and what to avoid.

Power to be Handled

First of all you want to know what is the power to be handled by the transformer. Generally this means the power which you expect to take from the *output* side. Having decided this, it is a good rule to assume that the *output* will be not more than 75 per cent of the *input*.

Therefore you must multiply the desired output by four-thirds, or, if you like to be on the safe side, by three-seconds, and this gives a reasonable figure for the *input*.

Taking the input watts as voltage (of the mains) multiplied by amps., it is a very simple matter to determine the amperage which is to be carried by the primary winding of the transformer; the amperage will, in fact, be the input watts divided by the mains voltage.

Gauge of Wire Required

From the first and last columns of the table given later it is easy to see what gauge of wire is necessary for carrying the desired current.

For instance, if the current is, say, 0·315, the gauge of wire should be 24 or 26, preferably 24. If the current is 1·5 amps. the gauge may be 20, as the slight overloading will not be a serious matter.

Now you have to decide the number of turns of wire to be wound upon the primary. This depends upon the magnetic properties of the metal used as the core, also upon the cross-sectional area of the core and upon the frequency of the mains supply.

As a rough-and-ready rule it may be taken that the number of turns in the primary will be equal to the mains voltage divided by the cross-sectional area of the core, and also divided by the frequency or periodicity of the supply, the whole then being multiplied by the factor 500.

This is on the assumption that stalloy is used for the core. For instance, if the periodicity is the usual 50 cycles per second and the stalloy core is one square inch in cross-sectional area, the mains voltage being 250, the number of turns will be round about 2,500.

Number of Turns

Another way of expressing the relationship is that the number of turns required is directly proportional to the mains voltage, inversely proportional to the cross-sectional area of the magnetic core and also inversely proportional to the frequency of the supply.

With a supply of 50 cycles frequency and a stalloy core of one square inch cross-sectional area you

TESTING TRANSFORMERS IN TOKYO

Members of the staff of the Tokyo Radio Station at work in the laboratory, where careful tests of all sections of transmitting and receiving gear are carried out.

Allowing for Loss during Transformation of Energy

will require about 10 turns of wire per volt.

Loss by Insulation

I should add that, owing to air-spaces and insulation, there is a loss in magnetic material of about 10 per cent, so that a core which measures one square inch only contains about 9–10ths of a square inch of magnetic material. To give one square inch actually the apparent area of the core should be about 1·12 square inches. The approximate formula mentioned above can be written as follows:

$$n=\frac{E}{Af}\times 500,$$

where

"n" is the number of turns required;

"A" is the cross-sectional area of the *stalloy* core;

	Turns per square inch.		Current density.
S.W.G.	Enamel.	D.S.C.	1,200 amp. sq. in.
16	226	213	3·8
18	392	377	2·16
20	685	641	1·2
22	1,110	1,010	·744
24	1,770	1,600	·456
26	2,560	2,270	·306
28	3,760	3,160	·204
30	5,370	4,500	·144
32	6,890	5,650	·109
34	9,610	7,310	·079
36	13,500	10,300	·054

with small transformers, to allow at least a 20 per cent margin, that is, to make the number of turns in the secondary 20 per cent greater than

PREPARING TO TELL THE WORLD

Members of a British talkie cast rehearsing near Chesham for the film version of "School for Scandal," which is to be an all-colour talkie.

"f" is the frequency of the supply, and "E" is the voltage of the supply.

The Secondary Winding

The number of turns required in the secondary will be roughly proportional to the output voltage required, that is to say, the ratio of the secondary to the primary turns will be roughly the ratio of the secondary to the primary voltage. Owing to losses, however, it is a good plan, especially the value given by this simple relation.

Knowing the wattage and voltage of the output, the current in the secondary is immediately determined, since the wattage is equal to the voltage multiplied by the amperage, or the amperage is equal to the output wattage divided by the output voltage.

The gauge of wire required for the secondary can then be determined from the first and fourth columns of the accompanying table.

It is a good plan to make the magnetic core into a closed magnetic circuit and to put the primary winding half upon one limb and half upon the opposite limb. The secondary should be wound on the top of the primary.

A mistake which is often made by amateurs, and which completely ruins the efficiency of the transformer, is to wind the whole of the primary upon one limb and the whole of the secondary upon another limb, trusting to the efficiency of the magnetic core to carry the magnetic flux from the primary winding into the secondary winding.

Distributing the Flux

Owing to the great leakage which takes place this design is extremely bad, and no reasonable efficiency can be obtained unless the primary and secondary are both upon the same limbs. Putting half the primary on one limb and the other half on the opposite limb (half of the secondary being also on each limb) distributes the magnetic flux more evenly through the core and is a good design.

Enamelled wire is very convenient for winding small transformers, but great care is necessary to avoid damaging the insulation and also to avoid a turn of wire sinking down into the underneath layers, where a considerable potential difference may arise.

In the second and third columns of the accompanying table the number of turns which can be wound in per square inch of cross-sectional area of the winding space will be seen, the second column being for enamelled wire and the third column for double-silk-covered wire.

Optimistic Figures

I should say that the figures given in columns 2 and 3 are rather on the optimistic side, and generally, with home-made transformers, you will not succeed in getting nearly so many turns of wire to the square inch of winding space. It is a good plan to allow 50 per cent to 75 per cent more space per 100 turns than is indicated in this table.

* * *

An A.C. transformer of any kind will only give the rated output if its input is that for which it was designed. So such a transformer should never be used on mains other than the correct ones, unless it is certain the voltage and periodicity are identical.

