

The **Wireless Constructor**

6^D
MONTHLY

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

VOL. IV.

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**SPECIAL EXHIBITION
NUMBER**

"This Year at Olympia"
By the Editor



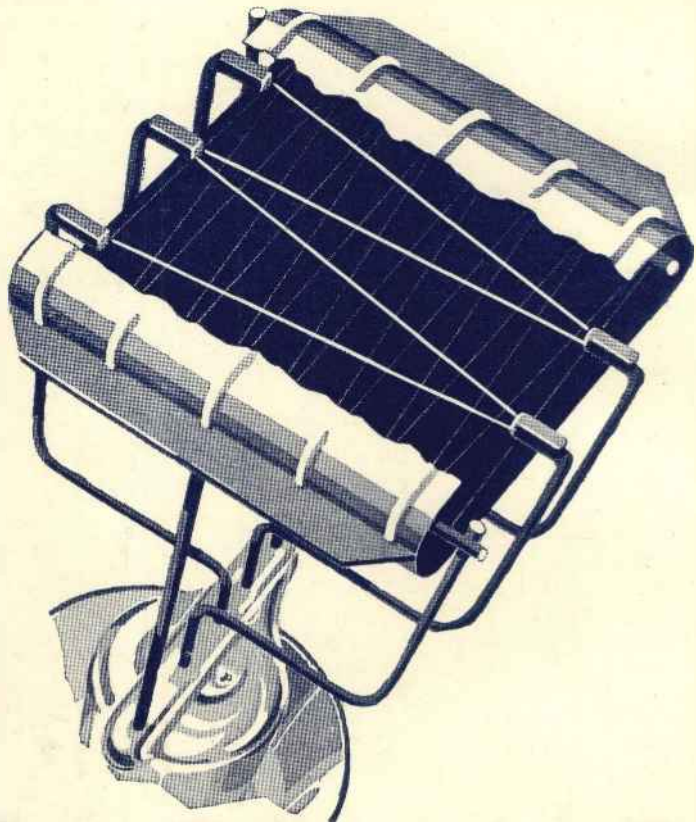
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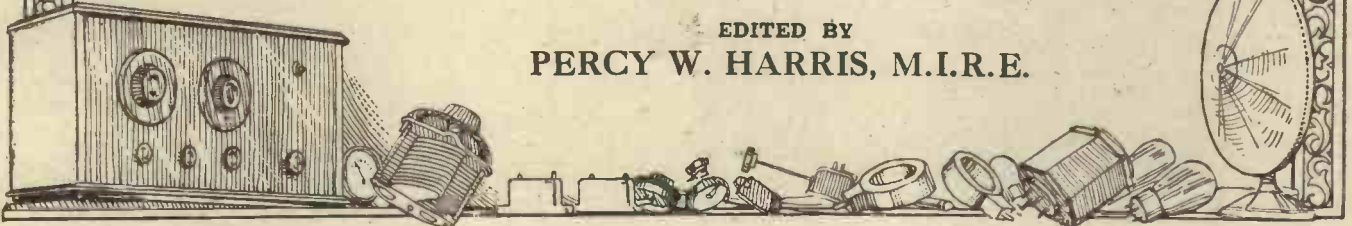
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CONTENTS

	Page		Page
Olympia and the Home Constructor ..	365	The "Trapper" ..	393
The "Twin-Tune" Five ..	367	Cartoon ..	398
Empire Radio ..	372	Some Points About the New Shielded Valve ..	401
This Year at Olympia ..	373	The "Localong" Crystal Set ..	405
What To See At The Exhibition ..	375	Foolproof Radio ..	414
The "Two-Circuit" Single Valver ..	381	The New Screening Box ..	425
In Lighter Vein ..	385	This Season's Valves ..	429
Savoy Hill Happenings ..	387	Chats At the Work-Table ..	432
All About the New Valves ..	389	Our News Bulletin ..	434

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



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The illustration shows the new Met-Vick 5 with the eliminators contained in the side cupboards. It can be plugged into a lighting circuit just like any other Electric appliance. If used with H.T. and L.T. batteries these can be accommodated in the cupboards. The circuit employs two phase-balanced and stabilized H.F. stages before the detector, and two resistance coupled L.F. stages.

Operation is extremely simple, the local station can be easily cut out and a wide range of alternative programmes obtained.

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The Met-Vick 5 is a really beautiful instrument and while a distinct advance on any 1926 model it still remains at a reasonable price.

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Battery Eliminators

Met-Vick Battery Eliminators are supplied in two models, one for providing filament current and the other for anode and grid currents, by plugging in on electric light mains. The H.T.-G.B. Model provides a high voltage (up to 250 V.) for the last valve (ensuring a large volume without distortion). It is fitted with a switch, a protective fuse and a distributor panel enabling it to be used on various supply voltages of 40-100 periods. Grid Bias tappings at 5, 10, 15 and 20 volts.

The smoothing system is of exceptional efficiency. The eliminator can therefore be used successfully with multi-valve and the most sensitive sets even in districts where there are considerable irregularities in the electrical supply.

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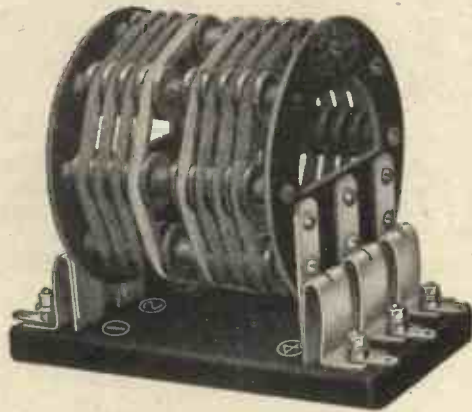
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Obtain List 7117/8 for full details and prices.



MET-VICK (COSMOS)

METRO-VICK SUPPLIES LIMITED

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Now you can get good Music always

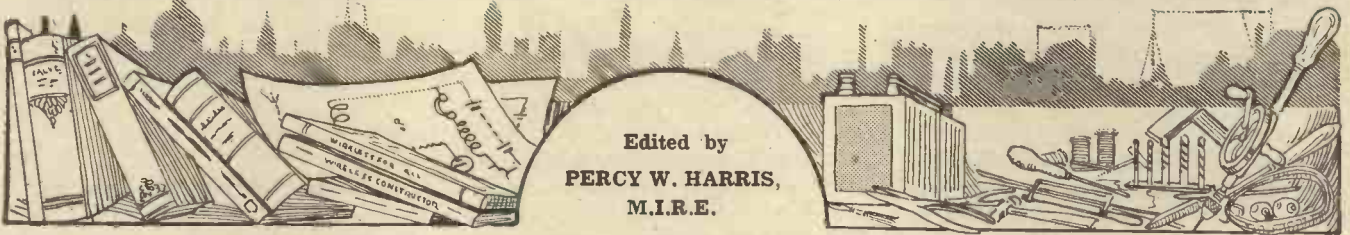


THERE'S a great musical treat in store for you the first time you use Cossor Valves. From the sweet high notes of the violin to the throbbing of the drums every sound is re-created with a wealth of colour and atmosphere, surprisingly beautiful and true in detail. Such perfect music is due largely to the super-sensitive Kalenised filament with which every Cossor Valve is fitted. But, remember—you can't get this remarkable Kalenised filament and, therefore the same outstanding quality of reproduction, with any other valve. It is an exclusive Cossor development.

In 2, 4 or
6 volts from
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When you use
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the Melody maker

The WIRELESS CONSTRUCTOR



Published by the Amalgamated Press, Fleetway House, Farringdon Street, E.C.4.

OLYMPIA AND THE HOME CONSTRUCTOR

Percy W. Harris, M.I.R.E., the Editor of the "Wireless Constructor," discusses the National Radio Exhibition from the point of view of the Home Constructor.

THIS is going to be a great season for the home constructor. First we have the recent reduction in valve prices—long overdue, but nevertheless welcome; secondly, we have at least two new types of valve, offering vast new fields for the home constructor to conquer; thirdly, we have an all-round improvement in the quality of British components, including several new and really high-grade low-frequency transformers, resistance-capacity-coupling units and impedances, while the valves used with them are vastly better than was the case only a year or two ago. New circuits and arrangements for increasing sensitiveness and selectivity, simplified methods of construction, with new components to suit them, a steady improvement in loud speakers, and a promise in the not too distant future of still better loud speakers—these are but a few of the signs and portents of the season.

The Radio Exhibition

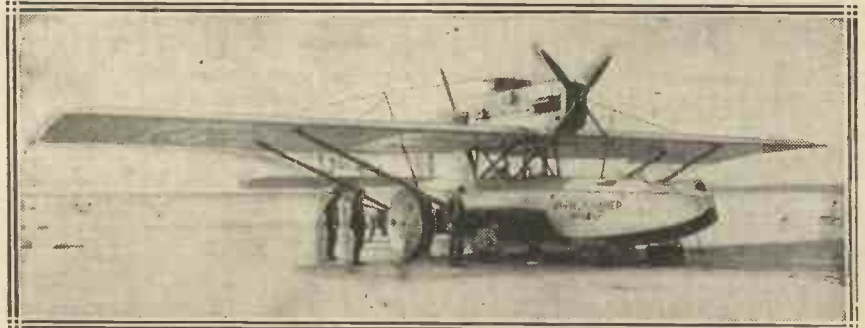
Then, of course, there is the annual "Show," which I hope every reader who can will visit. It is not so much that these exhibitions contain wonderful novelties, although the exhibition this year will really do so. The chief reason why I so strongly advocate a visit to the exhibition is that the home constructor can inspect practically the whole range of components available to him during the coming year, and by seeing and examining them closely he will get a far better idea than would otherwise be possible of the distinctive points of merit of each component.

There are probably a number of

useful components which you have seen advertised for some time. Why not take the opportunity of seeing them personally? You may not want to buy at the moment, but when you do you will have the satisfaction of knowing that you have already examined that particular article and will thus know whether or not it will suit your particular purpose. While you are there, too, examine the ready-made receivers, and note their special points.

you will not only find much of interest but will be able to give up-to-date advice to those who may consult you in the near future.

And now for the present issue, which I think you will agree is the best which has yet appeared. Every set described has been designed and built with an eye on the new selectivity problems which face us with the advent of Daventry Junior, and the possibilities of other powerful stations on the shorter wave-band. The new



Britain's representative in the race to be first across the Atlantic from East to West is the radio-equipped seaplane shown above.

There will be many new sets of exceptional interest. Thousands of English men and women enjoy building their own sets, and other thousands, while needing radio receivers, have not the slightest inclination to build them. It is to this latter class that the home constructor is so useful a friend. Having built several sets for himself and experimented with receivers from single to multi-valve, he is often consulted when the purchase of a set is contemplated. You probably will be consulted in just such a way this winter. If you have examined all the new season's models,

crystal set—and you will observe it is *really* new!—not only gives an immediate change-over, with the flick of a switch, from your local station to 5 X X, but also is more than ordinarily selective.

Good Signal Strength

This selectivity has been obtained with no sacrifice of signal strength. Incidentally, this set was submitted to the most careful measurements for efficiency in my laboratory and was found to give an output as high as that of any crystal set previously tested, while yet giving

Olympia and the Home Constructor—continued

a selectivity which most constructors have only obtained in the past by sacrificing perhaps fifty per cent of their signal strength. Incidentally, the inclusion of the long-wave coil in the receiver was found to make not the slightest difference to the efficiency of the short-wave coil—an important point often overlooked in the design of a double-range receiver.

In valve sets you will find a delightful variety. The multi-valve enthusiast will find much of interest in Mr. Johnson-Randall's five-valve receiver, which incidentally incorporates the new screen boxes designed by Mr. G. P. Kendall, B.Sc., and described by him in this issue. These screen boxes are a big advance on the small circular screens, which although compact obtained this compactness by an appreciable loss in efficiency. Furthermore, in the older type of screening box only the coil was shielded, leaving much of the circuit wide open to "pick-up" and interaction effects. The new screening boxes, incorporating not only the coils, but the valves and other components, give real and effective screening suitable for the conditions now ruling.

Additional Receivers

In "Foolproof Radio" the reader will find described a set—first referred to in these notes last month—in which simplicity of operation and very high quality reproduction of the local station are the main attributes.

Not all readers have the facilities or the desire for a loud-speaker set, particularly where listening has to be done in the presence of people who would be disturbed by the constant change from one station to another. Two sets for telephone operation (although one may be used for really good loud-speaker work if your local station is not too far

away) are described this month. Mr. A. S. Clark, who is already well known to the readers of this journal for the ingenuity he has displayed in previous receivers, contributes a very interesting single-valve receiver, in which the high selectivity desirable in so many cases is obtained by the addition of an extra tuned circuit. The manipulation of this set is made no more difficult by the addition, as the extra circuit is tuned simultaneously with the other by means of a double condenser. By such an arrangement very sharp tuning is obtainable without the sacrifice of quality, which the use of critical reaction involves when only one tuned circuit is used.

Wave-trap Included

Another method of obtaining selectivity—you will see by now that selectivity is a prime feature of this issue!—is by means of a wave-trap. Experiments in my laboratory have shown me that the new small adjustable condensers (they are variable within considerable limits) enable us to build a wave-trap into a set and adjust it to the local station without taking up additional panel room, doing this with only a very small additional cost, for the smaller adjustable condensers are considerably cheaper than the usual type of panel-mounting variable condenser.

The "Trapper"

The result of much experimental work is shown in the two-valve set "The Trapper," which is really a two-valve receiver incorporating the circuit which made the Radiano Three so popular, together with an efficient wave-trap. The selectivity of this set is extraordinarily good, and will enable the user to tune in stations very close to the local, even though

this latter may be only a few miles away. The provision of an extra terminal enables the receiver to be used without the trap, with no more trouble than is taken by changing the aerial wire from one terminal to another.

In the way of novelties I am glad to be able to describe in detail the new valve invented by our esteemed contributor, Captain H. J. Round, Chief of the Research Department of the Marconi Company. This valve is not merely a slight modification of existing types. It is a real step forward, for it gives a degree of high-frequency amplification previously unobtainable with a single valve, while dispensing with the need for neutralisation, as the effect of valve capacity has been completely removed by a method quite different from that of the usual neutralising.

Self-Neutralising Valve

I am also able to give readers particulars of another very interesting valve invented by Major James Robinson, who has also contributed many interesting articles to this journal. Doctor Robinson's valve may be called self-neutralising, as it dispenses with the usual neutralising condenser by a method quite different from that used by Captain Round. Both types of valves will be available to the home constructor, and will still further add to the interest of experimental work during the coming season.

To repeat the thought with which my notes open this month—no previous wireless season has opened with such good augury for a really interesting and fascinating time. Let us charge our accumulators, see that our H.T. supply is "up to scratch," heat the soldering iron, and get to work!

"Listen to this, old man!"



The "TWIN-TUNE" FIVE

A highly efficient five-valver employing the new screening boxes.

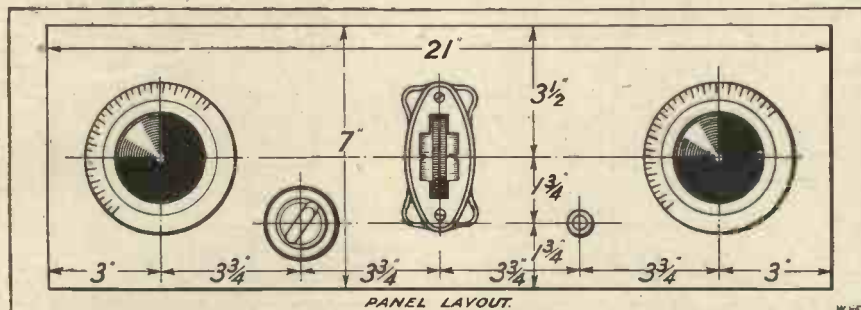
Designed and described by A. JOHNSON-RANDALL.

FOR the listener who requires "distance" probably the most useful type of receiver is that which employs two good H.F. stages with reaction and a couple of L.F. magnifying valves. In order to

The coil is placed in the centre of the box, and the losses introduced by the screen are negligible owing to the distance of the metal from the coil field. It thus becomes possible to employ high-efficiency Litz-wound

In addition to this it has been found that many listeners have trouble in obtaining the most accurate adjustment of the three sets of condenser vanes. Lastly, there is always a feeling that with a weak distant signal slightly more "beef" would be possible if one could tune each circuit separately.

With these points in mind I decided to tune the aerial circuit with an ordinary slow-motion condenser, and the two H.F. circuits with a drum-control twin condenser. With the drum control it is possible to operate both condensers together for the preliminary rough adjustments, and each condenser separately for the final "touch up."



obtain stability and so permit a high degree of magnification from each stage, to minimise direct "pick-up," and to ensure good selectivity, it is desirable to screen all the H.F. stages, including, in some cases, the aerial circuit.

To introduce small screens around the coils, with the metal only half an inch or so from the actual winding, introduces losses, and if these losses can be reduced or completely eliminated a more lively and sensitive receiver will result.

A more lively receiver, however, needs greater care in the construction, since the lower the ohmic H.F. resistance of the circuits the more difficult it becomes to prevent self-oscillation of the H.F. valves, especially if valves having a high mutual conductance are used.

The Screening Boxes

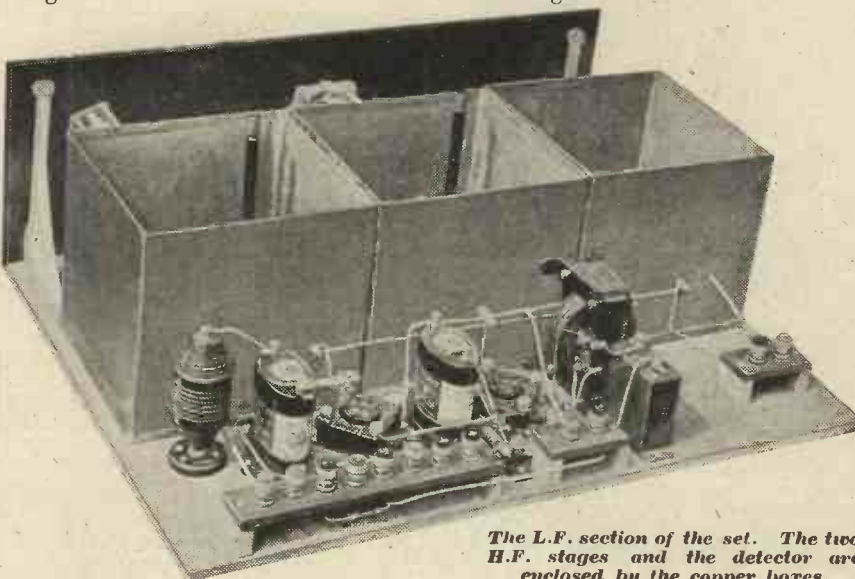
In the "Twin-Tune Five" which I am about to describe it was decided that the best method of screening was by means of the new square screening boxes recently introduced by Mr. G. P. Kendall of the WIRELESS CONSTRUCTOR research department. These boxes are 6 1/2 in. square and 6 in. high, and it is possible to place inside each box one complete H.F. stage, consisting of the coil, neutralising condenser, and valve.

coils with advantage, thereby increasing the selectivity and sensitivity of the set as a whole.

The problem of tuning the three tuned circuits must next be considered. The easiest method would seem to be to employ a three-"gang" control, thus giving only one dial to operate. Experience has shown, however, that this scheme is by no means foolproof, because it is difficult to balance up the aerial circuit in a manner that ensures maximum sensitivity over the whole range of wave-lengths.

The H.F. Valves

The two H.F. valves have a fixed resistor connected in each negative filament leg, the object of this being to give each valve a small negative bias in order to increase selectivity. In series with both valves a master-control rheostat on the panel permits a control of volume to be obtained and is a further aid to selectivity should it be necessary to separate two powerful transmissions on near-by wave-lengths.



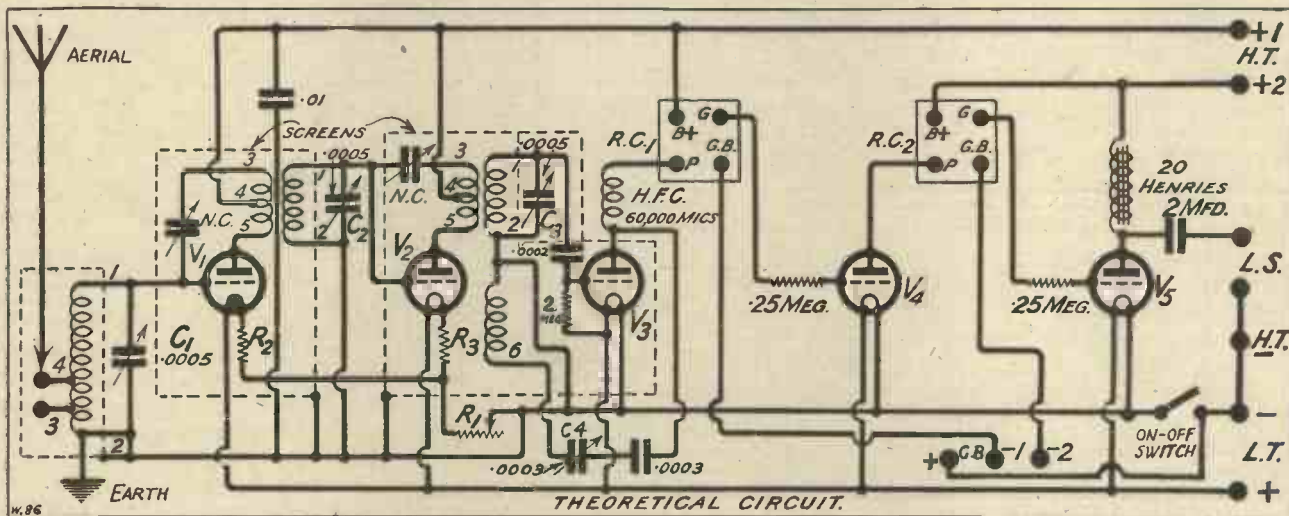
The L.F. section of the set. The two H.F. stages and the detector are enclosed by the copper boxes.

The "Twin-Tune" Five—continued

With most valves a 10-ohm rheostat will be about right, and the values for the fixed resistors should be about 4 ohms each if 6-volt valves are used. No resistors were employed with the remaining valves, since the modern valve will operate efficiently direct

reproduction with moderate amplification. The units chosen are not intended for high "mag." valves but the combination is quite suitable for use with valves having an amplification of about 20 with an A.C. resistance of 30,000 ohms or so. A choke

had a tendency towards making the actual working of the set a little more critical than was the case when the usual grid leak and condenser were used. For this reason it was decided that the final circuit should employ the conventional grid con-



from the L.T. battery provided the accumulator is chosen to suit the valves.

For instance, one would use a 6-volt accumulator with 6-volt valves and a 2-volt cell with 2-volt valves. On the L.F. side two straightforward R.C. stages employing units have been used.

The object here was to obtain good

output filter enables the D.C. component in the anode circuit of the last valve, which should be of the "super-power" type, to be isolated from the loud-speaker windings.

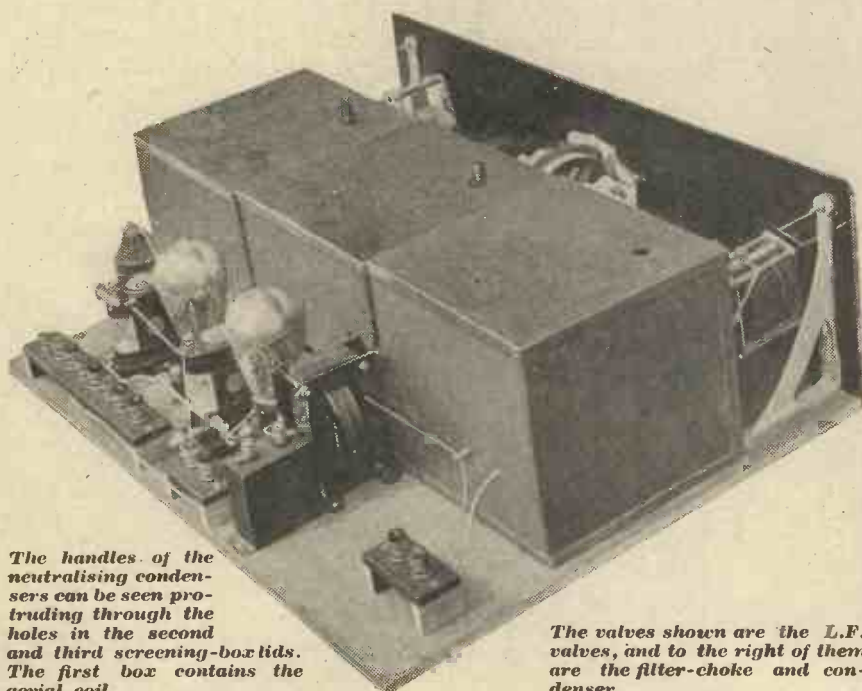
The Rectifier

In the preliminary tests the detector valve was operated as an anode-bend rectifier, but the arrangement

denser and leak, an arrangement which incidentally gives a little more signal strength.

COMPONENTS REQUIRED.

- 1 cabinet, 21 in. × 7 in. × 18 in., and baseboard, 21 in. × 16 in. deep. (Carrington Manufacturing Co.)
- 1 ebonite panel, 21 in. × 7 in. × 3/8 in., and two panel brackets. (Cameo.)
- 1 .0005 slow-motion condenser and one .0003 condenser. (Brandes.)
- 1 Bruno "Two-gang" condenser. (R. A. Rothermel.)
- 3 screening boxes. (Peto-Scott.)
- 3 six-pin bases. (Peto-Scott.)
- 2 neutralising condensers.
- 5 valve holders. (Benjamin.)
- 2 fixed resistors and bases.
- 1 10-ohm panel-mounting filament rheostat. (Igranic-Patent.)
- 1 on-off switch. (Igranic.)
- 1 .0002 grid condenser and 2-meg. leak. (Dubilier.)
- 1 .01 fixed condenser. (Dubilier.)
- 1 2-mfd. Mansbridge condenser. (Dubilier.)
- 2 25-meg. leaks and one Dumetohm holder. (Dubilier.)
- 1 H.F. choke. (McMichael.)
- 2 R.C. units, type "A." (R.I.-Varley.)
- 1 Output choke, 20 henries. (Pye.)
- 1 .0003 fixed condenser. (Lissen.)
- 12 terminals, marked as on diagram. (Belling Lee or Eelex.)
- 2 split-primary H.F. transformers and aerial coil to suit. (Lewcos.)
- (Also ditto for the 1,000-2,000 metre band if you wish to receive the long-wave stations.)
- 3 ebonite terminal strips. Some Glazite or tinned-copper wire and sistoflex.



The handles of the neutralising condensers can be seen protruding through the holes in the second and third screening-box lids. The first box contains the aerial coil.

The valves shown are the L.F. valves, and to the right of them are the filter-choke and condenser.

The "Twin-Tune" Five—*continued*

In the first trials a very interesting phenomenon occurred. The set was found to function in a perfectly satisfactory manner on the ordinary B.B.C. band, and so pleasing were the results that the short-wave coils were immediately interchanged for those suitable for use on the 1,000-2,000 metre band.

Unwanted H.F. Currents

It was then found impossible to stabilise the receiver. An independent test was then carried out in the research department under the direction of G. P. Kendall, B.Sc., and it was discovered that H.F. was getting through into the L.F. stages. The insertion of two 25 meg. resistances in series with the grids of the L.F. valves completely cured the trouble.

The construction of the receiver is fairly simple, and the chief difficulties are in taking the leads to the various components through the screening boxes. Where possible, I have used No. 20 gauge tinned-copper wire and systoflex covering, but with care Glazite can be employed. For convenience certain leads were taken underneath the baseboard, this necessitating extra holes in the screening boxes. It should be noted that the Bruno twin-"gang" condenser has its moving vanes insulated and its fixed vanes connected to the frame.

Hence the moving vanes must be joined to the grids of the H.F. valves and the fixed vanes to the screens, otherwise it will be impossible to stabilise the set. Another point concerns the positions of the screening boxes on the baseboard. There is just room to place the three boxes in line and to leave sufficient space at the ends of the baseboard to permit the set to be placed in a standard "Camco" Solodyne cabinet.

A Point To Note

If the boxes are incorrectly placed those on the outside will not clear the fillets in the cabinet unless the thickness of these is reduced slightly. The same applies if the boxes are oversize, and they should be checked up to see that they conform to the standard specification.

Great care must be taken to see that the insulating covering on the leads passing through the holes in the screens does not become frayed, since this may produce a short circuit and ruin the batteries or burn out the valves.

Remember that the metal boxes also form the common L.T. negative connection which is joined to earth. When testing for the first time place a small flash-lamp fuse in circuit in the H.T. negative lead and try one valve at a time in each holder.

First see whether it lights, and then place the H.T. plus wander plug in the battery. An old valve is very suitable if there is any doubt as to the correctness of the wiring.

Be very careful in handling any of the leads in the screening boxes, always removing the H.T. wander plugs when removing or replacing valves or coils.

When experimenting for the first time with these boxes I burnt out a complete set of five new valves through neglecting these simple precautions.

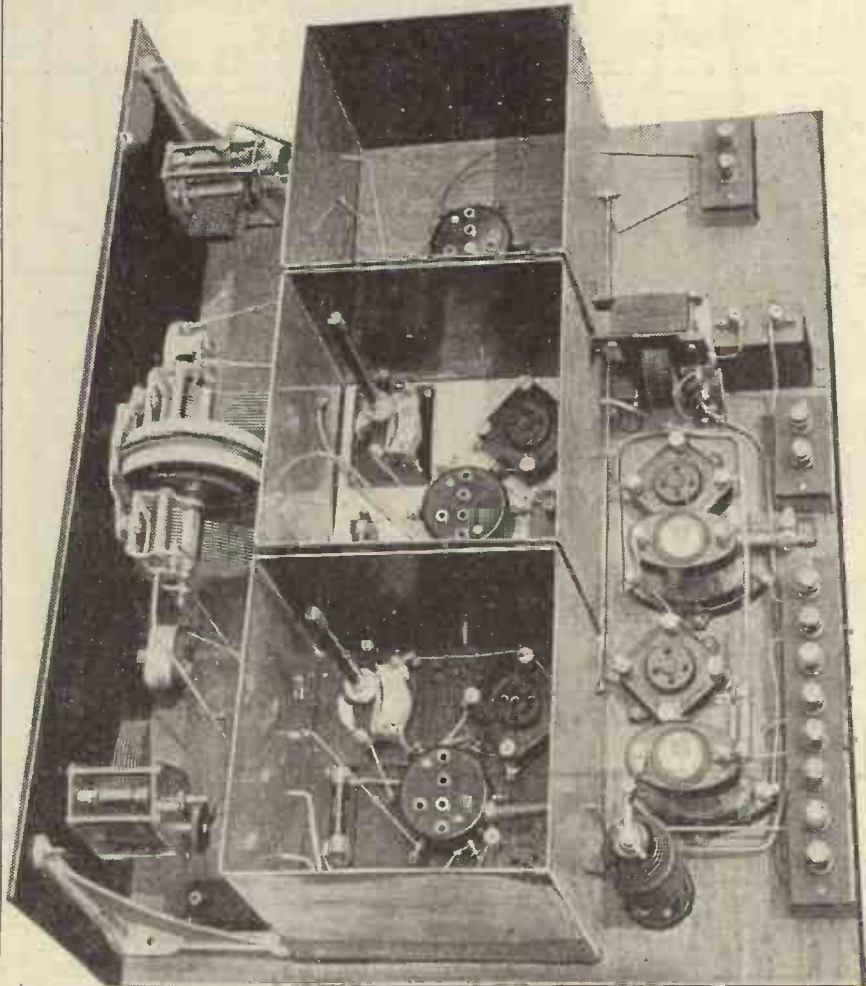
Do not insert a split-primary aerial coil in either of the H.F. sockets. If you do you will probably burn out the

coil, short-circuit your H.T. and L.T. batteries and possibly damage your valves. Lewcos aerial coils have a white spot on top to assist in distinguishing them from the ordinary split-primary H.F. transformers.

Since most listeners who construct this set will, I hope, have had some previous experience in the construction of at least one other receiver, I shall not give the usual elementary hints upon wiring up the components. A receiver of this type, employing, as it does, high-magnification H.F. stages, is not really suitable for the beginner. Such a set always tends to be a little critical, and small variations in layout are liable to have an important bearing on the results.

Suitable Valves

The valves I would suggest for this receiver are as follows: In the first three sockets, i.e. the two H.F. stages and the detector, valves having an A.C. resistance of not more than



The photograph clearly shows the components in the screening boxes, and the twin gang variable condenser.

The "Twin-Tune" Five—continued

30,000 ohms, with an amplification factor of about 20. Valves of this type will normally be found in the 6-volt class, and among them may be mentioned the D.E.5B, P.M.5X, Cossor 610H.F., and S.S.610H.F. There may be other valves of more recent type which are equally suitable.

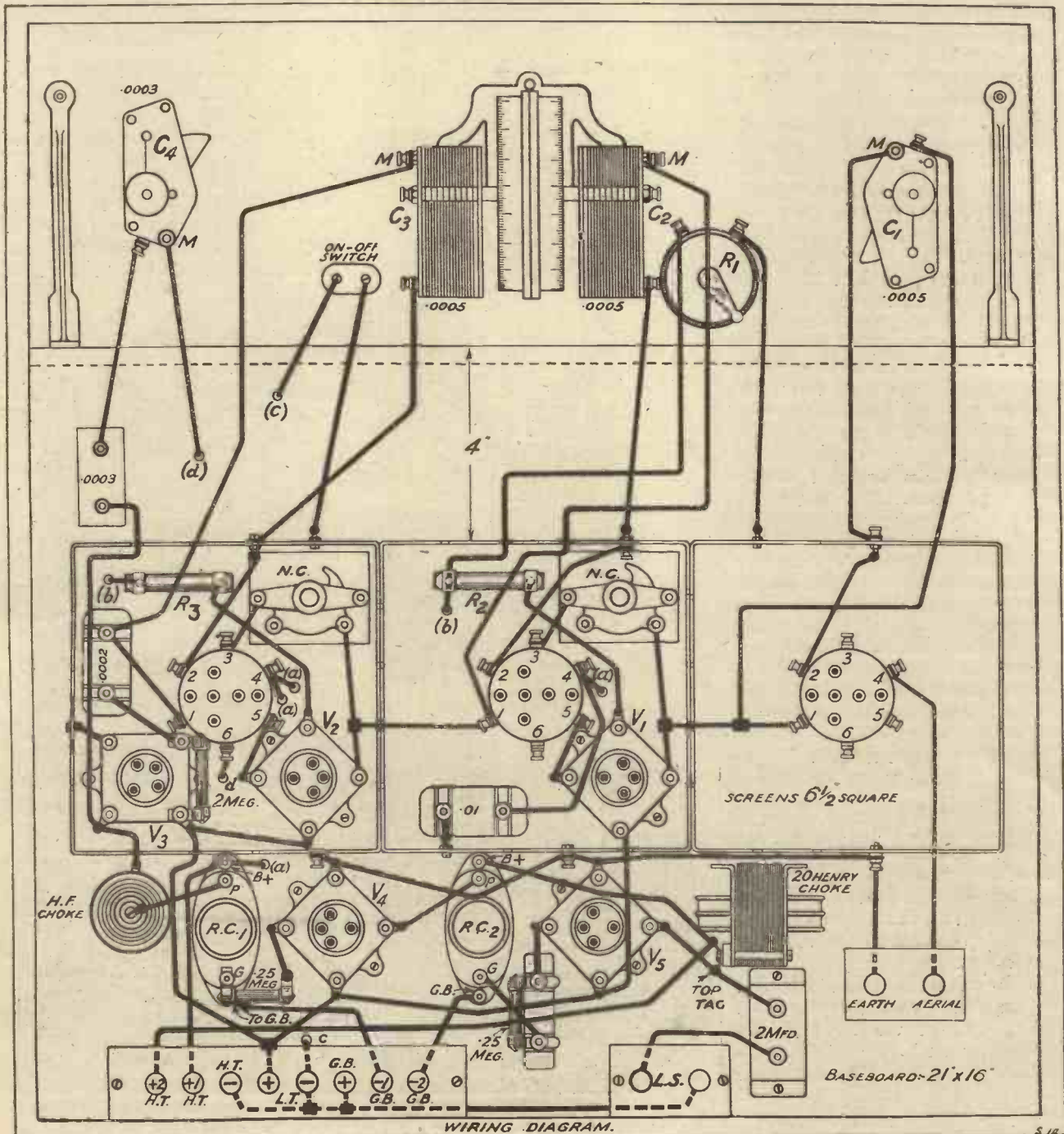
For the first L.F. valve the same types will be satisfactory and a grid bias of $1\frac{1}{2}$ –3 volts should be employed.

In the last socket a valve with an impedance of about 3,000–4,000 ohms will give good results, the grid bias in this case being in the neighbourhood of 16 volts, the exact value depending upon the H.T. voltage.

The H.T. voltage on the first three valves (H.T. + 1) should be approximately 75–90 volts, but the best value should be found by trial. On the L.F. valves at least 120 volts should be

employed; 150 volts would be better.

For the reception from the local station it is advisable to use a small indoor aerial since the high magnification on the H.F. side will probably produce overloading if a large and efficient outdoor aerial is employed. The outside aerial can be used for distant reception. At a distance of 15 miles from 2 L O a short length of wire across the room gives full loud-



The "Twin-Tune" Five—continued

speaker strength on this station, but if the outdoor aerial is employed distortion occurs through overloading.

The well-known method of neutralising by finding the silent point does not seem to be infallible. On a powerful local station it is not always possible to find a true silent point, and at considerable distances from a loud station removing a fixed resistor will cut out signals.

The simplest method is to stabilise by trial. Tune in a station with the neutralising condensers practically at zero and the reaction condenser at its minimum. The H.F. valves will probably oscillate freely. Then rotate the two neutralising condensers a little at the time while swinging the aerial condenser. A point will be found where oscillation ceases. Continue to adjust the neutralising condensers until no oscillation occurs at any point on the tuning range. The neutralising condensers will probably be one quarter to one third of the way in, if of the Peto-Scott type.

Neutralising Condensers

These adjustments should be carried out with the lids on the screening boxes. Having found a stable adjustment, try increasing the reaction on a distant station, and then endeavour to find the adjustment of the neutralising condensers which permits maximum reaction. Also try different values of H.T. until you find the best combination.

I have tried two types of neutralising condensers. The first were those of the Peto-Scott make, as shown in the photographs, and were perfectly satisfactory. I then removed these in order to test out

two of the new pattern manufactured by Jackson Bros. The Jackson neutralising condensers are of the screw-down type, and with them I was able to obtain a very accurate and satisfactory adjustment. They can be easily employed in conjunction with the screening boxes if a slot is cut in the ebonite adjusting knob on the top of the condenser.

Battery Coupling

With a critical receiver of this type one often comes up against

the snag of battery coupling. Should any difficulty be found in obtaining perfect stability over the whole wave-band, the existence of a coupling effect should be suspected.

I strongly recommend the use of a large condenser between terminals H.T. +1 and H.T. — and close up to these terminals. I personally use a .1-mfd. Dubilier mica condenser of the type employed for resistance-capacity coupling. In one case I found that the use of such a condenser made an uncontrollable set perfectly stable.

WIRING INSTRUCTIONS.

Join terminal 2 on aerial coil base to terminal on first screening box, and thence to moving vanes of C_1 . Join fixed vanes of C_1 to terminal 1 on same base.

Join terminal 4 to length of flexible connected to aerial terminal on baseboard.

Join one side of first neutralising condenser to grid of V_1 , thence to terminal 1 on aerial coil base.

Join other side of neutralising condenser to 3 on second six-pin base.

Join terminal 2 on same base to screening box, thence to fixed vanes of C_2 .

Join terminal 5 to plate of V_1 valve holder.

Join terminal 1 on second six-pin base to moving vanes of C_2 .

Join terminal 4 to one side of '01 condenser, the other side of which goes to terminal on screening box.

Join one side of second neutralising condenser to grid of V_2 valve holder, and also to terminal 1 on second six-pin base.

Join other side of second neutralising condenser to 3 on third six-pin base.

Join terminal 5 to plate of V_2 valve holder. Join terminal 2 to screw on screening box, thence to fixed vanes of C_3 .

Join moving vanes of C_3 to one terminal of '0002 grid condenser, and also to terminal 1 on six-pin base.

Other side of '0002 condenser goes to grid of V_3 . Plate of V_3 goes to lower tag on H.F. choke and to '0003 fixed condenser.

Remaining terminal of '0003 fixed condenser is connected to fixed vanes of reaction condenser C_4 .

A 2-meg. grid leak is joined between grid terminal on V_3 valve holder and L.T. positive filament terminal on same.

Moving vanes of C_4 are taken underneath the baseboard at (d) to terminal 6 on third six-pin base.

H.T. + 1 terminal on baseboard is joined to B+ on R.C. 1, and then goes through the baseboard at (a) to terminal 4 on third six-pin base and terminal 4 on second six-pin base.

L.T. — is joined to H.T. —, to G.B. +, and to one L.S. terminal. A lead from L.T. — is also taken through the baseboard at (c), and goes to one connection on "on-off" switch. Other side of "on-off" switch goes to terminal on third screening box.