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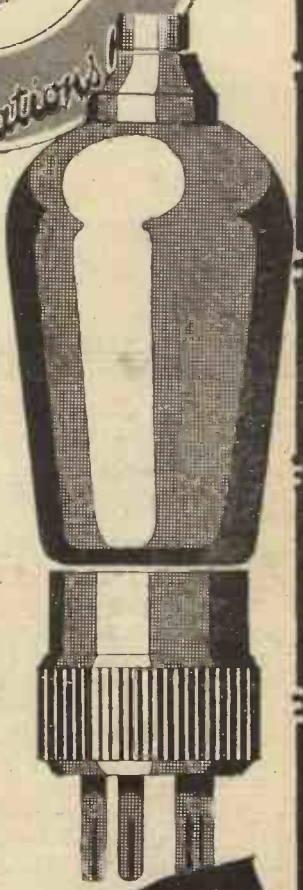

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RADIO IN INDIA

A very interesting letter from an "M.W." reader who has a wide experience of prevailing conditions, and the knack of packing plenty of facts into a letter.

Sir,—Having read in your April number Mr. James Craik's letter, in which he said he was taking his "B.P.5" set to India, it occurred to me that some notes on the conditions prevailing in India and the type of set most suitable there might prove of interest.

Outside the large towns there are no theatres, concert parties seldom call, and such cinemas as there are, judged by home standards, are of poor quality. One has therefore plenty of evenings available for experimenting with and constructing sets and enjoying the entertainment they provide.

Reception Seldom Good

To be in direct touch with Europe has, of course, great fascination. To the musician, unless he is also a wireless enthusiast, I fear the results are likely to be disappointing, as reception is seldom as perfect as in England. His standby in the hot weather should be a good radio-gramophone.

To the technical enthusiast, however, a move east will bring into prominence opportunities for experiment which are generally overlooked in England owing to a surfeit of good broadcasting close at hand.

My experiences cover two cantonments, one on the Western Ghats some 300 miles south of Bombay, and one on the North West Frontier some 1,500 miles, roughly, north of Bombay. The requirements of a person situated in or near Calcutta or Bombay, and satisfied with what fare the local station provides, are similar to those of a listener in England.

Local Programmes

The Indian Broadcasting Company is now being run by the Government without any alteration in standard. The quality of transmission is good, but the time is divided between English and Indian programmes. This is not likely to satisfy one who is keen.

Obviously what is required is a high-power set to cover all wave-lengths. A loud speaker is almost an essential, 'phones are hot to wear in the hot weather and very unsociable.

The best set I have heard comprised one screen-grid valve, detector, one L.F., and a pentode, the screen-grid being fully tuned to give power, not selectivity, and the last two stages transformer-coupled.

I should like to stress the fact that selectivity is unimportant.

Many Indian cantonments have electric light, mostly 220 volts D.C., and as the consumption of the set described above is high, it is desirable to incorporate a mains unit.

As regards what one can get—Brookmans Park and several Continental stations on both wave-bands come in well at times, but only late in the evening. Atmospherics, moreover, may ruin reception for weeks on end.

Far more reliable are Huizen and Hilversum, on 16·88 metres and 31·4 metres. Philips Radio are really our one standby. Their type of music, times of transmission, and quality are all alike excellent.

5 S W, the British Empire station, is weak, and moreover never sends at a suitable time for India. Their wave-length is never changed and appears quite unsuited for India.

If they would only send the news to reach India at 10 p.m. or thereabouts, i.e. 4.30 p.m. English Winter Time and 5.30 p.m. Summer Time, many more British sets would be sold. This is no idle fancy. Indian newspapers reach outlying stations a day or more late, and up-to-date news is what we all want.

Besides Huizen, Zeesen is well received.

As regards import duty and licences, the former is only 2½ per cent, but there is also an import licence costing Rs.10, which must be purchased annually if any goods are imported.

Components and sets can be purchased from a number of dealers at reasonable prices, but the stocks carried are small and there is often much delay in getting exactly what is wanted. The receiving licence is Rs.10, obtainable at the Post Office.

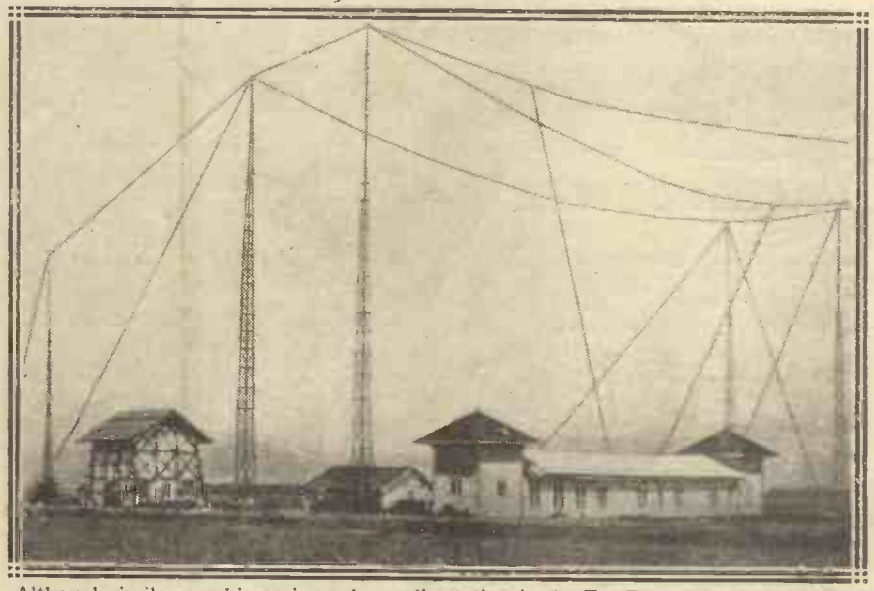
Many Pounds Saved!

I should like to congratulate you on your April Number. I have been in the habit in the past of cutting out and filing all articles which were of use or interest under Indian conditions. In your last number the question is to decide what I can do without, rather than what I want to keep.

May I end by expressing my thanks to MODERN WIRELESS, which has given me an education in practical wireless work unobtainable in any book to which I have yet been introduced. Moreover, it has saved me many pounds, no small matter, my birthplace being well north of the Tweed!

Yours truly,
D. B. MACKENZIE
(Captain).

EAST IS EAST, AND WEST IS WEST . . . .



Although similar machinery is used, a radio station in the Far East presents an external appearance very different from that to which we are accustomed. This "sun-shady" station is in Java.

"JONES," said the Editor, "you've been romancing lately. But there's a tendency in your stuff now towards a mixture of Marie Corelli, O. Henry, E. V. Lucas, and Professor Low, all diluted with Edith Shackleton. Just be your own old self and either write 'one hundred per cent Jonesy' or get back to your old job in the fly-paper trade."

"A Trifle Joggled"

Here he brought his eyebrows down with a bang which nearly shook his glasses off his nose.

"Do you know," he hissed, "that on the strength of something of yours which I accepted in a weak moment a son of perdition from the Skiddles Court Press has just asked me to take charge of 'The British Boy's Buster Budget Weekly'! May he fry in—well——"

SELF-CONTROL

"I am a man of equable character."

"Margate!" I suggested.

"No, I'm not vindictive, Jones. But see here. (Thank goodness I am a man of equable temper and know how to control myself!) *If ever I catch you* writing such—pah! —I'll break you, *like I do this penholder*, if you won't bend, *like I bend this penholder*. And the pieces will be thrown into the fire-grate—as I cast these spectacles."

The typist told me afterwards that he uses four or five pairs of spectacles each week and could hit the grate blindfolded!

The scene which I have described left me a trifle joggled. My nerves felt as though my solar plexus had become caught up on a nail. In that state I fled to the club for meditation and was soothing my bruised psyche with some of the club's "pre-war" lotion, when in tottered Bunkett, trembling at the knees and white at the gills, calling faintly but determinedly for a "Vampire's Kiss."

That cocktail went down his throat like a stone down a well; there was no visible movement of the gullet, though he blinked slightly. After that he called for something to drink and lowered himself into a chair like a centenarian.

The Vampire's Kiss

"'Smatter?" I asked.

"Phew! Jones. I've have a bad quarter of an hour on the carpet in front of my Board. Nosy old marmots! Specially Sir Pungo Wattle—him and his white whiskers! 'Colossus of Commerce!' Phoh! Why he is about intelectually level with one of those gentlemanly apes you see acting for the movies! He's a blocming whited sepulchre with feet of clay."

"You mix your metaphors as efficiently as one of those Special Correspondents of the evening papers," I said. "However, if you had only fifteen minutes you got off lightly. I've just had half an hour. That reminds me of one of the worst ordeals a man ever lived through. Sane!"

We went a little further into our investigation of the "Vampire's Kiss" and then I told him the substance of the following narrative, which I think is Jonesy enough even for the Editor.

In 1923, when radio was creeping into history as a household word, I happened to give a lecture on the subject, and as my audience was a body of public officials the affair received a fair amount of notice from the Press. By evil luck Arthur Ingle came across one of the notices and began the tragedy of which I was the victim.

Plunging Down

Ingle was at school with me. A brilliant boy! Hog for maths., and could flip chewed paper more precisely than any of us. A right merry whelp! Apparently destined for a great career. Then, at the age of eighteen, he went pi. Nothing whatever to say against that. Better, in many ways, than fishing or golf!

THE "MOTHERS' GUILD"

"Such dear old souls!"

But what upset us all was his developing a taste for slumming. Nothing against that, either. The trouble was that instead of realising that the proper thing to do is to work for the abolition of slums, he announced that he had conceived it to be his duty to plunge down amongst the submerged and stay under for as long as he could breathe. So Arthur Ingle disappeared, and no sign of him, except occasional ripples in the form of begging letters for his "Pant-patching Club," and so forth, was received on the surface until he leapt into the air and asked me to lecture to some of "his people."

"Right Brotherly"

I nearly fainted. Artie assured me that they were as quiet as mice and would give me a "right brotherly welcome," a promise which brought me round immediately and substituted palpitation of the heart. He added that the "Mothers' Guild" would be invited "Such dear old

IN PASSING

—*continued from page* 185

souls." At this I leapt towards the empyrean howling like a hydrophobiac bloodhound.

"Come on, Stinker, be a sport!" said Artie, in his old schooldays' voice. And his fiancée, a peach cursed with a hankering after spiritualism—bless me, what a rummy team those two will make!—looked at me with a kind of oxy-hydrogen appeal. So I melted and went out to see "Rap the Counter" at the Jollity, as an antidote.

BROADCASTING!

A rabbit-skin warehouse.

A November day was displaying its worst features as it approached the invisible division between itself and a November evening, when I set out to discover the Ingle Mission Hall, Gravy Street, S.E.

I travelled about seventy miles by bus from Whitehall to the Surrey Docks and was flung off into the very shadow, so to speak, of a timber ship's bowsprit, which stuck out of the dock and ended a foot from the roof of some Rotherhithe burgher's shop. I remember the name over the window. "Jno. Larsenson. Purveyor!"

"Dahn Furver"

In the doorway of Jno.'s place two lovers were crooning. I coughed, approached, and enquired for Gravy Street, and was received with outraged stares and a muttered, "Dahn furver." Dahn furver I found a lot of fog and a lot of river in the custody of the hairiest man I have ever seen. His directions for finding "Grivy" Street sounded like the key to the Hampton Court Maze, as it might be described by Mr. George Robey. So I sloped miserably away towards a smell of frying fish and guided myself by smellivision to the hungry crowd who lusted after hake as a hart after the water-brooks.

Fifteen aitchless voters disagreed about the geographical position of Grivy Ster-reet; one gentleman—he had the vinegar bottle, I remember—volunteered the information that it was a rotten 'ole, and the head hake-ist bent out of the fumes and steam, like a god descending from Olympus, and told me to ask the perliceman artside the Jolly Waterman. I wandered on, thinking of my cosy flat as a Muslim ponders Paradise, till I entered Gravy Street.

At the first tabernacle I came upon I stopped and rapped upon the imitation oak door. Mrs. Sairey Gamp opened to me and, disguising the voice with which Providence and Gravy Street had enriched her, asked me what was it that I might have wanted. I explained.