Screw on first screening box is joined to one side of variable resistance R_1 . Other side of R_1 goes through second screening box to one side of R_2 , and also underneath the baseboard at (b) to one side of R_3 .

Remaining side of R_2 is joined to negative filament socket of V_1 , and remaining side of R_3 is joined to negative filament socket of V_2 valve holder. Negative filament terminal on valve holder V_3 is joined to screw on screening box. Negative filament terminals of valve holders V_4 and V_5 are joined to common wire joining the three screening boxes, and which is joined to Earth.

L.T. + goes to remaining filament terminals on V_4 and V_5 , and also through the holes in the screening boxes to positive filament terminals on valve holders V_1 , V_2 and V_3 .

Join P on R.C. 1 to top tag on H.F. choke.

Join G on R.C. 1 to one side of '25 meg. resistance, other side of which goes to grid of V_4 . Join G.B. on R.C. 1 to G.B. — 1 terminal on baseboard.

Join P on R.C. 2 to plate of V_1 .

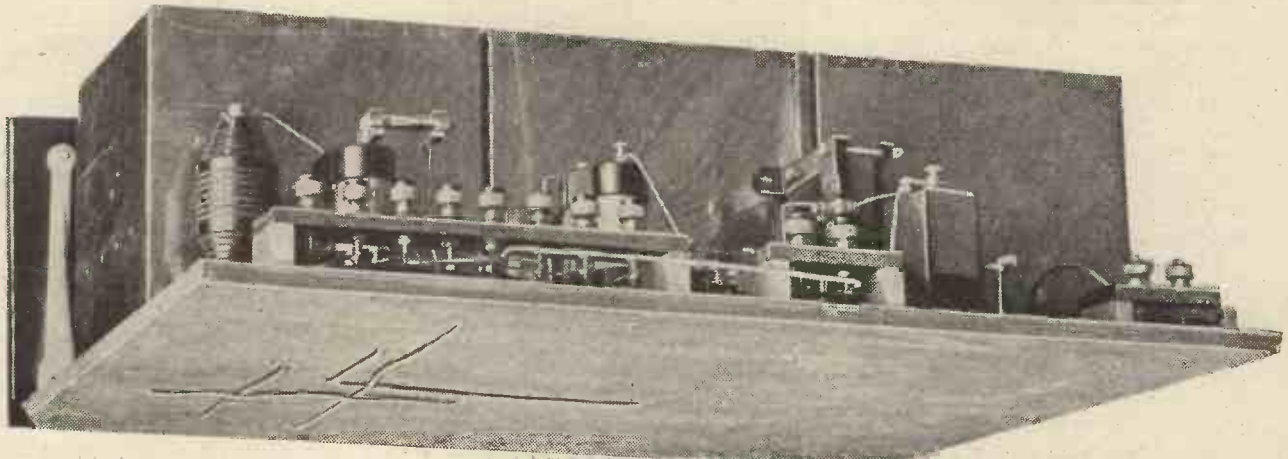
Join G on R.C. 2 to one side of second '25 meg. resistance, other side of which goes to grid of V_5 .

Join B+ on R.C. 2 to bottom tag on 20-henry choke and to H.T. + 2.

Join G.B. on R.C. 2 to G.B. — 2 terminal on baseboard.

Join plate of V_5 valve holder to top tag on 20-henry choke and to one terminal of 2-mfd. condenser.

Join remaining terminal of 2-mfd. condenser to remaining L.S. terminal.



Part of the filament wiring is carried out under the baseboard, as can be seen in the above illustration.

EMPIRE RADIO

The author of this article stresses the need for a short-wave broadcasting station in this country.

By a Correspondent.

A JOHANNESBURG reader of the WIRELESS CONSTRUCTOR, in the course of a long and interesting letter (which the Editor has kindly allowed me to see), voices the views of South African amateurs in connection with Empire Broadcasting.

"A point that is worthy of your best support," he writes, "is the establishment of a short-wave station in Britain. There has been a lot of talk, but nothing done.

"Nevertheless, from the national point of view we are worthy of endeavour in this respect. When the War was on, Britain made no mistake in her request for support of her arms, and large contingents from her Colonies went forward cheerfully, and then they were really good chaps, etc., etc. Now that the Colonies require a short-wave installation to get news and views, and incidentally her music, we have to whistle for it. Is it fair and just?"

Some Interesting Suggestions

"We have started a short-wave installation here without waste of time, although it has stopped temporarily, due to a certain amount of non-success. If we can do so, why not you?"

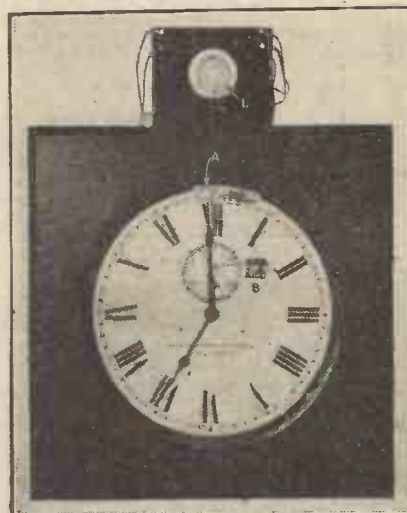
"One can hardly expect the B.B.C. to foot the bill, but since we import many thousands of pounds' worth of components (wireless) from the Old Country, and naturally get value for our money, surely they (the manufacturers) should support such a scheme, in order to foster their own wares? America has done this right along the line, but a Britisher once he gets a £1 sticks to it like glue, and refuses to speculate for an increase. America has led the way in wireless from the beginning, in circuits and in components, and it is about time that Britain bucked up and made a splash.

"The reason for mentioning that this country imports a large quantity yearly of British-made wireless parts, is that this point has never been given publicity to the smallest degree whenever the question of a short-wave station in Britain for her Colonies has been brought up. If the point has

never been thought of, such naturally passes my comprehension; but it is sent forward for British consumption through this letter.

"The same applies to you editors of wireless magazines. I am sure that your publications meet with general demand in all Colonies, and again, while we get value for our money, it is up to you to promote and aid in a financial way something more than you are doing. I do not suppose you would care for a boycott of your publications, your valves, your various wireless components, your different makes of sets; but if such did happen and you found British trade being ousted by foreign trade, then I am sure you would sit up and take notice. It seems to be the old saying, 'A bridge is never erected over the stream until someone is drowned.'

"Finally, I would ask that you give this subject your thoughtful consideration and help by taking the Colonial's point of view; by being more broad-minded with a view to increasing British trade and prestige, in which case you will naturally receive our full appreciation."



An automatic time chime used at W R N Y (New York). Everything is done automatically in the clock itself, which regularly transmits the hour.

Our South African obviously has definite ideas about wireless in the Old Country, but no doubt the news that the B.B.C. has decided to take

their "rightful part in the development of Empire broadcasting"—and this may be taken as an indication that some day we shall have the much-wanted short-wave Empire broadcasting—will cheer him up a good deal.

Urgent Need for Experiment

Our correspondent certainly makes a good point when he says that, apart from all other considerations, an Empire broadcaster would be excellent propaganda for the British radio trade in the Colonies, but the suggestion that editors of wireless publications should contribute to the cost of an Empire broadcaster is, to put it colloquially, "a bit thick." If our South African correspondent really believes in that suggestion, it must mean that South African editors are paid extraordinarily fine salaries!

But seriously—the extracts from this South African's letter are but mildly indicative of the feeling abroad, and especially in the various parts of the British Empire, in connection with an Empire broadcasting station, and it is only to be hoped that now the B.B.C. has definitely made up its mind to take a hand in the game it will not dilly-dally too long, but will start—even in the crudest experimental way—a series of short-wave Empire broadcasts.

Even if it is not immediately successful, the psychological effect on the Colonies will be well worth while. They will at least realise we are interested, and that we are trying.

Of course, the problems in connection with short-wave Empire broadcasting are numerous and difficult.

A Difficult Problem

The B.B.C. considers that the primary problem is one of reception, and not of transmission, and it is good news to hear that it is making elaborate plans for research in this direction during the next few months.

Even the most casual glance at this Empire broadcasting scheme will make it clear to the reader that the job is a difficult one, and that only by intensive effort and elaborate experimental work can anything worth while (in the practical sense) come of it.

But it will—for Mr. Marcuse, at any rate, has a happy knack of carrying through a job of work to a successful conclusion—and we feel sure the Dominions will not lag behind when it comes to getting on with the job at their end.

This Year at Olympia

by
The Editor

I WANT every reader of the WIRELESS CONSTRUCTOR, or rather everyone who can possibly do so, to visit this year's National Radio Exhibition at Olympia. There are several reasons for the request. First of all, it will be, without question, the *best* wireless exhibition we have had; secondly, it will probably be the most *comfortable* wireless exhibition, as the organisation has been considerably improved; and thirdly, really my main reason for asking you to go, the coming season is going to see such big advances in the art and practice of home construction that all who contemplate building their own sets should take the opportunity of examining at first hand the various new devices and components available.

It should not be imagined that the interest of this exhibition will be confined to the enthusiast alone. The show authorities, realising that many visitors like to bring their womenfolk, who are not necessarily interested in the technical side of radio, have thoughtfully made provision for matters of wider interest. For example, the Royal Air Force string band will play throughout the exhibition, and its music will be relayed through loud speakers over a dance floor which is situated in the gallery shown in the plan. This dance floor is quite a new feature in such an exhibition, and is intended to demonstrate one of the many applications of wireless.

Many New Things

The lighting schemes, too, have been well thought out and improved. In addition to the large electrolier which was used at the last show there are three tiers of lights in the centre of the roof, eight other similar electroliers, and on the whole the effect will be far more decorative than at any previous exhibition.

All of us have admired at times the many "effects" obtained in a broadcasting station. The British Broadcasting Corporation has therefore arranged a particularly interesting exhibit at the right-hand end of the

Every reader of the "Wireless Constructor" should visit this year's Wireless Exhibition.

gallery, where, on a complete island site, the visitor will find a replica of the control apparatus used at the 2 L O station. In addition, the B.B.C. will stage, on the lines of a "peep-show," reproductions of all of their broadcasting stations.

But it is, of course, in the exhibits themselves that the chief interest of our readers lies. I would make a shrewd guess that it will be the new valves which will draw the biggest crowds. The new shielded-grid valves which both the Marconi and the General Electric organisations will be exhibiting, enable huge improvements in high-frequency amplification

are also showing fruit, and several of the companies will be showing special valves in which the filaments are heated by alternating current obtained from the mains in place of the usual accumulator supply. Again, the many devices for dispensing with dry-cell or accumulator H.T. batteries and substituting "mains units" will be exhibited in full array, while a multiplicity of new and already standardised components will claim our attention.

How To See It

As a hardened and experienced exhibition visitor, I hope I may be forgiven for spending a few moments in giving a few hints on how to get the best out of a show such as this. Last year I took particular pains to observe the methods adopted by visitors to the Wireless Exhibition, and I soon found, as in previous years, that more than half the visitors miss some of the most interesting items of the exhibition, not through lack of time, but through lack of any plan in their strolling. If you adopt the following method you save a great deal of time spent in fruitless searching.

On entering the exhibition turn to the right and walk round the outer circle, briefly inspecting the exhibits at all the stands *on your right*. Do not stop long at any one stand—keep this for later—but make a note on a piece of paper or the back of your catalogue of the stands which interest you most. Most important of all, do not dodge from one side of the gangway to the other, as this is a certain method of missing stands and of giving yourself a great deal of unnecessary trouble.

Having made the round of the outer ring, go round a second time, examining the exhibits *on the left*. Repeat this process on the inner ring, and then cover the radiating aisles.

When you have been round once you can sit down, note the stands you have marked for special attention, and go back to them with comfort.

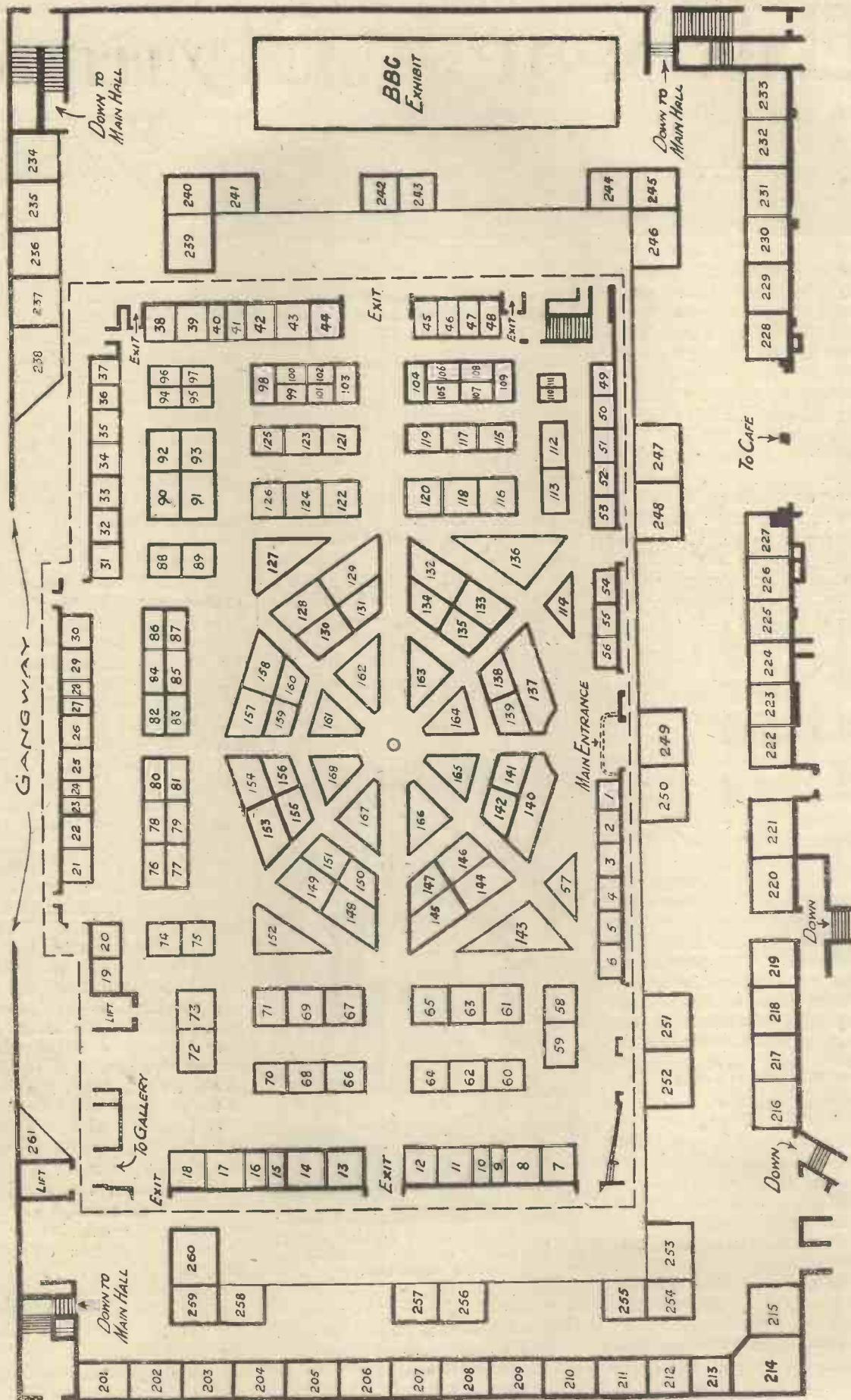


The winning design in the competition recently held for a poster advertising the Radio Exhibition.

to be effected. Details of these valves are given in another part of this issue.

The constant endeavours of valve manufacturers to enable the listener to dispense with messy accumulators

TAKE THIS PLAN WITH YOU!



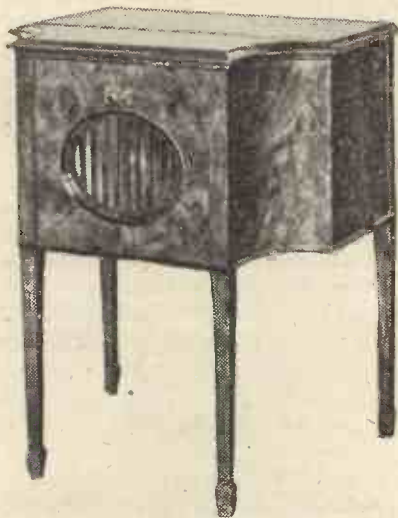
NOTE: THE PLAN OF THE MAIN HALL IS SHOWN INSIDE THE DOTTED LINE; THE PLAN OF THE GALLERY WHICH SURROUNDS IT, IS DRAWN TO A SLIGHTLY LARGER SCALE.

WHAT TO SEE AT THE EXHIBITION

A brief survey of some of the various exhibits to be seen at Olympia

Amalgamated Press, Ltd. Stands Nos. 74 and 75.

Readers should make a point of visiting us at this stand, where an array of completed sets (described in the WIRELESS CONSTRUCTOR, "Modern Wireless" and "Popular Wireless") will be on view. Readers and other visitors are warmly invited to come along to these stands and to examine for themselves the original models of



The C.A.V. Three-Valve Baby Grand receiver.

these most interesting receivers. Meet your friends at the "A.P." stands.

Atkinson C. Creswick. Stand No. 55.

A series of receivers is on view here, in many of which full-size loud speakers are incorporated. Unusual ranges are claimed, while both high and low wave-lengths are covered.

Batteries, Ltd. Stand No. 53.

"Foolproof" "NIFE" L.T. batteries are being starred on this stand, all capacities being available. Extremely long life is claimed for them, while, as in the case of the H.T. accumulators shown by the same firm, no "self-discharge" is a strong point. For the H.T. batteries a "last-a-lifetime" claim is made.

Bedford Electrical and Radio Co. Stand No. 52.

It is impossible, in the space at our disposal, to give a full list of the

things to be seen at this stand, so we must be content with saying that all sorts of "Peerless" components are being shown, together with a

THE WIRELESS EXHIBITION.

AS will have been seen by the foregoing pages, the exhibition this year will be one of great interest, and should certainly be visited by all interested in radio, whether merely as listeners, home constructors, or experimenters. Many of the most recent developments in components and sets will be on view for the first time, and unless a visit to Olympia is made it is impossible for the constructor to make a full choice from the various parts available for his use. Go and see the things you think of using, and you will better be able to pick and choose those that suit you best.

There are many exhibitors, and for the guidance of the prospective visitor the accompanying brief symposium of the majority of the firms and their chief exhibits has been prepared. Firms will be found in alphabetical order and not in the order in which the stands appear.

series of complete receivers available to the public at popular prices.

Belling & Lee, Ltd. Stand No. 207.

As usual, the stand belonging to this firm is full of interesting "gadgets" in the form of terminals, plugs, and sockets, connectors, dial indicators, etc.

The Benjamin Electric Co., Ltd. Stand No. 79.

Valve holders, coil holders, and many of the hundred and one little components required by the constructor are shown on this stand, together with a range of Benjamin Short-Path valves.

Sydney S. Bird & Sons. Stand No. 121.

The chief exhibits here are the thumb-drive and "Panalong" gang condensers. These are arranged to be mounted parallel to the panel so that the control is obtained by means of a disc projecting partly through the panel in much the same way as the condenser used by Mr. Johnson-Randall in his five-valve set published in this issue.

The Bowyer-Lowe Co., Ltd. Stand No. 124.

Among the new productions on view for the first time is a new

wavemeter covering from 150-2,000 metres, L.F. transformers, and L.F. chokes, screening boxes, switches, and other well-made and useful components.

Brandes, Ltd. Stand No. 161.

The same lines as were shown last year are on view, with the addition of the new "Brandeset" IIIA. A new method of distribution has been arranged by this firm, and a number of authorised dealers of Brandes' goods have been appointed.

British Ebonite Co., Ltd. Stand No. 76.

A full range of ebonite and ebonite components is being shown, various types and grades being laid out in an interesting and instructive exhibit.

The British Thomson-Houston Co., Ltd. Stands Nos. 138 and 139.

Chief among this firm's exhibits are the various valves and the loud-speaker equipments to be seen. A full range of valves is being shown, with many of the best-known components and loud speakers, etc.

Brown, S. G., Ltd. Stand No. 122.

A complete and fully representative display of loud speakers and instruments is arranged on Stand No. 122.



The Mullard "Pure Music" Speaker, Model D.

What to see at the Exhibition—continued

Foremost among the new models is the Sphinx speaker, while the new gramophone electrical pick-up should certainly be examined.

Brown Bros., Ltd. Stands Nos. 25 and 26.

This well-known wholesale house is providing a fascinating display of goods, complete sets and components of all types being in evidence.

B.S.A. Radio, Ltd. Stands Nos. 10 and 64.

Besides complete sets, of which this firm is showing a full range, specimens of their valves and the famous "Kone" loud speakers are also to be seen.