Welcome to Gravy Street

"Har," says Sairey. "This here hain't them there missionisers. This here's those there gorespellers."

The next tin temple at which I knocked turned out to be a rabbit skin warehouse. However, I really did find the Ingle Mission, five minutes before the lecture was timed to begin.

Artie—I could have murdered him at the moment and thrown his mangled

(*Continued on page* 188.)

IN PASSING

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corpse to those there gorespellers!—received me with his best mission handclasp and a sonorous, "Hearty welcome to Gravy Street," and conducted me to a dent in the wall which he called his vestry. Here I parked my tile and coat, and took a sip of tepid water, which I firmly believe had been used for baptising babies.

A subdued hum, punctuated by infantile yelps, indicated that "my people" were all there. I turned from sweating a few drops of blood to be introduced to "Mr. Yamp, my second in command." My thought was that he looked like a minute in despair. Why did he not stay at home and nurse his grief? He was, I learned, an amateur paperhanger who had just cremated his third. After that I was glad to de-Yamp and pass into the hall.

The Lecture Begins

As I entered, led by Artie, the audience set up a thunder of cheers which lasted for three minutes, at the conclusion of which Artie raised his hand—just like the Pope might—and, amid the ensuing silence, introduced me in pure missionese. I recall only "dear brother" and "wondrous works of Nature." As he sat down he whispered to me, "If Looney Wilkins has a fit don't take any notice."

THE CLIMAX!

The Ingle Mission broke into song.

I began my lecture with one eye on the clock and both ears cocked for "Looney Wilkins." Lacking a blackboard, Artie had provided an easel with large sheets of paper and some sticks of charcoal, and before I had spoken for ten minutes I had rubbed charcoal over my forehead and nose, and started all ranks into laughter. Artie raised a pontifical hand and the mirth died down to an occasional explosion amongst the Mothers' Guild who were the nearest and got the best view of the white-eyed Kaffir.

The lecture, at this distance, seems like a bad dream at the dentist's. I have a recollection of Miss Eliza Bates's choking fit which coincided with my explanation of syntony. The Mothers' Guild broke into a chorus of "There, there, then; did she, then," and Eliza's natural protector patted her on the back till the young lady (*ætat* eleven months) declared.

First Aid for "Looney"

Midway through a very eloquent eulogy of Marconi, "Looney" Wilkins barked like a jackal and threw his No. 1 Special Fit. Three paperhangers sat on him till he died away into a mere background, half whine, half hoot. The Mothers' Guild hugged their babies closer, and here and there refreshed a youngster with pork pie.

My long agony reached its climax and ended when I tuned in 2 L O and the Ingle Mission broke into song, accompanied by the stamping of feet.

Luckily for me, Flossie Jenkins, *ætat* twelve months, broke into grief at that moment, and in the midst of the Mothers' Guild attack Artie declared the innings closed.

All this explains my grim, lined visage. So long. Till Sept.

Broadcast Records

Of the popular double-sided 1s. 3d. records probably the best one released this month is the Stoll Picture Theatre organ recording of a ***Night in Hawaii*** and ***In a Japanese Garden,*** on 576. This is very well recorded and is a pleasant disc to listen to.

Other numbers which deserve mention are: Val Layton singing ***Just Like In a Storybook*** and ***I'm in the Market For You,*** on 574; and Mellow and Rich singing the medley ***The Grand Parade*** and ***Should I?*** on 575. Both these records have instrumental accompaniments.

Teddy Jones' singing of ***Ave Maria*** and ***Danny Boy,*** on 578, is not as good as we should have liked. Both voices seem peculiarly difficult to record, and somehow or other the City Temple does not seem to be the best place in which recording could be carried out.

(Continued on page 189.)

RECENT RECORD RELEASES

—*continued from page* 188

Of the dance records, ***Puttin' on the Ritz*** and ***With You,*** on 579, and ***The Man From the South*** and ***The Empire Party***, on 582, comedy foxtrots, are well worth mention.

The 12-in. Broadcast records produce another organ piece, ***The Nutcracker Suite,*** on 5169, played on the Stoll Picture Theatre organ by Herbert Griffiths, and a lively rendering of ***The Stein Song,*** by the Band of H.M. Welsh Guards, on 5170. Vocal extracts from ***Merrie England,*** on 5167, are also well worth hearing.

The Super Dance records this month have several very good numbers, including Jack Payne's favourite, ***Blue Pacific Moonlight,*** on 2573 (played by Ted Somer's Dance Devils), and ***Mysterious Mose,*** on 2574, a comedy foxtrot by the same band.

It Happened in Monterey and ***Song of the Dawn*** are two good numbers on 2569, played by Rod Rudy's Talkie Boys; while ***Handsome Gigolo,*** by the same band, on 2570, is sure to be a popular record.

Decca Records

Anyone who wants to know about Decca records should listen to the special concerts from Radio-Paris, beginning at 2 p.m. every Sunday. There is no doubt that these records are being greatly improved and the scratch (of which there used to be rather a large amount) has now been largely removed.

In the latest list two of Ketelby's popular compositions, ***The Sacred Hour*** and ***The Sanctuary of the Heart,*** are played by the New Empire Orchestra, with a vocal quartette, on K524. This is a very novel way of producing Ketelby's music and is very effective.

Then, Janine Weill makes an exceedingly good pianoforte record on M125, the items played being ***Sous le Palmier*** and ***Danzas Estamalas.*** The Decca people are also publishing in sections a comprehensive selection recording from Gilbert and Sullivan's operas. The first and second parts appear on the record number F1635, and this is being followed with F1636, another record which is bound to be extremely popular.

Olive Groves and Peter Flynn provide us with ***By the Bend of the River,*** on F1807; while Olive Groves alone is really delightful in her rendering of ***I'll Always Remember,*** from "Here Comes the Bride." Olive Groves is too well known a favourite of the ether to require any introduction here.