A. F. Bulgin & Co., Ltd. Stand No. 236.

Among the many things on view at this stand are a great number of new lines well worth the attention of the visitor. These cover a range of battery switches, L.F. chokes, jacks, grid bias battery clips, spring connectors, and a number of the little odds and ends that are so necessary for the completion of a really up-to-date receiver.

Burndept Wireless, Ltd. Stand No. 127.

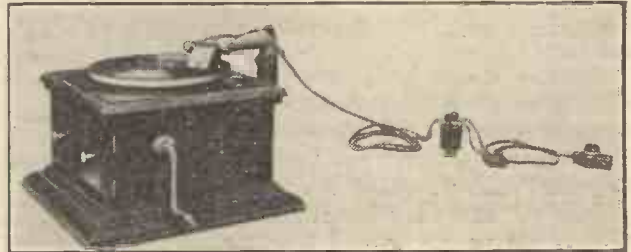
The chief exhibits on this stand among the sets are two, three, four and five-valve receivers, the famous Ethodyne Super Het, and a special three-valve receiver for the ultra-short waves. This latter receiver covers from 12-100 metres, and should command a ready sale among enthusiastic listeners. Various components and battery chargers are



A centre-tapped reactive anode unit by R.I.-Varley, Ltd.

also on view, while the Etho-Cone, a new cone loud speaker, also makes its appearance on this stand. Last but not least come the famous

The Igranio-Pacent Phonovox fitted on a gramophone and complete with plug adaptor and volume control.



Burndept super valves, of which a full range is being staged.

Burne-Jones & Co., Ltd. Stand No. 123.

On this stand can be seen some of the finest examples of recent British design, all types of components being on view, from split-pin coils, valve holders, switches, etc., to the latest copper screening boxes holding complete H.F. stages.

Cahill & Co., Ltd. Stand No. 101.

The "Pelican" range of receivers form the main exhibit of Messrs. Cahill & Co., all types of receiver being shown, the whole forming a very attractive exhibit.

The Camden Engineering Co., Ltd. Stand No. 96.

Die-cast variable condensers, of single-, dual-, and triple-gang type; are the chief exhibit here, though metal screening boxes, panels, and slow-motion dials form interesting companions to this exhibit. The variable condensers are obtainable in either straight-line frequency or logarithmic mid-line models.

Carrington Manufacturing Co., Ltd., Stand No. 12.

A very large range of radio cabinets is on show here, and a special display of cabinets for circuits described in the wireless periodicals has been arranged. A new cabinet—the Carlton—is worth the attention of visitors, as it not only provides accommodation for set, batteries, or eliminator, but also has a flex ready for any loud-speaker unit.

Celestion Radio Co. Stand No. 151.

Famous for their loud speakers, this firm have gone "one better" and are showing a super model speaker complete in oak or other type Jacobean cabinet. It is a fair-sized instrument, and forms a useful piece

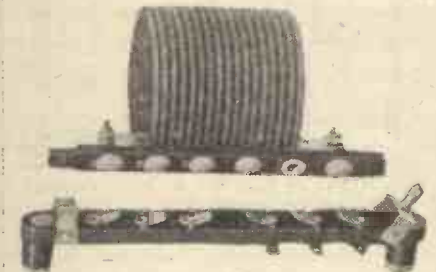
of furniture. The tone of this new speaker is amazingly good, and it is undoubtedly an advance on the older models.

City and General Radio Co., Ltd. Stand No. 202.

A novel feature is arranged for this stand in the exhibition of sets of parts for specific sets made popular and introduced by the various wireless publications.

H. Clarke & Co. (Manchester), Ltd. Stand No. 83.

The main exhibits here are the "Atlas" H.T. battery eliminators (a new addition to this firm's goods), and a demonstration model of the "Neutrofour" receiver, a four-valve set using 1 H.F. stage, Det., and 2 L.F.



The new clip-in Formo inductance.

Climax Radio Electric, Ltd. Stands Nos. 83 and 89.

In addition to the well-known Climax products, there are several new and interesting Climax lines to be seen at the above stands.

Of these new products the most outstanding are the H.T. supply units. The D.C. model with ten tapings is no larger than an ordinary valve box, and can be easily fitted into the cabinet of a receiver in place of the H.T. battery.

Another interesting departure is a series of mains receivers, which work entirely from the electric supply of a house.

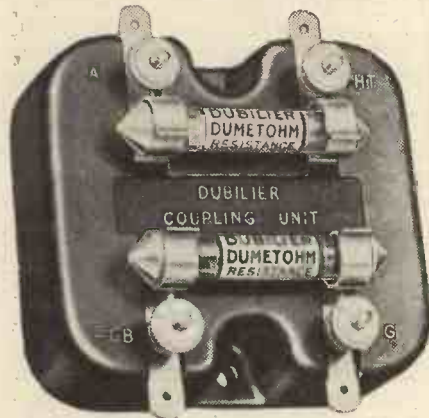
E. K. Cole, Ltd. Stand No. 11.

Well known for its H.T. battery eliminators this firm is now proceeding further and supplying complete

What to see at the Exhibition—continued

sets for use direct off the electric-light mains.

Among the new H.T. units must be mentioned a compact eliminator for direct-current mains measuring only 3 in. by 2 in. diameter, which can be



A new R.C.C. unit with interchangeable resistances.

plugged direct into the electric light socket and which then supplies H.T. suitable for one-, two-, or three-valve sets.

The Colonial Technical Press, Ltd. Stand No. 232.

Upwards of sixty radio periodicals from all countries will be shown on this firm's stand, for which journals the Colonial Technical Press are agents in Great Britain. The enthusiast will be able to have his fill of radio literature at Stand No. 232.

Cossor, A. C., Ltd. Stands Nos. 86 and 87.

Besides a full range of Cossor three-electrode receiving valves, this enterprising firm is showing a series of new valves designed to operate direct from the A.C. lighting mains.



The "Lotus" remote control relay.

D. A. R., Ltd. Stand No. 104.

We have already given a full account of our experiences with the new "rejuvenating" fluid for sulphated accumulators, and readers will

now be able to see some of the results for themselves. Many interesting examples of the "before and after" type can be seen at Stand No. 104, where the D. A. R. people are ready to answer all questions and demonstrate as far as possible how efficacious this preparation is.

Bertram Day & Co., Ltd. Stand No. 51.

This well-known advertising firm are showing specimens of many advertisements, catalogues, booklets, folders, etc., and examples of complete radio publicity campaigns are open to the inspection of all interested.

Dubilier Condenser Co., Ltd. Stand No. 162.

Besides showing a wide range of condensers and resistances, the Dubilier Condenser Co. are introducing to the public a new R.C. unit, with interchangeable anode and grid resistances, some new fixed resistors, a Toroid H.F. transformer, and a series of H.T. supply units for use with A.C. or D.C. mains.

Eagle Engineering Co., Ltd. Stand No. 58.

Many new "lines" are to be seen here, chief among which is a series of sets, ranging from the "Junior" series of two and three-valve receivers to the portable five-valve "Daventry" sets, and a super-het.

Edison-Swan Electric Co., Ltd. Stands Nos. 133 and 146.

A full range of valves is the chief exhibit on view here, though a goodly array of other things may also be seen. The famous "Threesome" is being exhibited, together with R.C. units, H.T. accumulators, variable condensers, and many other of the firm's well-known lines.

Electron Co., Ltd. Stand No. 141.

A most interesting display of the famous Six-Sixty valves is to be seen here, and readers should certainly spare a few minutes at this stand.

Excel Radio Components. Stand No. 221. (Exhibiting on Stand of London Electric Stores Co.)

The chief exhibit provided by the Excel people is their "oscillating" crystal unit, a permanent detector for which wonderful results are claimed.

Express Radio & Electrical Co., Ltd. Stand No. 118.

Three receivers form the main exhibits here. They consist of the Empress Classic Four (1-v-2), a

neutralised receiver having a wavelength range of 150-3,000 metres, a change-over switch being all the control needed for a change of wavelength band; the Concert Four (1-v-2), a single-dial receiver, and the Concert Three (0-v-2), a powerful local-station set.

Falk Stadelmann & Co., Ltd. Stand No. 147.

A full range of Efesca components and Efescaphone wireless sets is being shown. Among the new lines of particular interest are a number of sets specially designed for simplicity in tuning.

Ferranti, Ltd. Stand No. 142.

In addition to the well-known L.F. transformers manufactured by this firm is being shown a comprehensive range of output transformers, chokes, loud-speaker attachments, and a complete line of radio ammeters and voltmeters.

The Formo Co. Stand No. 81.

A whole host of various items are being shown by this enterprising firm, and the stand will well repay a visit. A new type of log condenser is worth consideration, while an illuminated vernier dial is also an interesting feature.



The latest in L.F. transformers—the R.I.-Varley "straight-line" model.

A. W. Gamage, Ltd. Stand No. 89.

A full range of wireless apparatus, including complete receivers and component parts, is being shown by this famous store. Everything for the constructor, listener, or experimenter will be on view.

What to see at the Exhibition—continued

Gambrell Bros., Ltd. Stand No. 66.

Low-loss coils, centre-tapped coils, a special centre-tapped coil holder, neutro-vernier condensers, neutro-vernier indicating dials, wavemeters, buzzers, etc., are among the many components shown by Messrs. Gambrell Bros., Ltd.

Garnett, Whiteley & Co., Ltd. Stand No. 93.

A full range of components may be seen here, the chief one of interest being the new remote-control unit, which will be demonstrated on a receiver with four loud speakers.

General Electric Co., Ltd. Stands Nos. 15 and 140.

A complete series of receiving valves is on view, including the new 610 type, the K.L.1 and K.H.1 valves for indirect heating, and the latest H.F. valve with shielded grid—the S.625. Readers should not miss a visit to this stand.

Gordon, F. J., & Co., Ltd. Stand No. 28.

The main exhibit here is the "Electone" automatic programme selector, a device which enables the listener to select the evening's programme ahead, and which ensures his receiving the desired items, cutting out the unwanted sections.

Graham Amplion, Ltd. Stand No. 137.

Many new types of Amplion loud speakers are to be seen on the Graham stand, including the A.C.1,



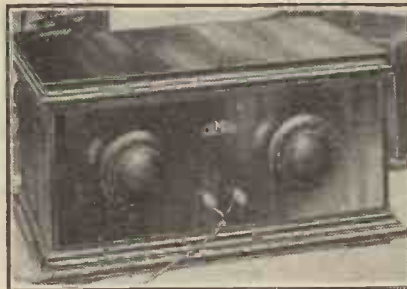
A centre-tapped inductance for plug-in coil-holders.

an open cone for hanging on the picture-rail or standing on the table, as desired; A.C.4, a similar model, but contained in an oak cabinet.

Cone assembly units for incorporation in complete receivers and the famous horn and "cabinette" types are also in evidence.

Halcyon Wireless Co. Stand No. 168.

Constructed of first-class components, the new Halcyon five-valver



The Climax three-valve mains receiver.

(the chief exhibit) requires no outside aerial or earth, and has a Daventry range of 400-500 miles with a local range of 40-50 miles on the loud speaker.

Hoare & Tagels, Ltd. Stand No. 14.

A full range of models of this popular receiver (the Rolls Portable) are on show, the outfits incorporating many improvements.

Hobday Bros., Ltd. Stands Nos. 19 and 20.

As would be expected, this firm is showing a bewildering array of radio goods of all descriptions, coils, coil holders, variable and fixed condensers, valves, sets—everything that is likely to be needed by the constructor or listener can be seen on Stands Nos. 19 and 20.

Houghton, Butcher, Ltd. Stand No. 61.

Well known as wireless factors, this firm is providing a wonderful display of apparatus from screws and terminals to complete super-hets. Everything for the radio enthusiast is on view, and all types of components are represented.

Igranic Electric Co., Ltd. Stands Nos. 148 and 149.

A full display of all types of radio equipment is being shown on this stand, foremost among the accessories being power transformers for H.T. supply units, smoothing chokes for the same type of unit, potentiometers, and

a series of twin-, triple-, and quadruple-gang condensers.

Jackson Bros. Stand No. 85.

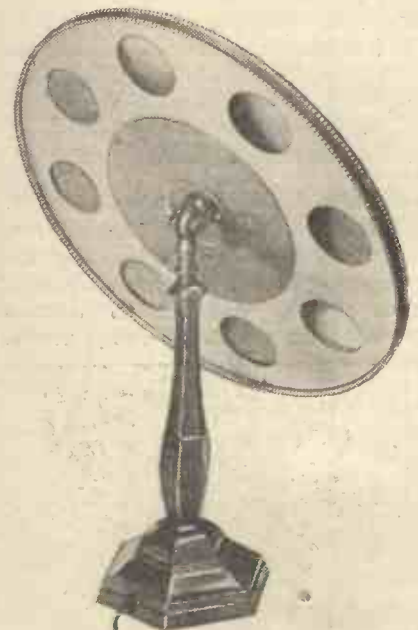
Various types of well-made variable condensers form this firm's exhibit, the ranges being well covered from ordinary square law, S.L.F., etc., condensers to the triple-gang models and a newly brought-out neutrodyne condenser.

The Junit Mfg. Co., Ltd. Stand No. 230.

The famous self-soldering wire manufactured by this firm is one of a trio of interesting exhibits on show at their stand at Olympia. The other two main features are the "Peer-point" soldering iron and a new solder known as "Elephant" solder, which is said to be much stronger than ordinary solder, and which will flow easily when a fairly low temperature iron is employed.

P. A. Lamplugh, Ltd. Stand No. 117.

Many new and original lines are to be seen here, one of particular interest being the "Quality" II loud-speaker receiver. Another item of interest is the "Panel Plate Tuner



The G.E.C. cone loud speaker.

Unit," a novel scheme consisting of an engraved metal panel on which are mounted a slow-motion condenser, a calibrated inductance covering from 200-2,000 metres, with a switch for changing from low to high wavelengths.

What to see at the Exhibition—continued

Lectro-Linx, Ltd. Stand No. 227.

All kinds of Clix terminals, sockets, tags, etc., are shown on this stand. A new feature is the multi-plug, which forms a foolproof method of connecting H.T. and L.T. batteries to a set.

Lissen, Ltd. Stands Nos. 158 and 160.

A full range of completely manufactured loud speakers of both the horn and new disc types is among the chief exhibits here, as well as



The M.H. five-valve portable receiver.

an electrical pick-up device for attachment to any gramophone, turning it, when used in conjunction with an ordinary low-frequency amplifier, into an electrically reproducing gramophone.



The Ormond R.C.C. unit.

In addition is being shown a very light pair of headphones (this is a new line), new coil holders, a new type of variable condenser, plugs and sockets, and various additions to the Lissen range of H.T. batteries.

The London Electric Wire Co., and Smiths, Ltd. Stand No. 113.

Among the famous lines for which the "Lewcos" people are noted, visitors to this stand should make a point of examining the new coils and coil units on show. These include six-pin binocular coils, the dual screened coil units, centre-tapped coils, and sundry six-pin coils and bases.

Marconiphone. Stands Nos. 128 to 135.

Marconiphone are at this year's Radio Exhibition staging a larger and more interesting exhibit than ever before.

The stands are in two large blocks, comprising Nos. 128-131 and 132-135. Features are the elimination of batteries entirely on Models "22" and "32," where alternating or direct current is available; the new and powerful super-heterodyne model "82"; constructors' sets, three and four-valve, which can be operated entirely from the mains; all-power units and H.T. units, including very cheap models D.C.3 and A.C.3 for small receivers; new Marconi Economy valves; indirectly heated cathode K valves, and the new Marconi screened four-electrode valve S.625.

L. McMichael, Ltd. Stand No. 120.

The famous "Dimic Three" receiver, which appeared last year, is again being shown among other things, but with many internal improvements.

C. D. Melhuish. Stand No. 231.

A three-speed vernier dial is one of the most interesting exhibits on this stand, ratios of up to 500 to 1 being obtainable.

Metro-Vick Supplies, Ltd. Stands Nos. 155 and 156.

Ranges of Cosmos Short-Path valves, Cosmos sets and components are on view, and form an attractive array of well-made apparatus.

Among the new valves is a series for operation from A.C. mains, with special adaptors so that they can be used in any set without alteration of the wiring.

M. P. A. Wireless. Stand No. 57.

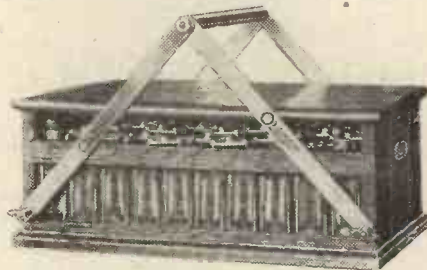
A complete new range of loud speakers is the chief attraction of this exhibit, though the well-known "transportable" sets are also well in evidence.

The Mullard Wireless Service Co., Ltd. Stands Nos. 44, 164, 165, and 166.

Each of these stands will be of vital interest to the radio public,

inasmuch as they will reveal many interesting developments in valve construction, wireless accessories, and speakers.

The exhibits comprise a complete series of P.M. valves covering every



A 60-volt H.T. accumulator marketed by the Oldham Acc. Co.

possible operation for 2-volt, 4-volt and 6-volt L.T. supplies. This P.M. series has new features that will prove of intense interest to all valve users.

Two models of the Mullard Pure Music Speaker are being shown, while the P.M. resistance-capacity coupling unit will appeal to those who favour resistance-capacity circuits.

The New London Electron Works, Ltd. Stand No. 70.

Famous for its Electron wire, this firm is showing in addition to that wire a special extension wire, an earth mat, strip aerial, and two types of loud speaker, one of the horn variety and a cabinet model.

Oldham & Son, Ltd. Stand No. 71.

As would be expected, this stand is devoted solely to accumulator exhibits, all types and classes of secondary batteries being on view.

Ormond Engineering Co., Ltd. Stands Nos. 72 and 73.

Well known for its slow-motion variable condensers and dials, this firm is now offering a new R.C.C. unit which has been produced for



The "Peerless" three-valver made by the Bedford Electrical and Radio Co.

What to see at the Exhibition—continued

valves of the high "mu" type. Fixed resistors are also being shown, and a new logarithmic condenser, available in three capacities.



The "Ekco" D.C. H.T. unit.

Peto-Scott, Ltd. Stand No. 163.

The exhibits on this stand include a wide range of entirely new radio receivers of up-to-date design, while there is also a complete range of the well-known Keystone components and Copex screened coils and screening devices.

Portable Utilities Co., Ltd. Stand No. 94.

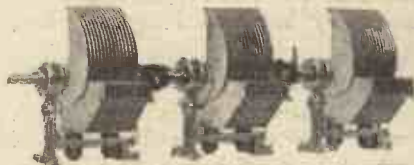
This firm has many new lines on view, and the stand is well worth a visit.

Precision Screw Co., Ltd. Stand No. (Unaltered)

The exhibit on this stand consists mainly of inductances and formers suitable for all purposes. In addition, a special set of five short-wave coils is on view, and also a new R.F. choke of novel design so that three different values are obtainable.

Pye & Co. Stand No. 136.

Series of chokes and L.F. transformers for which this Cambridge firm is famous take their place beside



The new Formo gang control with universal joints.

three portable receivers on Stand No. 136, and amateur constructors should make a point of visiting this section of the exhibition.

Radi-Arc Electrical Co. (1927). Stand No. 3.

The chief exhibit here is the new "Liberty" two-stage R.C. coupled unit. This forms a neat little unit at an attractive price, and is for incorporation in any kind of receiver.

Redfern's Rubber Works. Stand No. 84.
The famous "Ebonart" radio

panels will form the premier exhibit on Stand No. 84, while next in order of importance is the coil former, which is specially designed to give maximum efficiency for single-layer windings.

R. I.-Varley. Stands Nos. 5 and 143.

The outstanding exhibit shown by this go-ahead firm is a receiver designed for Dr. Robinson's new double-plate H.F. valve which does away with the need for neutralisation—it is self-neutralising. The set shown is known as the Interdyne, and has five valves. It is claimed that results equal to those from a good eight-valve set are obtained with this new system.

Siemens Bros. & Co., Ltd. Stand No. 150.

Siemens Brothers & Co., Ltd., exhibit on Stand No. 150 concerns



The R.I.-Varley Interdyne five-valver.

principally primary batteries for H.T., L.T., and grid bias purposes.

The H.T. dry battery is still the most popular form of H.T. current supply used by the general public, and therefore a considerable portion of the exhibit is devoted to this form of battery.

Prominent among the H.T. batteries are the new competitive types at low prices, of which the "Power" batteries are worthy of special attention from those who prefer large-capacity batteries but have not so far used this type owing to the somewhat high cost.

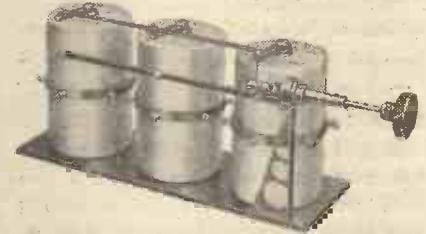
A. J. Stevens & Co., Ltd. Stands Nos. 27 and 159.

Two new lines are being shown by A. J. S., Ltd., namely, a cone loud speaker and a two-station portable receiver. Other exhibits include two-, three-, five-, and seven-valve receivers which are already well known on the market and need no introduction.

Sylvex, Ltd. Stand No. 223.

"Sylverex" and "Reactone" crystals, permanent detectors, variable condensers, inductance coils, etc.,

are being shown on Stand No. 228, while an interesting and unusual exhibit is a case showing all the



A "Lewcos" three-stage gang screened inductance—a novel feature in tuners.

ingredients used in the manufacture of synthetic crystals of the galena type.

The Telegraph Condenser Co., Ltd. Stand No. 115.

The exhibits of this well-known firm will naturally be confined to fixed condensers, but a full range of these will be on view. Some complete A.C. and D.C. eliminators will also be in evidence.

Tungstone Accumulator Co. Ltd. Stand No. 98.

A wide range of batteries is to be seen here, with H.T. models varying from 12 to 96 volts. These have an actual capacity of 3 amp. hours. This stand is of vital interest to all valve-set owners.

C. A. Vandervell, Ltd. Stands Nos. 157 and 212.

Among the new lines well worth attention at these stands are the two complete sets, the three-valve portable receiver and the three-valve Baby Grand.

The latter is a very handsome piece of work, and is built on novel lines.



The Bowyer-Lowe neutralising condenser.

There will also be seen a four- and a five-valve set, the latter being designed for frame-aerial reception.

Walker Brothers. Stand No. 99.

It is only natural to find on this stand an extreme range of all wooden

(Continued on page 442.)

The "TWO-CIRCUIT" SINGLE VALVER



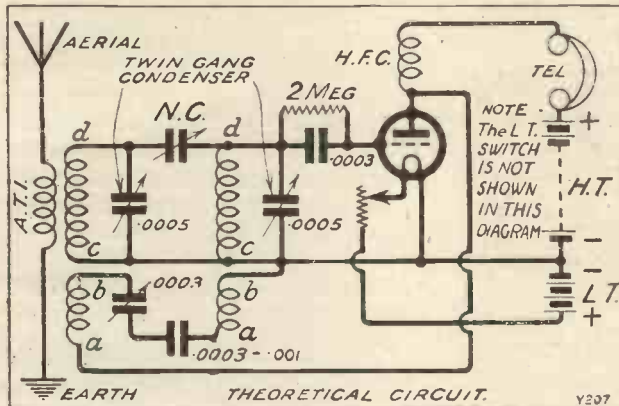
A selective receiver designed for those who are unable to cut out their local or 5 GB, and to pick up other transmissions. Ease of control is a feature of the set, and it is inexpensive to build and maintain.

Designed and described by
A. S. CLARK.

SELECTIVITY is greatly in demand nowadays, either to cut out a powerful local station or to separate two more distant stations. Many enthusiasts, however, look

for a "semi-aperiodic" coil tightly coupled to a tuned circuit. This tuned circuit is in its turn loosely coupled to another tuned circuit, which is connected across the grid

and filament of the valve. The coupling between the two coils is not magnetic, but is effected by means of a small capacity connected between one end of each coil. The other ends of the two tuned coils are directly connected.



A novel circuit is employed in this receiver, enabling a high degree of selectivity to be obtained.

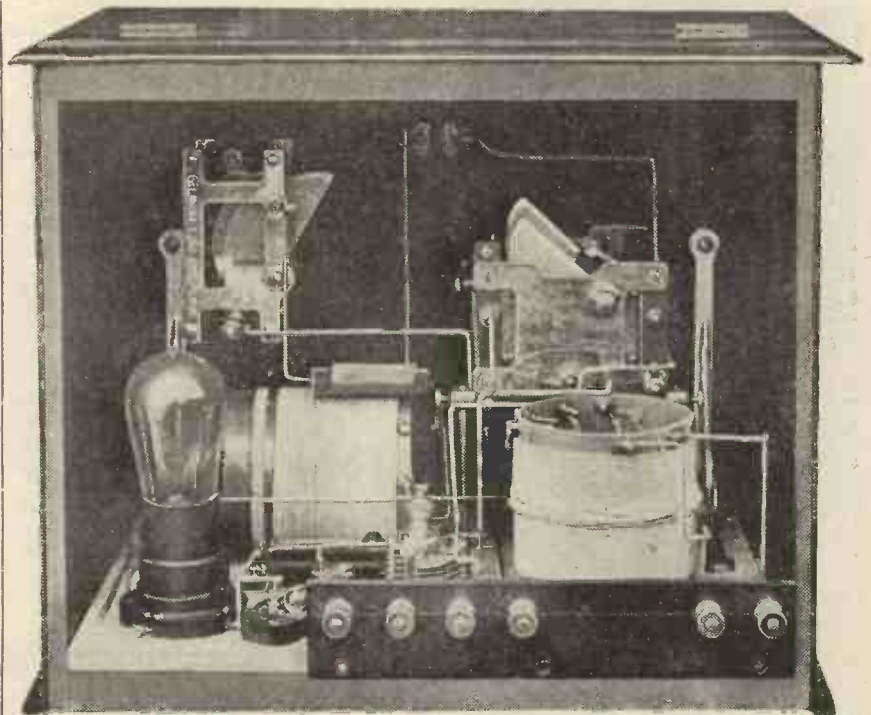
Split Reaction

The chief point of interest in the set, however, is that these tuned circuits instead of being independently tuned are adjusted at the same time by means of a "twin-gang" condenser. It is necessary, therefore, that the two coils should be as nearly identical in winding and distributed capacity as possible. In this connection it is interesting to note the arrangement of the reaction winding. This is split into two

askance at the number of valves and multiplicity of controls employed in most sets with much claim to selectivity. To many, the set to be described in the following article will have a great appeal, since not only is it a single-valve receiver, but only two variable controls have to be manipulated.

On looking at the photograph of the front of the panel it is immediately noticed how simple the set appears. The normal number of controls for a single-valve set are employed, namely, two variable condensers, one for tuning and the other for reaction control. The only other components on the panel are the on-and-off switch for the filament, and the telephone terminals. The set is just as easy to operate as the majority of single-valve sets, no extra skill being required because of the extra selectivity.

Although the circuit diagram may appear rather complicated at first sight, when it is analysed it will be found to consist of a fairly straightforward arrangement. The aerial



In this photograph the back of the cabinet is removed, and a good general view of the interior is obtained.

The Two-Circuit Single Valver—continued

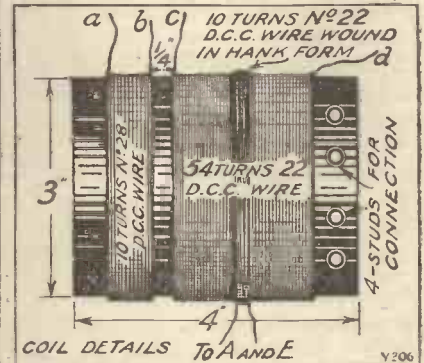
COMPONENTS REQUIRED.

Ebonite panel, 12 in. × 10 in. × $\frac{3}{16}$ in. (Radion.)
 Cabinet for same with 8-in. baseboard. (Artercraft.)
 2 panel brackets. (Camco.)
 Terminal strip, 8 in. × $1\frac{1}{2}$ in. × $\frac{1}{4}$ in.
 2 4-in. dials. (Igranic.)
 2 ebonite terminals marked 'Phones. (Belling Lee.)
 L.T. switch. (Igranic, Lissen, Lotus, etc.)
 6 ordinary terminals.
 C005 twin-gang condenser. (Ormond.)
 C005 variable condenser. (Cydon.)
 2 pieces of Pirtoid tubing, 3 in. diameter and 4 in. long. (Atlas.)
 $\frac{1}{2}$ lb. 22 D.C.C. wire.
 Quantity of 28 D.C.C. wire.
 10 contact studs.
 C003 fixed condenser with grid-leak clips. (Dubilier, Lissen, etc.)
 2-megohm grid leak. (Lissen, Dubilier, etc.)
 Neutralising condenser. (Peto-Scott.)
 C003 fixed condenser. (Dubilier, Lissen, etc.)
 H.F. choke. (Lissen, R.I.-Varley, etc.)
 Variable resistor. (Magnum.)
 Valve holder. (Lotus.)
 Glazite, wire, screws, etc.

halves, one half being coupled to each tuned coil so as to keep the balancing correct. The damping of the aerial introduced into the first coil through the aerial winding is near enough balanced by the damping of the valve which is connected across the second coil.

Ordinary "Reinartz" reaction control is employed. A fixed condenser is, however, connected in series with the variable reaction condenser so as to make the control as gradual as possible, and also to prevent damage to the valve should the variable condenser become faulty and short. A variable resistor of the baseboard-mounting type is employed for regulating the filament current for different valves. The coupling between the two tuned coils is arranged to be capacitive only, and therefore they are placed so that their fields are at right angles. The reaction condenser is connected in between the two halves, thus making any coupling capacitive.

The set is housed in the usual type of cabinet with upright panel. In order to keep the panel as clear as possible all the terminals (with the



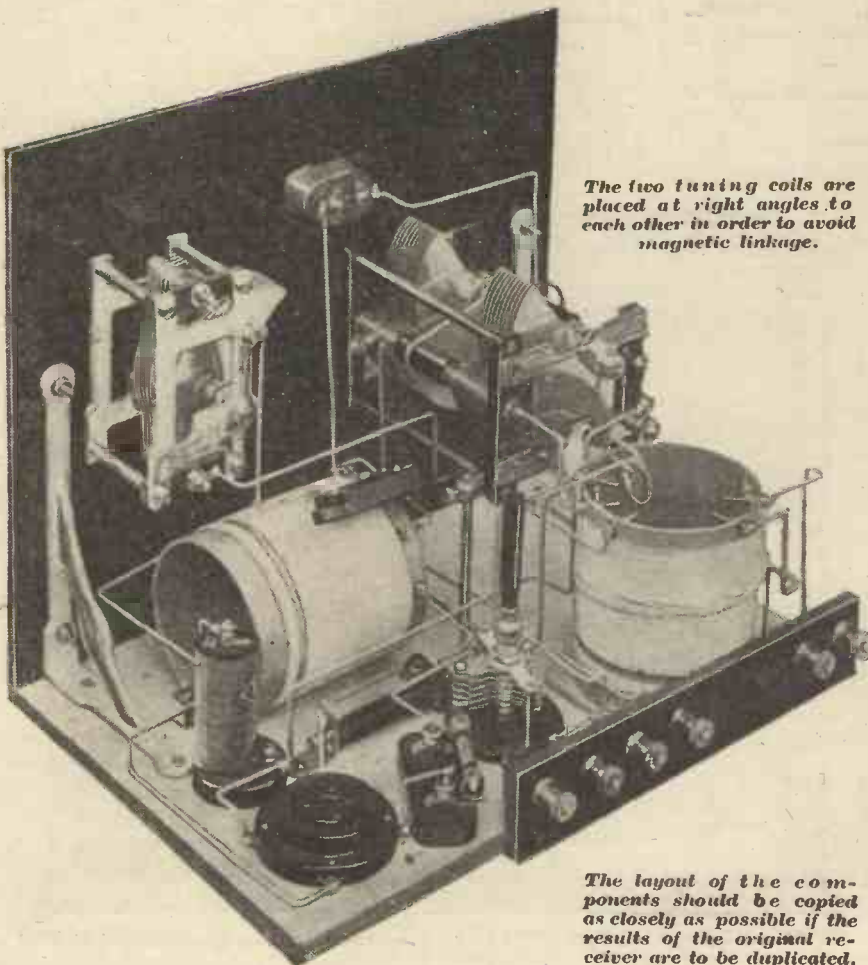
exception of the two for telephones) are mounted on a strip of ebonite at the back of the cabinet. Thus, the only components on the front of the set are the two variable condensers, the on-and-off switch, and the two terminals already mentioned. The size of cabinet used and the size of panel may at first seem rather large for a single-valve receiver, but on inspecting the photographs of the back of the set it will immediately be apparent that there is very little room to spare. The two coils are mounted as far apart as possible and are also arranged at right angles to one another. This is to keep the magnetic coupling as small as possible.

Winding the Coils

A complete list of all the components required to build this set will be found in another part of the article. The actual makes specified need not necessarily be adhered to, since any good parts should give just as good results. However, when substituting other components care must be taken to make sure that there is sufficient room in the cabinet to house them without interfering with the layout or fouling other components.

The first thing to do is to wind the two coils. Full details of these are given in a diagram.

Drill two small holes about $\frac{3}{8}$ in. from one end and secure the end of the 22-gauge wire by threading through these so that the end is inside the coil former. Now wind on as closely as possible 54 turns of the wire, securing the end of the winding in the same way as the beginning. About $\frac{1}{8}$ in. further along the former



The two tuning coils are placed at right angles to each other in order to avoid magnetic linkage.

The layout of the components should be copied as closely as possible if the results of the original receiver are to be duplicated.

The Two-Circuit Single Valver—continued

drill two more small holes and secure the end of the smaller gauge wire in the manner just indicated. Ten turns of this wire have to be wound on close together, and care must be taken to wind them in the same direction as the first coil. The end of the winding is secured again by twisting through two small holes and taking through to the inside of the former. Now wind 10 turns of the larger wire round the middle of the larger winding in hank fashion, securing the ends by twisting them together.

Fixing the Tappings

Round the end opposite the reaction winding (which is the smaller) drill six holes. Four of these should be together and the other two on the opposite side of the former. Contact studs similar to those used for panel switches are put into these holes with their heads on the outside. The ends of the windings are connected to these studs by being clamped between two washers with a nut. The two by themselves are connected to the two ends of the hank-wound coil.

The order of connecting the other four ends can be found by noting the lettering at the ends of the windings on the coil diagram, and comparing them with the letters on the coil studs on the wiring diagram.

This completes the first coil, shown as L_1 . The second coil, L_2 , must be made identically, with the exception of the hank winding on the outside of the larger winding. This has to be omitted completely, together with the two contact studs to which the ends are connected. When the two



A simple panel appearance and case of operation characterise this set.

coils are thus completed, file the heads of the contact studs bright, and heavily tin them in order to facilitate the wiring operations.

Attention may now be turned to the panel. This should be marked out in accordance with the drilling diagram. A template will be found in the box of the Cyldon condenser.

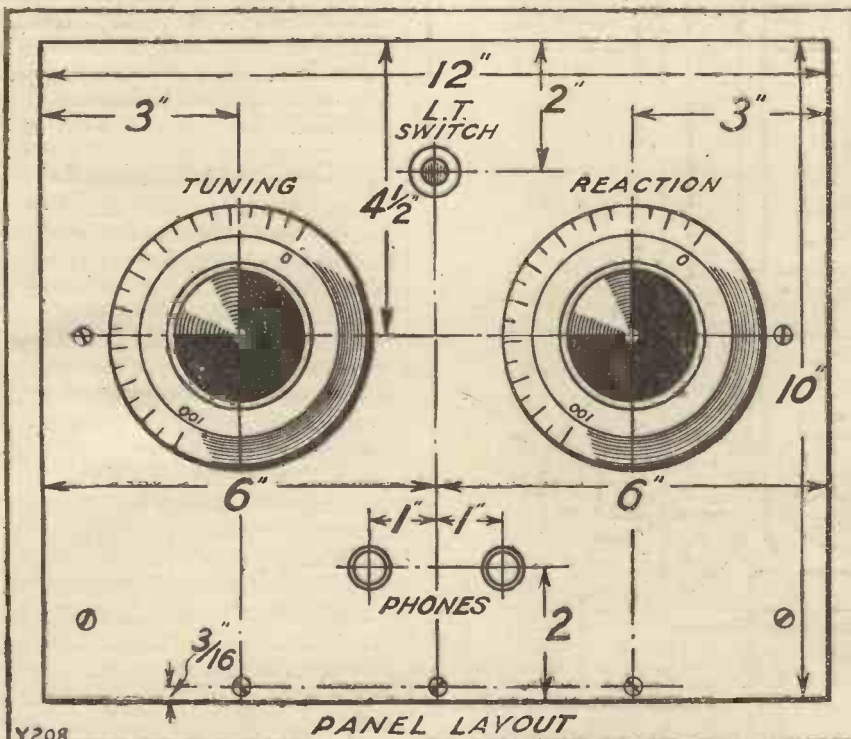
No dimensions are given for the panel brackets, as these vary, and it is best to use the brackets themselves as templates. The terminals on the terminal strip at the back of the set are placed half an inch from the ends and one inch apart. Their distance from the top of the strip is half an inch.

Details of Assembly

As soon as the drilling is finished, the terminals and the parts which go on the panel may be mounted. The condensers should be placed at the same relative angles as shown in the photographs, as also should the switch. It will probably be as well to point out here that this switch has been omitted from the theoretical circuit diagram in order to simplify it. It is connected in the negative L.T. lead.

Now fit the baseboard, panel, and terminal strip into the cabinet, and screw the last two into position, screwing the panel brackets to the baseboard after the whole assembly has been removed from the cabinet again.

The coil L_1 is fixed to the baseboard by means of a screw through a small piece of wood, which is fitted inside the end of this coil, opposite the end at which the tappings are made. This piece of wood is fixed to the former by means of two wood-screws which are inserted from the outside of the former. The other coil is fixed to the baseboard by means of two wood-screws through a piece of wood passed through the coil former. Mount these two coils as near to the positions shown in the wiring diagram as possible, but take care that the plates of the reaction condenser do not foul the coil mounted beneath them. When the coils have been put into position the remainder of the components which go on the baseboard should be screwed down.



Y208

PANEL LAYOUT

Wiring Up

Before fixing any wires all points to which soldered joints are to be made should be tinned. Follow the wiring given in the wiring diagram carefully, making use of the back-of-panel photographs to help in spacing the wires correctly. The fixed condenser mounted over the coil L_2 is held in place by the wires to which it is connected. It has not been

The Two-Circuit Single Valver—continued

screwed in place as, although the value of .0003 will generally be suitable, sometimes a larger one up to even .001 may be required to get sufficient reaction effect. It is only the matter of a moment to change this condenser.

When you have completed the wiring check it with the wiring and theoretical diagrams very carefully to make certain that every-

thing is in order. The set may then be connected up. The set is not at all critical as to the valve used; a good detector is all that is required, and practically any valve will answer except the very high impedance and super-power types.

Connect the aerial and earth to their terminals and the H.T. to the two terminals provided. The filament supply should also be connected

to the appropriate terminals. The grid of the valve is connected to L.T. negative through the grid leak, and, as some valves work better when connected to the L.T. positive, it is as well to try connecting the accumulator the opposite way round to the markings on the terminals. Switch the set on and adjust the resistor to an appropriate setting.

Adjusting the Condenser

The selectivity will be slightly better if the neutralising condenser is partly out, but as a rule it will be found satisfactory to use it all in. Once the gang condenser has been set with it "all in," it must not be altered, otherwise the balancing will be upset. Instructions for the actual manipulation of the condenser while balancing are given with the Ormond condenser. There will not be much difference between one half and the other.

Probably the back half—namely, that tuning the first coil, L_1 —will need to be a little nearer its maximum than the other half. As soon as the gang is balanced on the local station, H.T. filament current, etc., should be adjusted to give the smoothest control of reaction possible, and then the balancing should be checked on a distant station.