Of the dance music, the Rhythm Maniacs give us a further selection of up-to-date numbers which should certainly be heard. Bert and Bob, vocal duettists, with pianoforte accompaniment, are to be heard on F1811, singing ***Here Comes Emily Brown*** and ***Cheer Up and Smile,*** the latter from the "New Movietone Follies." "Here Comes Emily Brown" is a favourite comedy number with concert parties at all the seaside resorts. It is an excellent record.

Goodson Records

Have you tried the Goodson unbreakable record? Extremely useful for portable-set work, this record is rapidly coming to the fore. Electric recording and a very good selection of dance numbers are provided by a large variety of dance bands. Those we enjoyed particularly in this month's releases were: ***The Blue Danube Waltz,*** by the Metropolitan Dance Orchestra, on 219; ***Like a Dream,*** by Cova Cavaliers, on 221; and ***It Happened in Monterey,*** by the Metropolitan Dance Orchestra, on 214.

These are all extremely well recorded, and the ridiculously low price of 1s. 9d. for these double-sided records has no doubt had a great deal to do with the success which the Goodson records are enjoying.

Other numbers well worth hearing are the High Hat Revellers in ***Free and Easy*** and ***Telling it to the Daisies,*** on the other side of the same record, by the Metropolitan Dance Orchestra. Both these are foxtrots with vocal choruses and are recorded on No. 215.

H.M.V.

One of the best numbers of the H.M.V. releases recently has been ***Brahms' Symphony No. 3 in F Major,*** the four movements being on five discs enclosed in an album. Played by the Philadelphia Symphony Orchestra, one of the world's best, this work has been most faithfully rendered, and these are records which should be in every home. They are undoubtedly one of the best pieces of orchestral recording that has ever been done.

The Stein Song, the now-famous song of Maine College, U.S.A., is played on the cinema organ by Mr. and Mrs. Jessie Crawford, with enlivening effects. This is an extremely

(*Continued on page* 190.)

RECENT RECORDS RELEASES

—continued from page 189

novel record, and is well worth hearing. Raie da Costa, who was trained as a pianist for classical pieces, has most successfully turned her attention to the lightest of compositions, and contributes ***High Society Blue*** and ***Cryin' for the Carolines.***

A Kreisler record is always an event, so that his playing of ***Deep in My Heart, Dear*** and ***The Indian Love Call,*** from "Rose Marie," is something to look forward to.

A record wholly out of the usual is ***A Visit to the Zoo,*** in which the noises made by various animals are realistically reproduced. The sounds were recorded in the London Zoological Gardens, and the amusing description chat was made by the late Mr. Leslie G. Mainland, this being one of the last records L. G. M. made.

Piccadilly Celebrity Records

A very fine selection of Piccadilly records is available, one of the outstanding discs being 5048, on which is recorded ***Daughter of the Regiment Overture.*** This is a very fine recording, and the Piccadilly records get a remarkable amount of "body" into the record.

The Admiral's Broom and ***Drake is Going West,*** by Joseph Farrington, with orchestral accompaniment, on No. 5045, is a record well worth hearing. The depth of Mr. Farrington's voice is very well brought out.

Mephistopheles' Serenade, from "Faust," and ***O Star of Eve,*** by Philip Ranalow, baritone, on 5044, is another noteworthy record, the baritone voice being brought out exceedingly well. ***La Capricieuse,*** by Louis Godowski, is a violin solo which should be heard by everyone who is a lover of good music. On the other side of the same record is ***Hungarian Dance No. 5,*** in G minor, by Brahms, played by the same violinist with equal success. The number of the record is 5040, and electrically reproduced on a good radio-gramophone it is particularly effective.

Zonophone Records

The Zonophone Company have secured the services of another well-known tenor in Herbert Thorpe, and have thereby added another star to their already crowded list. This month he gives us ***I'll Sing Thee Songs of Araby,*** popular with Ben Davis years ago, and ***Gentle Maiden,*** on 5592, and these two old favourites will surely be greatly appreciated by all.

Maurice Elwin, baritone, is extremely good in ***Cryin' for the Carolines*** and ***A Little Old Cottage,*** on 5594. His singing is alway exquisite in taste, and this is the kind of song into which Elwin puts his best. It is sure to be an extremely good seller.

The biggest item of all on the Zonophone programme is undoubtedly ***Der Freischutz*** overture by the National Symphony Orchestra, played on 5588. This is a record which is certainly one of the best Zonophones we have heard, and the price of 2s. 6d. makes it exceedingly good value for money.

Clarkson Rose Again

Clarkson Rose goes all out in ***The Empire Party,*** on the record of that name, while ***The Stein Song*** and ***Eleven - Thirty Saturday Night,*** by the Arcadian Dance Orchestra, on 5603, is one of the hits of the year. "The Stein Song" is being sung by everybody, and its swinging tune has a lilt in it which is almost irresistible. It is no wonder that it is an extremely popular number.

THE "VERSATILE" THREE

—continued from page 109

Now we come to the eliminator. The theoretical circuit shows that a slightly different scheme has been used to that commonly employed. In order to reduce the bulk of the smoothing choke it is actually wound in two sections on a common core, and it is connected so that the magnetising force of the current flowing through each half of the winding is in opposition to the other.

By this means a very high inductance under actual working conditions is obtained with a small core, thus reducing the bulk and cost of this component.

A full-wave valve rectifier is used—I prefer it to the dry rectifier type—and you should be sure to get a valve with a filament voltage suited to the mains transformer you use. Thus the one I have employed has a 5-volt rectifier winding, and so I have used a Marconi U5 valve. If you should get one with a 4-volt winding, then you can use a U9 or a D U2.

(*Continued on page 192.*)

THE "VERSATILE" THREE

—continued from page 190

You will see from the photos that I have packed the valve round with asbestos wool. I have done this because there is not a great deal of room to spare round the valve, and in the case of excessive vibration it might knock against the can or the choke and get damaged.

Making the Mains Unit

The plan view of the mains unit is given in the wiring diagram, but in order to make the construction of this unit rather clearer, since it is somewhat complex, a front elevation is shown in Fig. 5. The mains transformer is mounted right along the back edge of the baseboard, and close up to it the 6-mfd. condenser C_{11} is fixed to the baseboard. The 4-mfd. condenser C_{12} is fixed on top of C_{11} with a spot of solder, the two cases afterwards being connected to H.T. —.

The choke and valve holder are then fixed as shown and the connections are then made, for the greater part, with heavy rubber-covered flex. There are only four output leads, two for the 4-volt A.C. supply and two for H.T. These are taken out through separate holes drilled in the side of the can.

Two leads of lighting flex are connected to the mains terminals of the transformer, and the flex is provided with an adaptor plug for plugging into the mains supply. If desired this lead may be broken by means of a switch so that the set can be switched on or off from any convenient point, or the switch can be mounted on the panel.

Grid-Bias Battery

The H.T. and L.T. A.C. leads from the mains unit are fixed under their respective terminals after the mains unit has been secured to the baseboard.

Grid bias is obtained by means of a battery of suitable voltage, according to the valves and H.T. used; the battery being fixed to the side of the eliminator by means of a couple of clips, as shown in Fig. 6.

The remaining point to be dealt with is that of the coils. The coils you will want are two Lewcos C.A.C. and two C.S.P. If you want to work on the broadcast band only you will need a C.A.C.5 and C.S.P.5, but to cover the long waves as well you will also require a C.A.C.20 and C.S.P.20. As well as these you will need four interchangeable coils to plug on to the above, and the sizes of these will depend on the degree of selectivity you need.

For the broadcast band, when working at a distance of 7 or 8 miles from Brookmans Park, the National and Regional programmes can be separated by using P.8 and P.10 for L_2 and L_4 respectively. P.8 will be plugged on to the C.A.C. coil (which goes in the first can), and P.10 will be plugged on to the C.S.P. coil, which goes into the second can. For a very high degree of selectivity use P.4 and P.6 respectively. These coils will give complete separation at even quite a short distance.

For the long waves I advise you to use two P.22's, since these give good separation between 5 X X and Radio Paris. If you are very close to 5 X X, however, you may need to reduce the size of one of these coils. Don't reduce it more than necessary, otherwise you will lose amplification.

In some cases where a large aerial is used a series condenser in the aerial lead may give an improvement without any appreciable loss in signal strength, especially on the short waves, where I have found the coupling to be a little on the tight side.

Valves to Use

Now, as regards the values of the decoupling resistances R_4 and R_5. R_4 feeds the H.F. valve and will only need to be at all high if a very high plate voltage is in use. The eliminator incorporated in this set, for instance, gives from 180 to 200 volts, which is a little on the high side for the output valve, when this is an ordinary low-frequency valve or a pentode, and the series resistance R_6 is therefore adjusted so as to cut the H.T. voltage down to 150 volts. Since this is not an excessive voltage to apply to the H.F. valve the value of R_4 need not be more than 1,000 ohms.

R_5, I have found, should be about 200,000 or 250,000 ohms. Not only does this give the best signal strength, because it prevents transformer saturation, but it also gives delightfully smooth reaction control.

The valves in use in this set when working on A.C. mains will be an A.C. S.G. valve for V_1, such as the Mazda A.C./S., the Marconi and Osram M.S.4, the Mullard S.4V.—be sure to get five-pin bases. All the above have been tried in this set and found to function with very little difference in performance. If anything, I think

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THE "VERSATILE" THREE

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that the Mazda valve gave slightly greater amplification than the others.

For the detector the Mazda A.C./H.L., Marconi and Osram M.H.4, and Mullard 354V. have all been found excellent. Personally, I am inclined to the 354V. as giving a slightly better background.

The Output Valve

For the output valve the Mazda A.C./P. or Mullard 154V. can be recommended in the power class, or else one of the 4-volt pentodes. If a five-pin base pentode is used a slight alteration to the wiring in the set must be made, and it is advisable to do this rather than use a four-pin valve with a side terminal, and its accompanying risk due to a loose H.T. lead lying about in the set.

For a five-pin pentode the following alteration must be made: Looking at the wiring diagram it will be seen that two leads are connected to the cathode tag of the V_3 valve holder. These should be removed from this tag, though still connected to each other.

A lead is then taken from the cathode tag to the B tag of jack No. 1.

When using a pentode the slider on R_7 should be adjusted so as to give the best background. If the slider is not correctly set the receiver will be inclined to hum.

Full-Wave Rectifier

The rectifier valve, as previously stated, will be a U.5 when using a 5-volt rectifier filament winding, or else a U.9, a Philips 506F, Mullard D.U.2, or a similar valve with a 4-volt winding, all these being full-wave rectifying valves.

To get the set working, all the wiring having been carefully checked, plug in coils and valves, connect aerial and earth and loud speaker—using the most suitable output transformer connections according to the maker's leaflet—and plug the set into the mains.

The grid-bias battery is clipped into position and the correct values of bias given to the detector and L.F. valves, For the detector 1½ volts positive, and for the L.F. according to the maker's instructions, depending on the value of H.T. used.

In the case of I.H.C. valves where the heaters are visible, it is not a bad idea to switch the set on first with the rectifier valve not in position, and check up the fact that the heaters are functioning correctly. Then plug in the rectifier valve and insert a voltmeter plug into jack No. 2.

Operating the Set

Give the set a couple of minutes to warm up and adjust the H.T. voltage to the desired value by means of R_6, and then readjust the grid bias if necessary. Set the slider of R_3 about three-quarters the way round in a clockwise direction, and search for your local station. The tuning will be found to be sharp, but not unduly critical, and if any difficulty is found reaction may be used in making your first efforts.

Should it be found that a silent background is not obtained after the set has warmed up, try the effect of reversing the connections to one of the windings on the double-wound choke. Theoretically, the connections given are correct, but there are occasions when practice does not agree with theory, and I have had at least two mains receivers through my hands recently which gave a better background with the opposite connections.