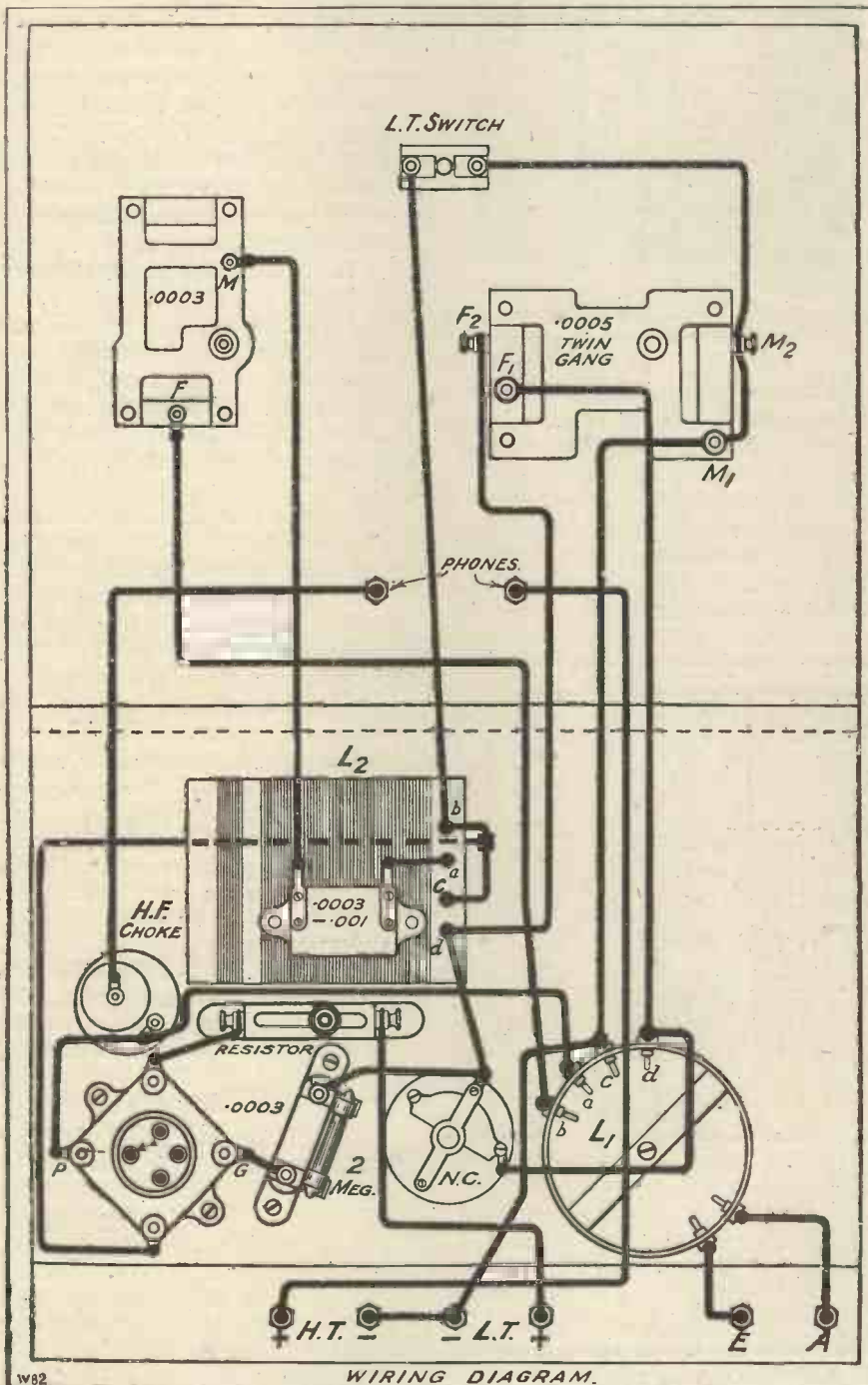
It may be found that on the local station there is a slight "double-point" effect. There is no need to worry about this, as it does not appear on distant stations, which come in very well.

Good Signal Strength

The set will oscillate easier when the two sets of plates are properly balanced, and this may be taken as an indication that the condenser is suitably adjusted.

It was found possible to tune in several other stations, including French and German, at really good strength while the local station was on, without any "background" whatever. This was actually done in daylight. After dark stations were much stronger, and no attempt was made to identify all received, as they were so numerous.

The set will be found really sensitive in spite of its high selectivity, although a little strength must always be sacrificed on distant stations in a really selective single-valve set.



W82

WIRING DIAGRAM.



I AM happy to say that Professor Goop is in much better health than is usually the case at this season. The improvement is largely due to the fact that he is not suffering from the distressing malady to which he used to be a perfect martyr every summer. I refer to Melon-Eaters' Earache. Since he is passionately fond of this form of rare and refreshing fruit and maintains that there is only *one* way to eat it the professor's ears were in a constant state of wellness in previous summers; but he has now



Professor Goop discovers that 'phones prevent that distressing malady "Melon-Eaters' Earache."

made the happy discovery that all unpleasant results can be avoided by the donning of a pair of telephones before a juicy slice is attacked. The professor tells me that he is thinking of bringing out a neat little crystal set called the "Melon-Lover's Own." This will be provided with especially large and entirely juice-proof receivers. The set itself, which will be fitted with a dessert-dish attachment to the top of the cabinet, is intended to be placed upon the table as a kind of centrepiece, one of each of the several pairs of headphones connected to it being laid beside the plate of each person at table. It will thus be possible to enjoy at one and the same time both fruit and music, or possibly a topical talk upon how to avoid bunions, or something of the kind.

A New Invention

But this invention, important though it is to real melon enthusiasts, is as nothing beside the one which he and I have just finished working out together, an invention

which we may fairly claim will entirely revolutionise existing methods of short-wave reception. The trouble about short waves, as you are possibly aware, is that they *are* short. Instead of behaving themselves like decent, well-grown members of the tribe they play all manner of unpleasant tricks. They worm their way into places where they have no right to be and upset the tuning like anything. It is, in fact, quite a common experience for short-wave enthusiasts who have tuned their sets to 2 X A F to be able to bring in K D K A by the simple process of crossing their knees. The short waves are, so to speak, the small boys of wireless, behaving in every way as their human counterparts. Now, what do we do with small boys who score bull's-eyes upon our bald spots with well-aimed missiles from pea-shooters? Having spanked the lads, we comfort ourselves with the assurance that they will *grow* out of it. In other words, when their stature approaches reasonable proportions they will no longer be a nuisance.

Concerning Analogies

Very well then. Let us continue our analogy. I always like analogies in wireless explanations, though I think that most of them suffer from dullness. Why, for example, does the one about waves always tell us that if a *stone* is thrown into water ripples move outwards in ever-widening circles? Does not precisely the same thing happen when someone falls in off the greasy pole? Again, you know the one about shock excitation. They tell you that if you whack the drum of a banjo all its strings will zim and zoom. But do you not get a far better illustration of shock excitation by coming quietly up behind General Blood-Thunderby and slapping him heartily on the back? Wireless explanations, I feel, require a little brightening up. Well, I was just saying, as you may remember if you have not dozed off, that the larger the boy grows the less is he given to the placing of cobbler's wax

on the seats of chairs, to the making of butter slides, and to other pieces of juvenile devilry. So with waves. The longer they are the more amenable do they become to discipline.

The Short-Wave Stretcher

It was a consideration of these highly important points that led Professor Goop and myself to make what we may perhaps call without undue modesty the very greatest discovery that has so far marked our long and distinguished careers. This is the "Goop-Wayfarer Short-Wave Stretcher," which is illustrated semi-diagrammatically in Figs. 1 and 2. Instead of a plain vertical aerial mast we have a slightly more complicated but much more beautiful affair provided with a pivoted arm after the manner of the derrick. Between the top of this arm and a chimney, or other suitable exerescence of the short-wave enthusiast's dwelling, is suspended a special aerial made of Professor's Goop's new elastic copper. This wonderful alloy is produced by bringing pure copper to the temperature of molten granite and then bunging



It is comforting to remember that small boys will grow out of this sort of thing.

in a minute quantity of Bunkonium, the rare metal which is found only in the snowfields of Zanzibar. The resulting alloy is so elastic that a single inch of rod with a cross section of one square centimetre will stretch to the length of the fish that Captain Bucketts says he caught last Saturday week in the canal at Mudbury Wallow.

To the end of the pivot arm is attached a length of stout rope, which passes over a pulley fixed to the top of the mast. The other end

In Lighter Vein—continued

of the rope is fastened to a special collar which goes round the thinnest part of the Bingo, the automatic stretcher. To a convenient branch of a tree is secured a clock, whose pendulum supports the Attractor. The pendulum of the clock is adjusted to suit the frequency of the incoming wavelet. At the moment of its arrival the Attractor swings inwards and the Bingo recoils. The tension upon the aerial is thus released. Before the miserable little wave has time to think better of it, or to escape,

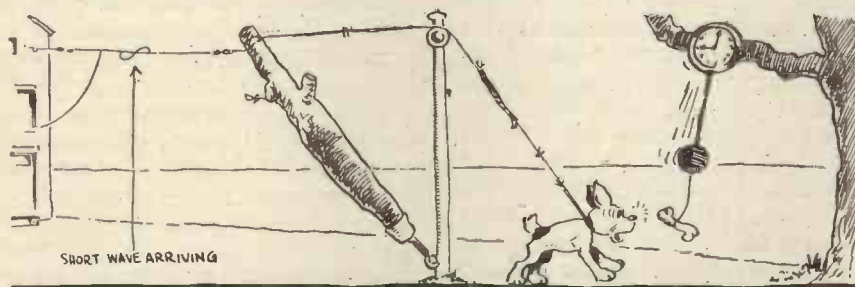


Fig. 1. Showing the first phase in the operation of the Goop-Wayfarer Short-Wave Stretcher aerial system.

a swing of the pendulum moves the Attractor away. The Bingo follows, extending the elastic aerial and stretching the wave, which having been properly elongated passes down the lead-in to the receiving set, where it does its duty with no nasty tricks. The Attractor and the Bingo then resume their original positions in readiness for the arrival of the next undergrown wave.

Rather High Frequency

Only two parts of the apparatus have so far given any trouble. These are the clock and the Bingo. Since a wave-length of 15 metres represents a frequency of 20,000,000 per second there was some difficulty at first in obtaining sufficiently rapid swings of the pendulum. This, however, has been got over by a method which I will now describe, though I am afraid that I must necessarily employ a few technicalities here and there. By means of hypercentroidal mounting of the main guffing pinion a procatabambostic movement is imparted to the subsidiary biffle pin. A small train of ordinary blatherskite gears conveys this motion by way of an escapement of special pattern to the pendulum, which can obviously be made to oscillate at any desired frequency by adjustment of the gootle plates in a lateral sense. With this simple explanation before him the

reader will have no difficulty, then, in following the action of the clock.

Special Injections

The bother about the Bingo was that after oscillating 20,000,000 a second for a few minutes on end it was apt to show signs of fatigue. This has been overcome by the injection of a special compound of condensed vitamine dissolved in monkey-gland solution. So amazing were the results produced by this injection that our difficulty at one

time was to keep the Bingo from moving to and fro at too high a frequency, thus getting out of step, so to speak, with the Attractor, and causing a queer form of heterodyne.

Every Home Constructor

should keep himself up to date with the latest developments in his hobby.

Popular Wireless

contains all the latest and best news concerning happenings in the Radio World.

Every Thursday - - - Price 3d.

Make sure YOU get it this week.

In actual tests the Goop-Wayfarer Short-Wave Stretcher has exceeded all expectations. Curiously enough, we have been able so far to adjust the

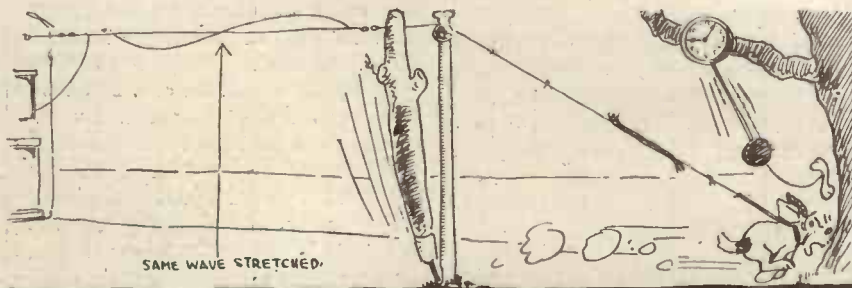


Fig. 2. The "Bingo" has followed the "Attractor" and stretched the wave at the moment of its arrival. The operation has to be repeated at the rather high frequency of twenty million times per second, and it is stated that the "Bingo" soon tends to become fatigued unless given special injections.

frequency only to that of one short-wave station, and, still more curious, we have been able to obtain satisfactory reception only on one night in the week. The station is 2 X A D, and the night upon which we are able with the help of the Stretcher to receive it upon ordinary broadcast coils is Tuesday. There must be something very peculiar about Tuesdays, for we have noticed that the B.B.C. also finds this the best evening for conducting its relays of this particular station.

As might be expected, the short waves are apt to suffer to some extent during the stretching process from attenuation. We are still working upon this problem and hope ere long to arrive at a complete solution of it. Meantime the Goop-Wayfarer Short-Wave Stretcher bids fair completely to oust the Super-heterodyne system and other equally clumsy methods of elongating wavelets.

A Further Idea

Even as things are our results leave little to be desired. Experts who have been present during tests have stated that in their considered opinion not the slightest difference can be detected between 2 X A D as received direct by means of the Stretcher and as heard via the local station's relay. The Stretcher idea is also likely to find in the near future another most handy application. We are thinking of bringing out a small portable stretcher for indoor use into which the DX enthusiast will insert his list of foreign stations received. A single movement of the neat crank which operates the device, and the list is returned to him enormously enlarged. Professor Goop proposes to call this form of the device the "Autolyre."

WIRELESS WAYFARER.

Savoy Hill Happenings

By OUR SPECIAL COMMISSIONER

*Staff Problems—
Empire Broadcasting:
Capt. Eckersley's Complex—
Publishers or Broadcasters?—
The Art of Broadcast
Entertainment—The
Case of Dick
Sheppard—The
Handicap of
Geneva.*

Staff Problems

THIS is the month in which the Governors of the British Broadcasting Corporation will be making their first serious review of staff matters. During the past nine months they have wisely refrained from unnecessary interference with the delicate machine evolved by the Broadcasting Company. They were aware, however, that a new set of conditions and circumstances would be imposed by the institution of alternative programmes, and might well require considerable staff changes. These new conditions and circumstances, now making themselves apparent, have become the subject of anxious discussion with the B.B.C. Board.

The era of improvisation and expediency is over. Programme building has become a combination of wide culture, popular sympathy, and impeccable taste. There is no call for the kind of alleged "genius" that merely disguises self-conceit; nor can mediocrity be tolerated any longer. The B.B.C. Governors agree that the present staff is admirable for the work it has carried through during the past few years. It speaks well for the shrewdness of the Board, however, that it realises that changes will be required by new conditions in the near future. I am informed on the best authority that compulsory retirement not due to bad conduct will be liberally compensated. This is only reasonable and just.

Empire Broadcasting: Captain Eckersley's Complex

Four months have elapsed since Captain Eckersley told the "Daily Mail" that he was beginning "forth-

with" the construction of a short wave transmitter which, in six months' time, would be providing a regular service of relays for the Dominions and Overseas possessions of the Crown. While there has been no denial that Captain Eckersley is to carry out this promise, there have been certain developments which point in the opposite direction.

For one thing there has been the unfortunate treatment of Mr. Gerald Marcuse, the well-known amateur. Mr. Marcuse placed his short-wave transmitter at the disposal of the B.B.C., and was frigidly turned down. He was told that the "considered

opinion" of Savoy Hill was that to allow him to relay substantial parts of B.B.C. programmes would be "contrary to the best interests of the Service." There was no explanation of this enigma. The whole position of Empire Broadcasting has been so mishandled by the B.B.C. that if Captain Eckersley's promise is not carried out—that is, unless there is a short-wave transmitter in commission in two months' time—there will be a great and irresistible public outcry.

Incidentally, Captain Eckersley's reputation, which in other matters deservedly stands high, will sustain a serious setback. It is profoundly to be



A novel loudspeaker brought out in America to commemorate the success of Captain Lindbergh when he flew across the Atlantic.

Savoy Hill Happenings—continued

hoped, therefore, that the end of the year will see the B.B.C. alive to its Imperial obligations.

Publishers or Broadcasters?

Judging by the present and prospective publishing activities of the B.B.C. there is room for the query as to whether the B.B.C. are primarily publishers or broadcasters. First there was the programme weekly, building up a huge circulation on its monopoly of information in advance. Then there was added the foreign programme weekly, which is now understood to be making a substantial profit. Then came the numerous libretti of operas. Stations began children's papers and occasional publications by the score. The educational people brought out syllabuses and pamphlets and follow-up books. And now we are threatened with a serious weekly and a children's paper.

Really it is time to call a halt and restore a sense of balance. Naturally, the information side of the Savoy Hill establishment will go on adding to its activities until it is curbed. This side has never revealed any lack of energy or enterprise, and no doubt its great and increasing earnings are of advantage to the programmes.

But the principle at stake goes much deeper. If the Post Office were to hand over to the B.B.C. a really fair and just proportion of licence revenue, then there would be no need whatever for exploiting other sources of revenue. Thus, for instance, in the current year the B.B.C. gets about £800,000 from the Post Office. The service cannot be run for less than £900,000. Therefore, £100,000 must be found elsewhere. Hence one of the reasons for all the restless expansion of the Publications Department of the Information side of Savoy Hill.

Unless some check is put to the present tendency, Treasury encouragement will no doubt carry it much further. There is already talk of the B.B.C. laying down its own costly printing plant and setting up as big a publishing house as exists in the country. The B.B.C. cannot be blamed for scratching its revenue together in this way, but Parliament should see to it that the need does not arise. After all, there are lots of publishers quite capable of looking after that side of things. Let the B.B.C. have its proper revenue and be confined to its legitimate activity. It would be very much in the interests of the newspapers generally to bring this about. If the present tendency is allowed to go unchecked, the B.B.C., with its own publishing house and press, will soon be able to work quite independently of the newspaper interests in the matter of news.

The Art of Broadcast Entertainment

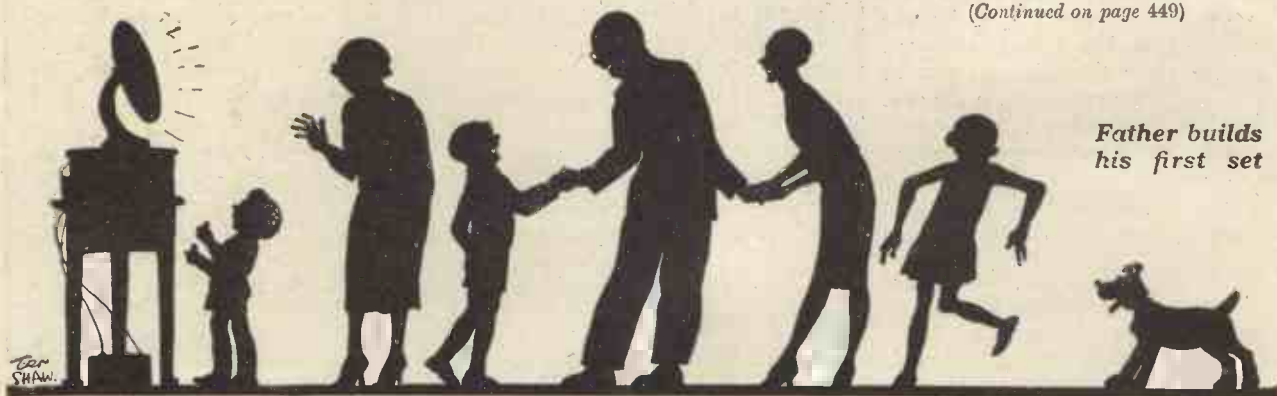
The inauguration of the first alternative or contrast programme at Daventry has raised afresh the old hare of highbrow versus lowbrow. I am glad to learn, however, that Savoy Hill has at last been convinced of the fallacy of taking these outbursts at their face value. Wherever the art of Broadcast entertainment is understood, it is a truism that there is no clear-drawn distinction between highbrow and lowbrow. The essence of the problem is subtlety of presentation. Given the requisite skill an ordinarily alleged highbrow programme may be presented in such a way that the vast majority of listeners would vote it a successful and typical lowbrow programme. It is indeed distinctive of successful broadcast entertainment anywhere that its presentation is

paramount. Thus it is wrong psychologically to admit the existence of the cleavage between two main classes of programme material, mis-named highbrow and lowbrow. There are only two classes of programmes: good and bad. There is no longer any room for mediocrity. Good programmes may include both highbrow and lowbrow stuff, or either; and bad programmes vice-versa. While there is evidence that something of the truth of this doctrine has been recognised at Savoy Hill, it is by no means sure that it is fully acknowledged. I would say most earnestly to the programme builders at this critical period: "Hold hard to immutable principles, and resist the distractions and wiles of passing phases of popular opinion."

The Case of Dick Sheppard

My exposure of the blunders made by the B.B.C. in connection with the appointment of the Rev. H. R. L. Sheppard, C.H., evidently created somewhat of a stir at Savoy Hill. Even the traditional urbanity of Mr. Gladstone Murray has been ruffled. It is not often this official is "drawn," but the present occasion is obviously the exception. He tells me with more emphasis than argument that my accusations are unfounded. Well, I don't mind giving him the benefit of the doubt when I realise that, whatever the cause, the whole matter has been raised afresh, and is to be considered with more prospect of success than formerly. If the B.B.C. fail again to secure Dick Sheppard as the Radio Vicar it will reflect very seriously not only on the executive staff but also on the Board. My reply to Mr. Gladstone Murray was that I would not be driven from the subject until the B.B.C. did the right thing.

(Continued on page 449)



Father builds his first set

All About the New Valves

by Percy W.

Harris MIRE

Some interesting details concerning the new H.F. shielded valve and the double-plate self-neutralising valves.