To check up the plate current of the output valve, which is desirable (*a*) to see if the valve is right, and (*b*) to see that the valve is not being overloaded, a milliammeter is plugged into jack No. 1. Note that both jacks are wired up so that the tip contact on the plug is positive.

If you have a selection of the P coils you will be able to try out what combination gives you the best results, if not, the coil table will give you a guide to the sizes to use.

There is a slight difference in the selectivity obtained with different makes of S.G. valves, but the table will give a rough guide which should prove useful.

A Good Plan

If you ever have any trouble with the set it is not a bad plan to test it out with batteries, using a 4-volt accumulator to feed the heaters and a battery for H.T. This will tell you immediately whether the trouble is in the set or in the eliminator.

When testing in this manner remember that there is no L.T. switch, and that there is a potentiometer connected straight across the H.T. So disconnect both batteries immediately you have completed your tests.

If you are the possessor of D.C. mains and want to try out this set you will have to modify the design slightly. Firstly, the A.C. eliminator will be replaced by a D.C. H.T. eliminator; secondly, you will use battery valves.

The theoretical circuit of the H.T. eliminator is shown in Fig. 7. Two 30- to 40-henry chokes, Z_1 and Z_2, are needed. I do not advise the choke used in the A.C. eliminator unless your mains are fairly silent. With bad mains two big chokes are needed. C_{13} should not be less than 6 mfd., and may be bigger with advantage.

Necessary Precaution

A fixed condenser, as shown at CX in Fig. 3, should be connected between the actual earth lead and the earth terminal. If this is omitted serious damage to the set may result, fuses blown and other damage done

The two switches S_1 and S_2 are the two poles of a two-pole switch that breaks both H.T. and L.T. circuits, and this will be mounted on the panel so as to control the set. The L.T. battery will be connected to the L.T.A.C. terminals. The slider of R_7 will be turned so that it makes contact with the end of R_7 which is connected to the terminal going to L.T. —. This is important.

In order to get grid bias on the H.F. valve a grid condenser and leak are needed, as shown in Fig. 8.

The condenser should be ·0003 or ·0005, and the leak may be 1 or 2 megohms.

A special G.-B. battery should be used for this valve.

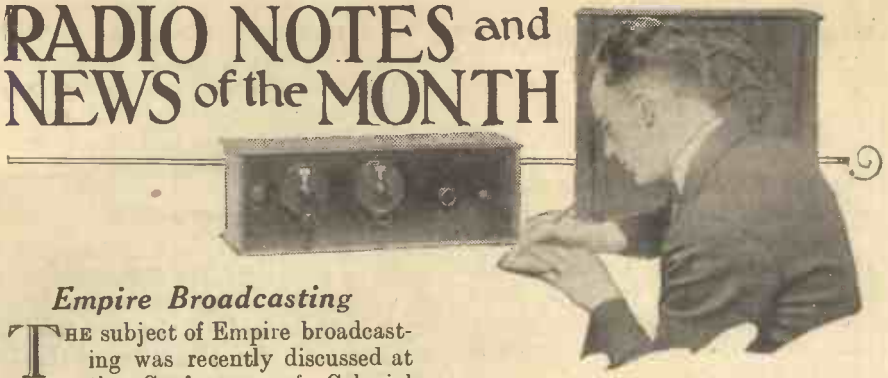
Using Batteries

The above alteration, with the exception of the condenser in the earth lead, will also be made when using batteries only for working this set. Another alteration to be made when using batteries only is to leave out the potentiometer R_3, and bring the H.T. + lead for the screening grid to a separate terminal. The potentiometer would only impose a continuous load on the H.T. battery, and a fine enough adjustment is obtainable by means of a separate H.T. lead. Pre-detector volume control may be obtained, if desired, by connecting a filament resistance in one of the H.F. filament leads.

Important Price Reduction

Since going to press with our cover a number of price reductions in connection with British valves have been announced, and among them is the new Mazda A.C./PEN., which goes down to 27/6 from 30/-.

RADIO NOTES and NEWS of the MONTH



Empire Broadcasting

THE subject of Empire broadcasting was recently discussed at the Conference of Colonial Governors and other representatives at the Colonial office. The Colonial Secretary, Lord Passfield, spoke of the benefits which would accrue to the Colonies if they could by some means be included in the B.B.C. system.

Sir John Reith's View

Sir John Reith, reviewing the history of the Corporation's activities in connection with Empire broadcasting, and with the work of the experimental station at Chelmsford, emphasised that Empire broadcasting is still in the experimental stage. He told his listeners that the transmissions from 5 S W should not be regarded as all that could be done by a regular organised service, and he felt that if a high-power short-wave station could be established there would be a possibility of having a real broadcast service to the Colonies.

Question of Expenses

Sir John went on to explain that the B.B.C. had no commercial motive in this; whatever there might be of benefit in the British system would be available free of charge to the Colonies, provided that the actual out-of-pocket expenses involved in the organising of an Empire service could be met from some source.

Committee to Consider

The majority of the Colonial representatives at the meeting spoke very highly in favour of the value of an Empire broadcasting service, and the whole matter was referred to a sub-committee of the Conference, which will report later.

Political Talks

We understand that the broadcast discussion on Empire Free Trade by Lord Beaverbrook, which was forecast in a recent issue of MODERN WIRELESS, will probably have taken place by the time these words are in print. The broadcast was conditional on whether Mr. Lloyd George, the Prime Minister, Mr. Baldwin, and other leaders representing the Conservative and Labour Parties accept the invitation to speak also.

20-Minute Innings

The present arrangement is that Lord Beaverbrook should speak first, and that the other leaders should follow in an order to be arranged by the Party Whips on various nights at intervals of three or more days. The

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talks will probably last about twenty minutes.

A Big Bill

As we reported in a recent issue of MODERN WIRELESS, Sir Thomas Beecham has now practically severed all connection with the B.B.C. It is understood that, in the past, he came to an arrangement with the B.B.C. concerning Symphony Concerts, and we now understand that Sir Thomas has received from the B.B.C. a bill for about £5,000, being his share of the losses suffered during the season when the concerts were running.