SINCE the thermionic valve is practically a perfect relay and will amplify wireless signals many times, it would appear to the beginner that nothing should be simpler than to combine a number of

that one soon reaches a limit in the cascading of valves, for the magnified energy has a nasty habit of getting back into the input side and producing violent self-oscillation.

The early way of getting rid of this trouble was deliberately to introduce losses into the circuits in such a way that the losses just exceeded the amount of unwanted feed-back, and the net result was that nearly all amplification was lost. Indeed, in some receivers which were of bad design the addition of the high-frequency stages actually reduced signals!

Eliminating Feed-back

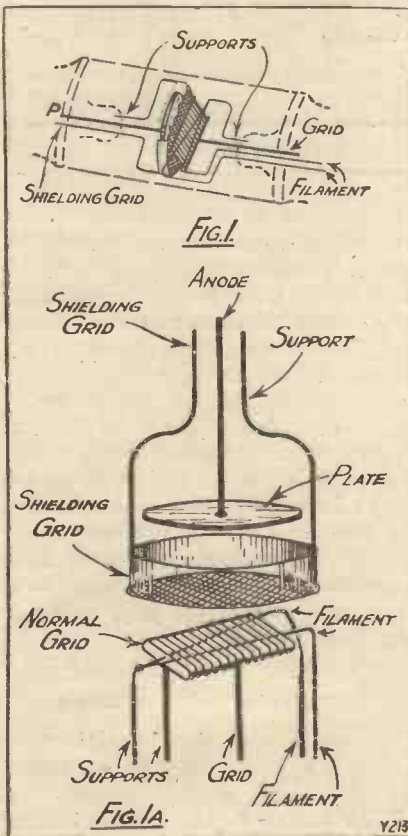
This objectionable feed-back can come only in two ways. The first is from feed-back *inside* the valve, and the second from feed-back *outside* the valve. This latter cause of feed-back can be subdivided into numerous causes, and the modern methods of shielding are designed largely to eliminate them; but the most perfect copper screening in the world will not eliminate the feed-back *inside* the valve, which has been our chief bug-bear.

Most readers are acquainted with the small neutralising condensers, many types of which consist of two small discs of metal which can be made to approach one another by means of a screw motion. The capacity so formed is very tiny, but is still appreciable. Consider for the moment the ordinary thermionic valve in which the plate, so called, takes the form in the modern varieties of a flattened cylinder, and a grid of a spiral of wire. These two parts of the valve are placed very close to one another and form a small condenser.

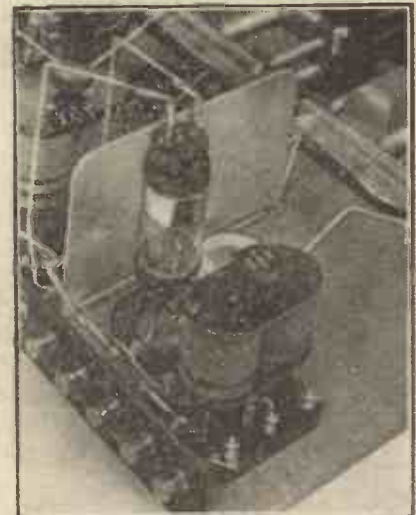
It is the condenser so formed, effectively joining the plate and the grid circuits, which causes most of the feed-back within the valve.

Neutralising Methods

In an endeavour to get over the problem Rice and Hazeltine in America devised ingenious schemes by which the potentials set up across this condenser were balanced out by equal and opposite potentials in a second external condenser connected between the grid and plate circuits. The scheme looks very well on paper, but has to be very carefully worked out in practice to give true balancing effects. For example, in what is called the "split-primary" method, shown in Fig. 3, proper neutralisation cannot be effected unless the coupling between the two halves of the primary winding is extremely tight.



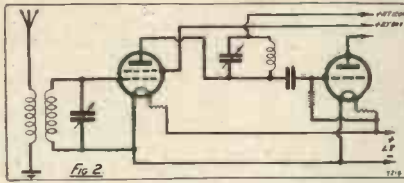
valves, one after the other, the output of one being connected to the input of the other until enormous amplifications could be built up. The practical experimenter knows to his sorrow



The S.625 valve in position in the experimental set.

All About the New Valves—continued

Prof. Hazeltine was the first to point out the importance of this, and, indeed, the neutralising method of this type was not put into commercial practice until the Hazeltine improvements were brought forward.



By using a balancing method for overcoming the capacity effects inside the valve, and by careful screening and elimination of all possible external feed-back, wonderfully selective and sensitive receivers can be produced. There are, however, certain important limitations to the normal neutralising methods which in the past have hindered the full application of high-frequency amplification, and the trouble of valve feed-back has now been tackled in quite a different way.

The New H.F. Valve

Visitors to this year's wireless exhibition will have the opportunity of inspecting what is known as the "shielded-grid" valve. The valve, in the form in which it is now being marketed, has been developed by Captain Round, the well-known contributor to this journal, and is being

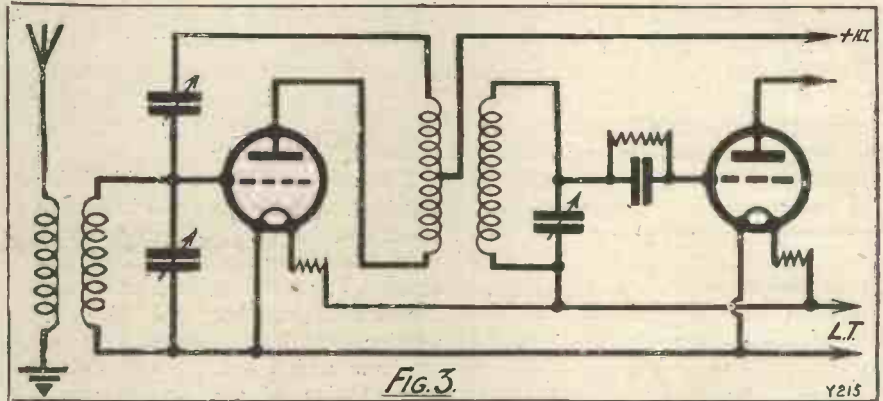
marketed by the Marconi Company and by the General Electric Company, under the well-known "Marconi" and "Osram" brands. I have spent considerable time in my laboratory in experimenting with and investigating the possibilities of this new valve, and I can assure readers that it is a very remarkable step forward in high-frequency amplification and opens up all kinds of interesting possibilities.

In its main essentials the new valve is fairly simple to understand. Its external appearance, however, is peculiar, for it consists, as our readers will note from the accompanying

specification shows that at one end the plate pin is missing, and at the other end the two filament pins. A detailed examination shows that inside the valve there is placed transversely what appears to be a normal V filament and flat spiral grid. This filament lights up in the usual way, consuming a quarter of an ampere at between five and six volts.

The Internal Construction

Immediately above this grid is placed a second grid of entirely different form. This second grid looks like a miniature sieve. It is flat



photographs, of a double-ended tube, each end being fitted with what appears at first sight to be the conventional valve base. Closer in-

and circular in shape, and occupies the whole transverse section of the valve. The edge of the grid is welded to a metal ring, so that this special grid formation resembles a sieve not only in its mesh but in its supporting edge. (Figs. 1 and 1A.)

The other half of the valve is obscured by the usual silvery internal coating, but actually within the "sieve" is placed a disc of metal which forms the plate. Incidentally, for the first time in history, the "plate" really looks like one! This disc has a slightly smaller diameter than the screening grid, and is insulated from it.

Complete Grid Screen

At one end of the valve the two filament pins are connected as usual, and the normal grid pin is connected to the ordinary grid; but the plate pin is absent. At the other end of the valve the normal grid pin is connected to the shielding grid and the plate pin to the plate.

There is no particular novelty in the way in which the valve is



Binocular coils were employed to cut down magnetic coupling.

All About the New Valves—*continued*

connected in any circuit with which it is used. The filament connections are made in the usual way, as are the normal grid and the plate connections. The plate voltage is 120, and the shielding-grid connection is taken directly to the H.T. battery at about 80 volts. The condition, then, is that we have a normal filament emitting electrons in the usual manner, a controlling grid which acts quite normally, and a plate which again follows the usual rules of working.

The special point is that between the grid and the plate is a second grid of wide mesh kept permanently at 80 volts positive. It might be thought that this screening grid, with so relatively high a potential, would act as a plate and absorb all the electrons emitted by the filament, obscuring the plate completely. But remember that the mesh is quite wide, so the amount of electron flow which this grid will stop is very small. Moreover, the plate is kept at a considerably higher voltage than the grid. Measurements in my laboratory show that the actual current taken by the screening grid is in the neighbourhood of half a milliampere only, whereas the actual plate current is about three times that figure.

An Experimental Set

The reader will now be asking, What is the purpose of this second grid? Briefly, while offering very little opposition to the flow of electrons between the filament and the plate, it practically eliminates any capacity effect between the plate and the normal grid by intercepting the electrostatic lines of force in their path between the normal grid and the plate. Having thus eliminated the capacity effect in the valve, we can design it to have a very high amplification factor, which is the case in the valve we are discussing.

I much prefer to try out a device rather than to theorise about it, and consequently I lost no time in building up a complete receiver for the purpose of testing out the new valve. Photographs of this accompany the article, and next month I shall give a practical design to enable you to make the best use of this valve yourself. The receiver

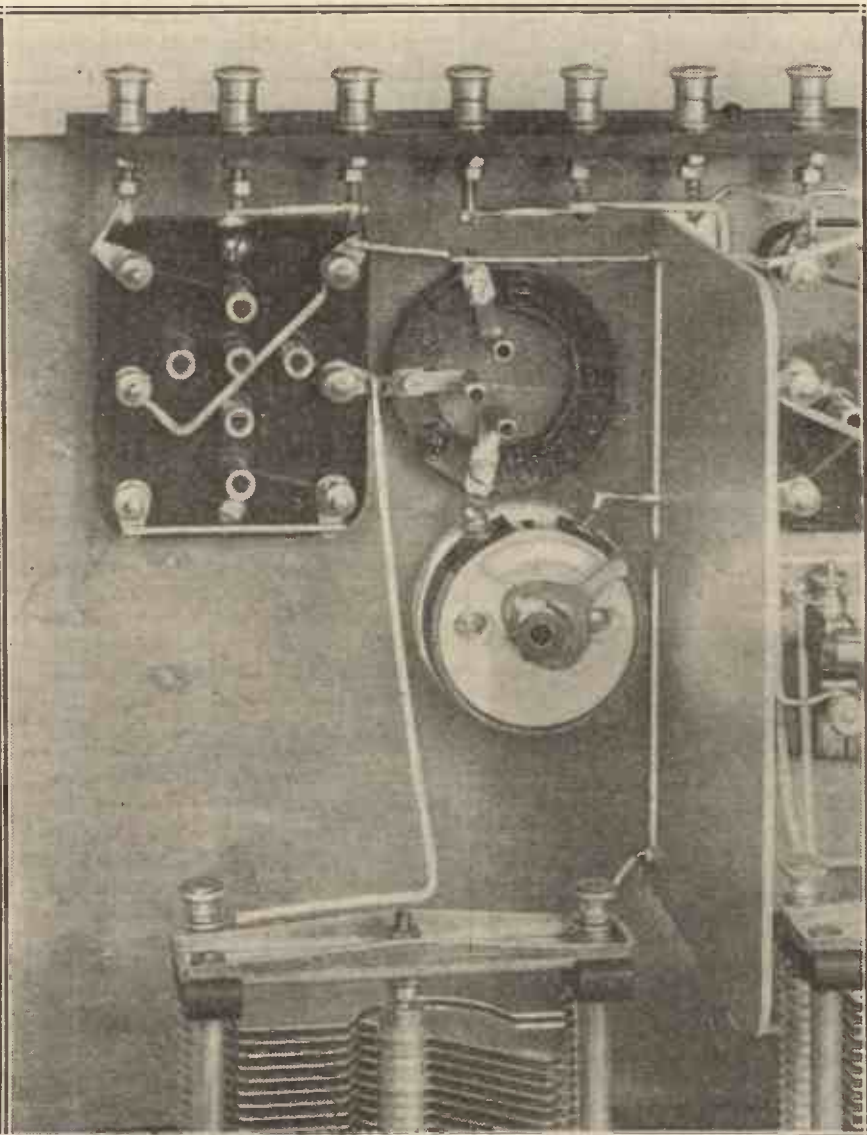
illustrated works admirably, but may entail one or two small changes before the design is published.

Cutting Down Interaction

At the same time, it will be interesting to examine the receiver as it stands at present. The circuit is shown in Fig. 2, from which it will be seen that the H.F. valve of the new type is coupled to the detector valve by the tuned-anode method. The screening grid is given an 80-volt positive potential. As internal capacity has been eliminated, there is no need for any neutralising circuit, but the very high amplification per stage obtainable makes it more than usually necessary to guard

against external coupling and feed-back. These problems have been overcome, first of all, by a very careful design, so as to give extremely short wiring in the H.F. stage; secondly, by using two binocular coils which have a very restricted field, and, thirdly, by placing a simple aluminium screen between the H.F. stage and the detector. The simple screening alone would be quite insufficient to prevent feed-back with the normal types of coil, but with the small binoculars it gives all the screening we require.

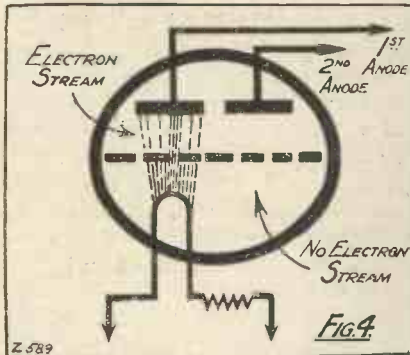
The first impression on using a valve of this type in a simple circuit is that it is extremely unselective, but on further examination this



A "close-up" of the H.F. end of the set, showing the arrangement of the aerial coil and grid and filament valve connections.

All About the New Valves—continued

lack of selectivity soon shows itself as due to the circuit rather than to the valve. We are so used to feed-back effects between stages that we rather overlook the fact that a



certain amount of feed-back, giving a reaction effect, very considerably sharpens up tuning. Provided the feed-back is not sufficient to bring the set too near the oscillation-point, we thus gain both in selectivity and amplification.

Sharpening the Tuning

If we remove all feed-back, both internal and external, we lose the sharpening of tuning due to reaction, and therefore tuning, unless we take special precautions, will be flatter than usual. In the experimental set illustrated a slight feed-back has been left for the purpose of sharpening up the tuning, but even with this the set is a long way from the oscillating-point, and very considerable reaction can be used in the detector stage before reaching this state.



The anode and shield leads can be seen over the top of the screen.

Only a very slight feed-back is helpful, and the best results are obtained with the valve when practically all of it are eliminated. It is not sufficient to design the set so that the set is just stable at any condenser setting. It is easy to make a set in this way, but we will not get the proper efficiency from the valve in so doing.

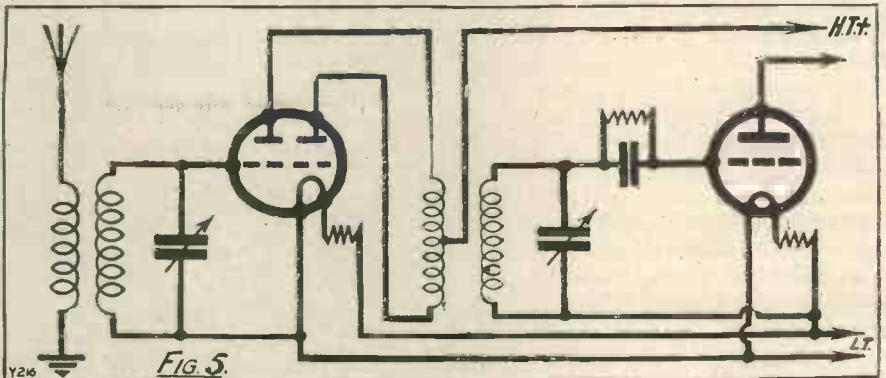
Experiment shows that with a carefully designed circuit the new valve gives with one stage of high-frequency amplification results previously only obtainable with two stages.

Specially prepared drawings in this article will explain to the reader the mechanical construction of the valve, and these together with the photographs will show him even more than

particularly Fig. 4. This shows not the actual mechanical construction of the valve but the theoretical make-up.

The Internal Arrangement

Here it will be seen that the valve contains a filament, a grid, and two plates or anodes. The left side of the picture really represents a normal valve, the electron stream passing from the filament through the grid to the plate. Beneath the second plate or anode, and with the same spacing as before, is another portion of the grid, but in this case there is no electron stream to the plate. Expressed in another way, we can say that one plate is "live," and the other "dead." The capacity between the first anode and the grid is the same as that between the second anode and



an actual examination of the valve itself can do.

A few minutes thought will show any experienced wireless experimenter that the new valve has very great possibilities. There is, to give but one example, a whole new field of work opened up in resistance amplifiers for high-frequency magnification.

Self-Balancing Valve

Another extremely interesting valve which I have been privileged to test out in my laboratory is one invented by Dr. James Robinson, who is also well known as a contributor to this journal. Dr. Robinson tackled the capacity problem in quite a different manner. Whereas in the past the balancing methods have involved the use of adaptable exterior capacities, Dr. Robinson's valve, which contains a normal filament, a grid, and two plates, is self-balancing. The principle of the valve will be understood quite clearly by examining the drawings,

the grid, but only the first is active.

Now turn to Fig. 5. Here we have a standard split-primary arrangement, and it will be seen at once that while the active plate is joined up quite normally to half of the primary and the H.T. battery, the other half of the primary, used for neutralising, is now connected, not to a neutralising condenser exterior to the valve, but to the second plate, which, as we now know, gives a capacity with the grid. It will thus be seen that the valve is self-balancing, as the grid and plate assemblies within the valve are matched in their capacity effects. The make-up of the valve is quite normal as far as exterior appearances are concerned, the only difference being that there is a flexible lead taken from the side of the base for connection to the second plate, the four pins on the ordinary valve base joining up in the usual way to the filament, grid, and plate respectively.

THE "TRAPPER"

By
Percy W. Harris
M.I.R.E.



A two-valver designed for selective results. Those who have trouble in cutting out their local station or 5 G B will find this set exactly what they require.

THE pioneer home constructor of broadcast receivers had quite an easy time. First of all, there was only the London station to consider, and for some time there were only one or two others. This meant that so long as the receiver was moderately sensitive the selectivity

COMPONENTS REQUIRED

(Continued)

H.T. + 1, H.T. + 2, G.B. —, G.B. +, Loud Speaker —, and Loud Speaker +.

Flexible rubber-covered wire and stiff wire for wiring up as shown.
Baseboard, 7 in. deep.

1 suitable cabinet. (The cabinet shown is the new Camco pattern which will take an 8-in. baseboard. The set, however, has been designed on a 7-in. baseboard so that it will also fit, if necessary, into any standard 16 in. x 8 in. cabinet. When using this particular cabinet the panel can be 8 in. high.)

A standard six-pin Reinartz-type transformer for 250 to 550 metres and one for 1,000 to 2,000 metres.

1 centre-tapped coil, No. 50 or Gambrell B.

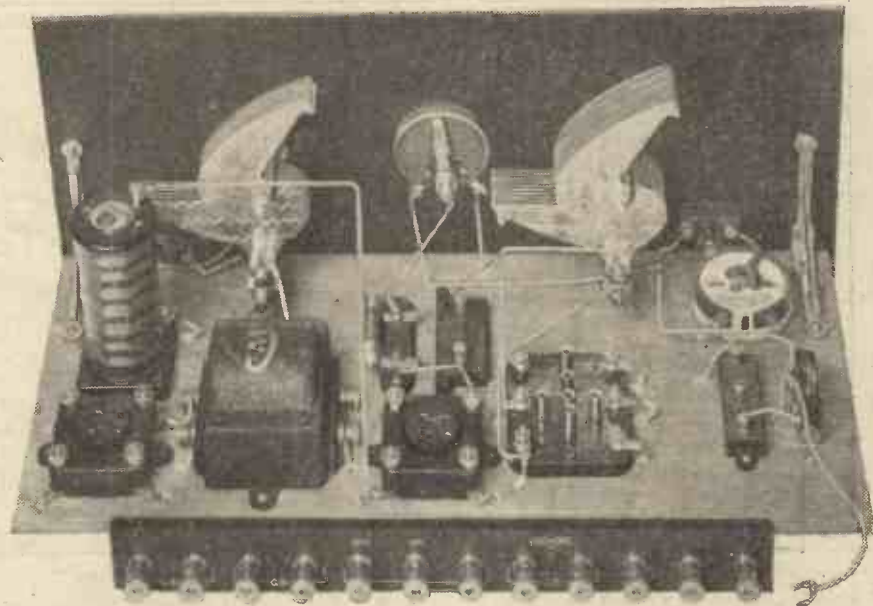
COMPONENTS REQUIRED.