Northern Wireless Orchestra

We understand that the disbandment of the Northern Wireless Orchestra has been postponed until the end of the year, and it is even likely that the orchestra may continue until the first quarter of 1931. This is welcome news for Northern listeners, who have been agitating for a long time against the disbandment of their favourite orchestra.

Listeners, however, should remember that this new lease of life is not a permanent one, for the B.B.C. has quite made up its mind that the orchestra must eventually go.

Scotland's Regional

According to the "Glasgow Evening Citizen," after several months of careful wireless research a site for the new Scottish Regional broadcasting station has been marked down for purchase, but it has been found that even a high-power station on the selected site will not be adequate to supply the Highlands, and it is therefore unlikely that the original scheme for closing down all the other transmitting stations in Scotland will be adhered to.

An Old Story

It was reported in the press the other day that a scientist had declared that in about a hundred years' time it should be possible to pick up the wireless programmes now being broadcast.

The old story! Anyway, if it ever comes true, that ought to stop people wanting to live a long time!

New B.B.C. Orchestra

The new B.B.C. Orchestra, under the directorship of Mr. Adrian Boult, is now practically complete. It is understood that women will figure largely in the 114 players. Mr. Arthur Catterall will be the leader, and many of the new players have been drawn from Sir Henry Wood's Queen's Hall Orchestra.

114 Players

It is understood that the strings will be divided into 20 first violins, 16 second violins, 14 violas, 12 'cellos, and 10 double basses.

The majority of the players have now been engaged, and it is expected that the orchestra will be complete within the next few weeks, so that rehearsals for the autumn season of public concerts will shortly be able to begin.

North Regional News

The cost of Moorside Edge, the new B.B.C. Regional station near Huddersfield, will probably be in the neighbourhood of £150,000, and, if all goes well, this station should be ready to begin tests in December, and to start a double programme service by the end of March, 1931.

Coming Closures?

It is not yet known definitely which of the smaller stations will be closed down when the new station is ready, but it seems fairly certain that the stations to be closed will include Stoke-on-Trent, Leeds, Bradford, and Sheffield.

A 5GB Alteration

The wave-length of the new station will be 301·5 metres for the National programme, and 479·2 for the Midland Regional. The latter wave-length is at present used by the Midland Regional station at Daventry, and so a new wave-length will have to be found for the latter.

Better Than Brookmans

The station will have the same power as Brookmans Park, but it is expected that its range and signal strength will be very much better, chiefly because of the higher wave-length employed.

The three masts for the two aerials will be each 500 ft. high—i.e. 300 ft. higher than the masts at Brookmans Park. Taken in conjunction with the fact that Moorside Edge is something like 900 ft. above sea level, readers will appreciate the fact that the transmissions should be heard at a greater range than Brookmans Park.

The total height of the aerial above sea level will be about 1,400 ft.

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Those Pirates

It was stated in the House of Commons the other day that the number of prosecutions undertaken by the Post Office for the twelve months ended May 31st last in respect of the working of wireless sets without a licence was 1,029 Convictions were obtained in all but five cases, and the total amount of fines and costs imposed was £1,193 19s. 7d.

"Juice" from the Mains

According to the "News Chronicle," a group of leading British wireless firms are considering undertaking legal action against one of the big electricity supply corporations in connection with the compensation of listeners whose receiving sets have been rendered useless by changes made in the voltages of their electric mains.

Changed Electric Supplies

If the action "comes off," it will be a test case, but it is hoped that it will be avoided if the diplomatic negotiations now taking place between the Electricity Commissioners, the supply undertakings, and the radio manufacturers can be satisfactorily brought to a head.

There is no doubt that thousands of listeners using all-electric wireless sets have been forced to buy new equipment because the electric lighting authorities have made a change in the electricity supply.

Tut, Tut!

The "Catholic Herald" came out the other day with the suggestion that as the Chairman of the B.B.C. has a good job and a good salary, his manners could do with a brush up. It appears that a complaint had been sent to Mr. Whitley re one of Mr. Vernon Bartlett's talks about the recent row in Malta, and as Mr. Whitley did not reply personally, he is now being "ticked off" for his bad manners.

Anyway, we think the tone of the paragraph is such that Mr. Whitley is quite right in completely ignoring the complaint sent to him.

Aberdeen's Garden

According to the "Aberdeen Press and Journal," since September of last year, when Aberdeen was relegated to little more than a relay station—taking most of its programmes from London—dissatisfaction has been steadily growing among listeners in the district. It seems that listeners are taking the most effective means of protest; in other words, they are ceasing to listen and are allowing their licences to lapse.

What the Dealer Said

The newspaper we have quoted from says: "We have plenty of talent in Scottish artistes, so let us have them in our wireless programmes. They know Scottish tastes better than the English."

The dealers, however, in Aberdeen are not particularly pessimistic. One dealer reported that the best period he has ever had was during the dead season this year.

Portland Place Progress

Work on the new B.B.C. headquarters in Portland Place, London, is progressing. The excavations and foundations were completed during last autumn and winter. One of the special features of the building will be in connection with the lighting.

In order to avoid any possible feeling of depression among those whose duties may keep them confined for long periods within the building, artificial illumination will be wholly used—artificial daylight radiated through casement windows of the normal type being the method employed.

Plays by Television

In the course of his criticism of the first play by television, which was recently broadcast by the Baird system, the dramatic critic of the "Times" said:

"Let it be admitted at once that plays by television are as yet a subject for men of science, not for critics of the finer points of acting The visual transmission is far from perfect. You feel yourself to be prying through a keyhole at some swaying, dazzling exhibition of the first film ever made."

"Not Yet"

In connection with improvements in television, the critic went on to say:

"How far off these improvements are only Mr. Baird and his men of science can judge. Men of the theatre may meanwhile rest in peace. The time for interest and curiosity is come, but the time for the serious criticism of television plays as plays is not yet."

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