- 1 ebonite panel, 16 in. x 8 in. x 1/4 in. (Ebonart or other standard makes.)
- 1 .0005-mfd. variable condenser, and 1 .0003-mfd. variable condenser. (S.L.F. or S.L.W. Formo or any standard make.)
- 1 on-and-off switch. (Igranic, L. and P., etc.)
- 1 double-circuit jack. (Lotus or any standard make.)
- 1 plug for same.
- 1 potentiometer. (Lissen or other standard make.)
- 2 vernier dials (if not provided with condensers).
- Pair of panel brackets.
- 1 baseboard-mounting coil socket.
- 1 adjustable condenser, .0001 to .0005 mfd. range. (Formo or Rothermel.)
- 1 baseboard-mounting adjustable resistor. (Igranic.)
- 1 standard six-pin base without screening. (Lewcos, Wearite, Peto-Scott, etc.)
- 2 anti-phonic valve sockets. (Benjamin, Lotus, Burndept, etc.)
- 1 .0003-mfd. fixed condenser. (Lissen, Dubilier, Atlas, Igranic, etc.)
- 1 separate grid leak holder. (Lissen Combinator, Dubilier grid leak holder, etc.)
- 1 3 or 4 megohm grid leak. (Dubilier, Lissen, etc.)
- 1 L.F. transformer, any good make. (C.A.V. All-Purpose is shown.)
- 1 radio-frequency choke. (R.I.-Varley, Lissen, Ormond, etc.)
- 1 terminal strip, 1 1/2 in. wide by 12 in. long, with terminals marked: A, A1, E, L.T. —, L.T. +, H.T. —,

did not matter, so simple detectors with or without note magnifiers and the old flat-tuning high-frequency stages gave very satisfactory results.

Nowadays "stations all round the dial," interesting programmes from near and far, and the recent arrival of Daventry Junior—all make selectivity of prime importance in a design. No matter how sensitive a set may be, it will serve only for the local station if selectivity is of the old order.

It is worth considering for a few minutes just where this selectivity lies. A sharp-tuning set is obviously one in which no signal can be received from a station that is not exactly in tune. If you take an ordinary tuned circuit and connect it to a detector



The positions of the various components should be carefully studied, and their orientation copied as closely as possible.

The "Trapper"—continued

valve without reaction, and if you connect the aerial and earth across the whole of the tuning inductance you will obtain a receiver which is so flat in tuning as to be useless for anything but local-station work.

Furthermore, a single detector valve without reaction is most insensitive and is not a great deal better than a crystal set. When you apply reaction to this circuit you will increase both its selectivity and its sensitiveness—the latter, indeed, will increase enormously. If now you connect the aerial across only part of the inductance or, if, better still, you couple the aerial inductively to the grid circuit, your selectivity will be still further improved.

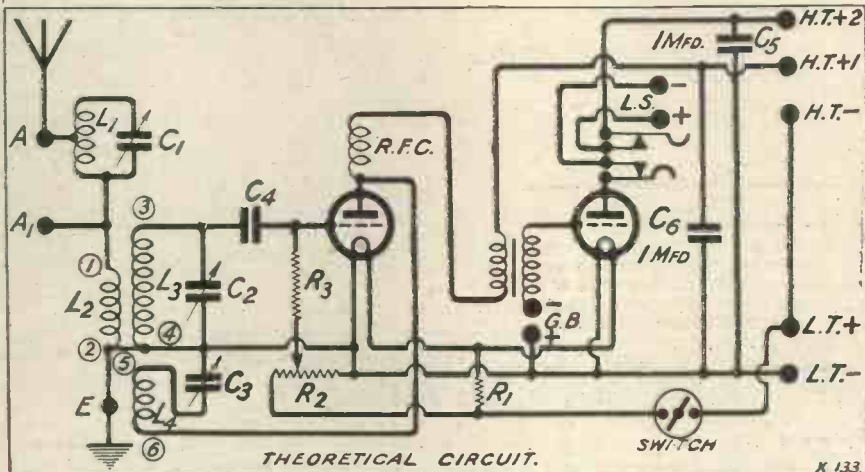
Effect of Reaction

One of the effects of applying reaction to the grid circuit is to reduce the effective resistance of that circuit. This means that once an oscillation is set up in the circuit it will continue much longer before it dies down to zero.

The "damping," as we say, will be less and the circuit will be much less responsive to signals which are not quite in tune with the frequency to which it is adjusted. Now, the more reaction we apply the less will be the damping in the circuit, so that we reach a point where we feed back into the grid circuit from the plate a little more energy than is lost, whereupon

the set will "burst into oscillation," and continue to oscillate to the frequency to which it is tuned.

action, generally called "the Reinartz method," has increased greatly in popularity. When well designed it

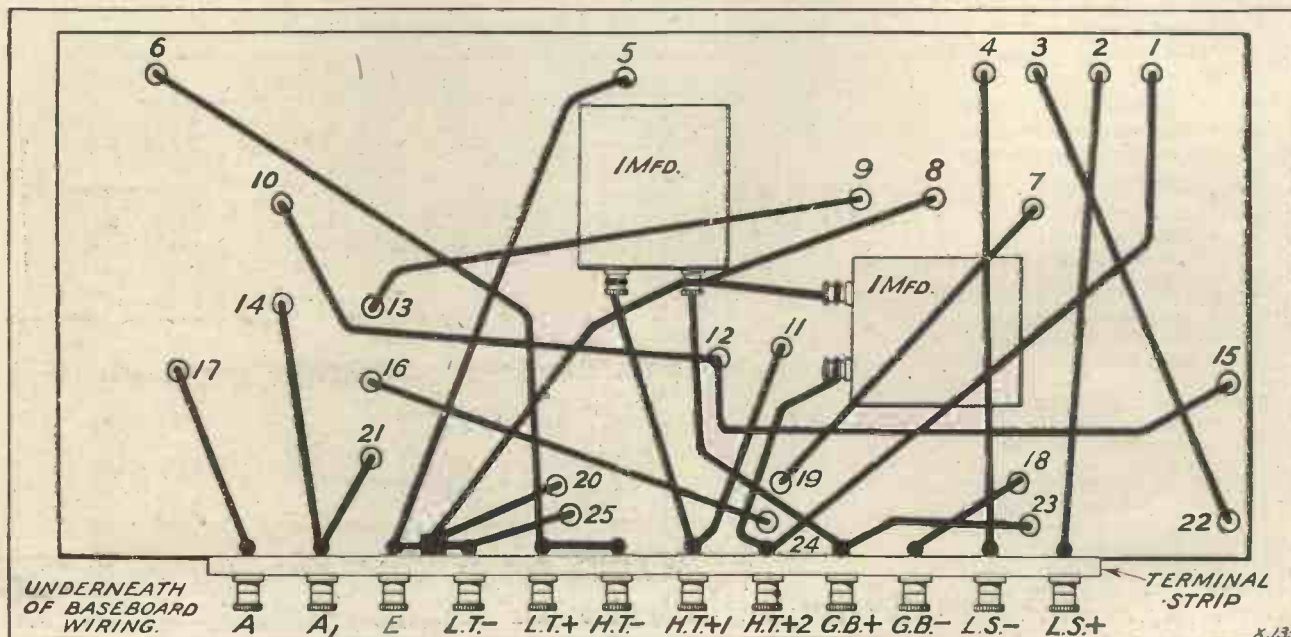


There are several ways of applying reaction, the oldest being by an inductive feed-back, using a coil in the plate circuit connected to one in the grid, the coupling between the two being varied by varying the relative position of the two coils. The trouble about this method is that unless you have the size of the coils correctly chosen, a very fine adjustment of mechanical movement, and other details "just right," you cannot get a smooth increase of reaction for the last critical setting in which the greatest sensitiveness is obtained. For this reason condenser-controlled re-

gives the smoothest possible reaction control and therefore the sharpest possible reaction tuning.

Cause of Distortion

Selectivity gained in this manner, however, is accompanied by a certain amount of distortion, as all the frequencies are not equally damped. If we were dealing with a single frequency in broadcast reception there would be no trouble, but it must be remembered that the carrier-wave frequency is accompanied by many other frequencies either side, caused by the modulation of the carrier wave.



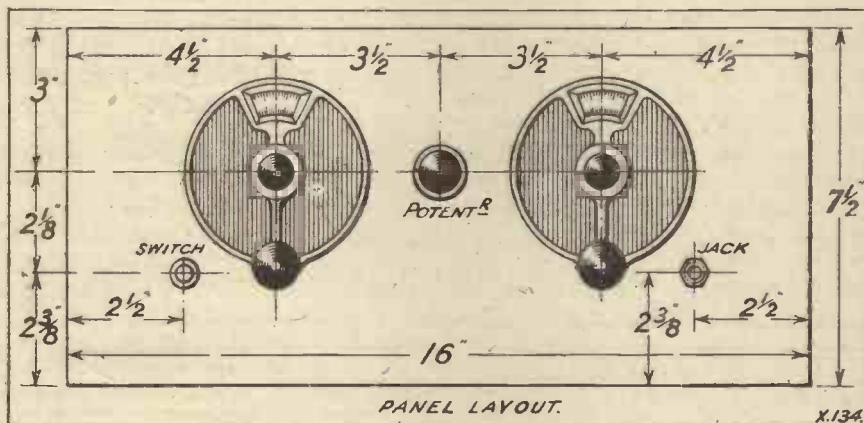
The "Trapper"—continued

As the modern microphone deals adequately with frequencies between 50 and 5,000 or 6,000, the broadcast signals to which we are endeavouring to tune our receivers must be considered as including all frequencies up

affect the receiver except when it is tuned to it.

Such a receiver, however, is rather complicated and expensive to build, and is, furthermore, a more elaborate instrument than many care to build.

reaction, with one stage of note magnification. This arrangement makes very good use of the two valves, gives a very smooth reaction control, so that very high sensitivity can be obtained with the detector valve, and, furthermore, is quite good in its selectivity for separating distant stations from one another.



to 6,000 on either side of the carrier-wave frequency.

The ideal receiver then, must tune uniformly to all those frequencies up to 6,000 on either side of the carrier wave, but should cut off sharply on either side of these points. We can approach this ideal in a receiver in which the signals have passed through a number of tuned stages, for it has been found that a "flat-topped resonance curve," as it is called, can be produced in this manner. If, however, we endeavour to do everything in a single circuit, we give it a very sharply tuned peak, but it will fall off so rapidly on each side of the peak that we shall amplify unequally the very important frequencies on each side of the carrier to which I have referred.

Two Tuning Problems

There are two problems in tuning which the average broadcast listener has to face. First of all, his set must be sharp enough in tuning to separate out signals on slightly different wave-lengths from distant stations, and at the same time (it is not quite the same problem, however) he must get rid of what are frequently enormously powerful signals from his near-by station. A receiver with a number of tuned circuits will serve excellently for the solution of both problems—it will give the selectivity between stations and will also be so sharp that the local station will not

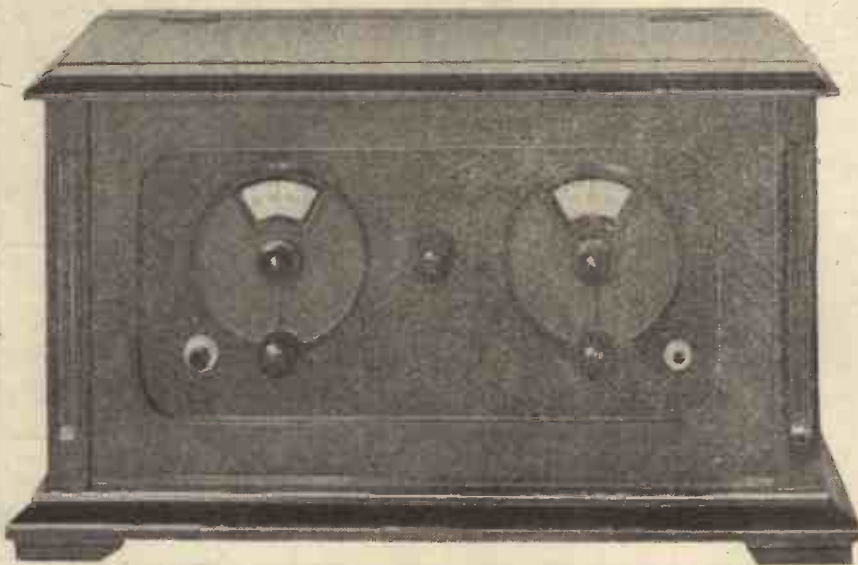
Many readers require a good and inexpensive, easily handled receiver which will give them a large number of distant stations in the telephones, while rejecting the local station on all save the exact tuning position, the receiver being sensitive enough to give loud-speaker reproduction on the nearby station when needed. The "Trapper" has been designed specifically for such users, and contains a number of special features which I think will appeal to them.

First of all, it is a two-valve receiver with a detector using "Reinartz"

An Efficient Jacking System

At the same time, there are not enough tuned circuits to give that strong rejection of the local station which is so necessary if distant signals are to be received, and a special form of easily adjusted wave-trap is therefore built into the set and adjusted once and for all to eliminate the local station as completely as possible. When the local station is needed a quick change of the aerial lead from one terminal to another will cut the trap right out, whereupon the set becomes quite a normal detector and note magnifier.

A further little refinement which in practice is very useful is the adoption of the jacking system which was included in the "New Family Four," for switching the set from telephones to loud speaker in a moment. By plugging in a telephone plug into the jack on the front of the set the listener can use telephones for tuning in, and if the station is strong enough to operate a loud speaker, withdrawing the telephone plug automatically switches the set on to the loud speaker, which is



There is nothing complicated about the construction of the set, simplicity in operation being a strong point.

The "Trapper"—continued

kept permanently connected to two terminals at the rear.

For tuning the wave-trap I have used one of the new adjustable condensers with which I have been experimenting a good deal lately, and which seem to offer very wide scope for the home constructor. The trap itself utilises a centre-tapped coil shunted by this adjustable condenser, the whole device being placed in series with the aerial lead. With the trap in circuit the receiver is used quite normally for everything but the local station, and although you can hear this when you tune sharply to it you will lose it practically immediately when you pass away from the tuning-point.

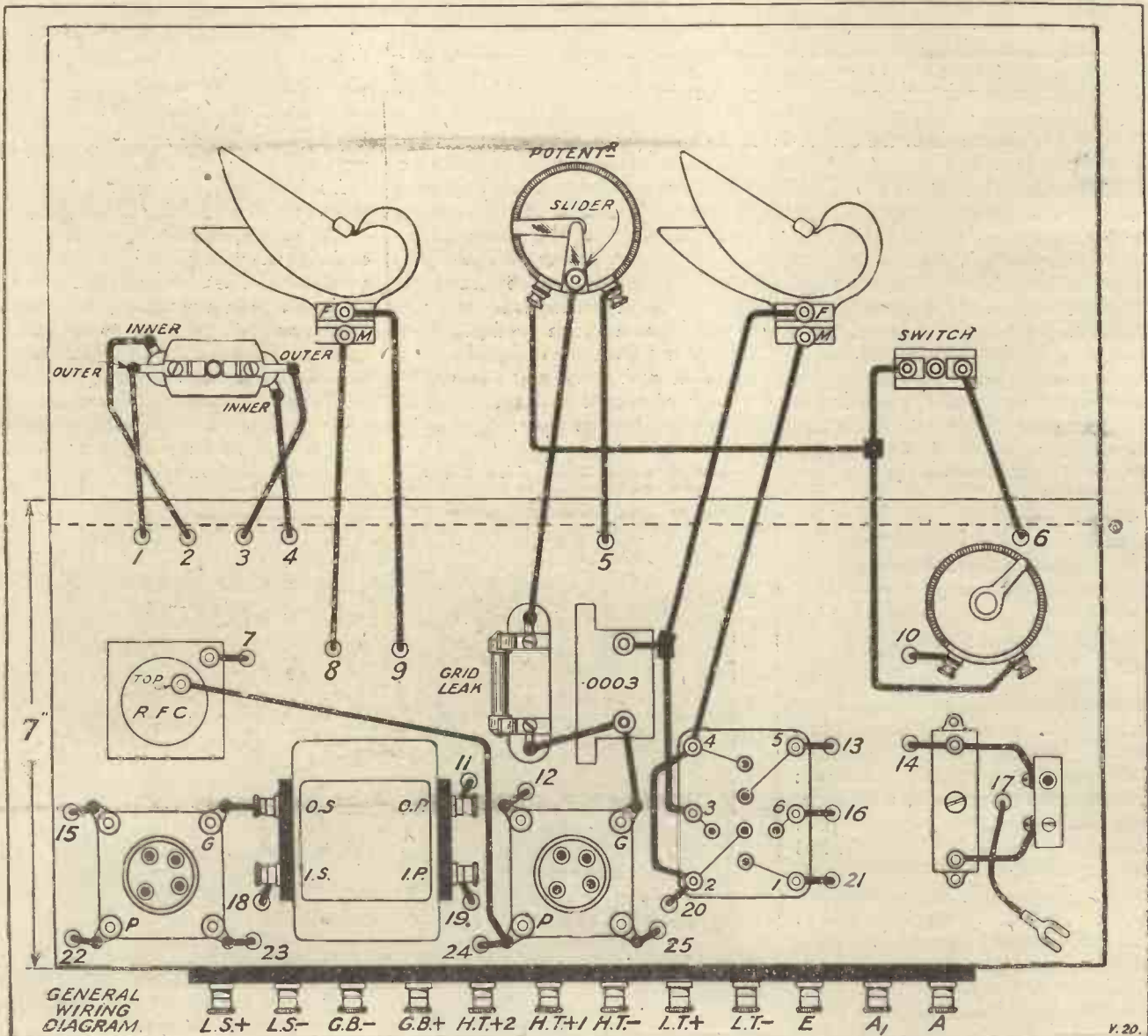
There is but one tuning control—the dial on the left—that on the right being designed for reaction. In order to get the finest possible reaction control, the lower end of the grid leak is connected, not to the positive leg of a potentiometer, so that the grid-leak return can go either to the maximum point of positive potential or right over to negative, or to any point between. Valves differ slightly as to the best point for grid-leak return, and by this arrangement we can find the best point, and incidentally use the potentiometer as a very delicate vernier control of reaction.

The make-up of the set uses the sub-panel flexible wiring which has

proved so successful in the "New Family Four." The inverted terminal strip acts as a support at the back, the baseboard being held in the correct position on the front of the panel by means of the conventional brackets. The coil used is a standard six-pin Reinartz winding, and it is but the work of a moment to change from the shorter wave-band to the Daventry band by substituting the longer-wave coil.

Using the Traps

The theoretical circuit will be seen in page 393, and from this it will be gathered that when the aerial is connected to terminal A the trap is in circuit, and when connected to



The "Trapper"—continued

terminal A, the trap is cut out. The trap, being built entirely inside the receiver, does not occupy any panel space. The first step in the constructional work is to mount the components on the panel. Remember that when the set is finished the top of the baseboard will be exactly $1\frac{1}{2}$ in. above the bottom line of the panel.

Mounting the Components

As different makes of condensers occupy different amounts of space it is advisable, after the components have been mounted on the front panel, to support the baseboard on a book or some other device, so that its top comes exactly against the $1\frac{1}{2}$ -in. line. With the panel temporarily supported in place you can then arrange your components on the baseboard to come into the positions shown in the diagrams and photographs. Keep as closely as possible to the arrangement shown, as this has been worked out carefully.

When you have found the correct positions for your various components the panel can be removed and the baseboard components screwed into position. When you have done this, mark with a pencil the positions of the holes to be made in the baseboard, and drill them with a size of drill sufficient to allow for the flexible wire to pass through easily. Note that in wiring up the set I have combined both the above- and below-board methods.

In particular, do not take the leads from the plate of the valve to the radio-frequency choke beneath the baseboard, but make the connections with stiff wire, as shown. It is worth while spending a little time in studying the diagrams and photographs carefully before you begin work on this set, as your work will be much simplified by so doing.

Some Wiring Hints

The only components mounted beneath the board are the two Mansbridge condensers, which are fixed in position by clips which you can make yourself from pieces of brass or obtain from the T.C. Company with their condensers quite cheaply.

You will find that most of the wiring up can be done very conveniently before you attach the front panel. The method of using the flexible wire is quite simple. A length is taken, the rubber bared

from one end to a distance of about $\frac{1}{4}$ in., and the wire tinned. The soldering lug of the particular terminal is then tinned, and the joint made with a good hot iron. The wire is then threaded through the hole and out at the corresponding hole, which will give you the length to which you must cut the lead. The rubber is then removed from the opposite end and tinned, and joined to the tinned soldering lug as before. It is not necessary to pull the leads very tight, but they should be fairly tight for neatness' sake.

Either 2-, 4-, or 6-volt valves can be used, but, whatever type is chosen, remember that one filament resistance controls both detector and the L.F.

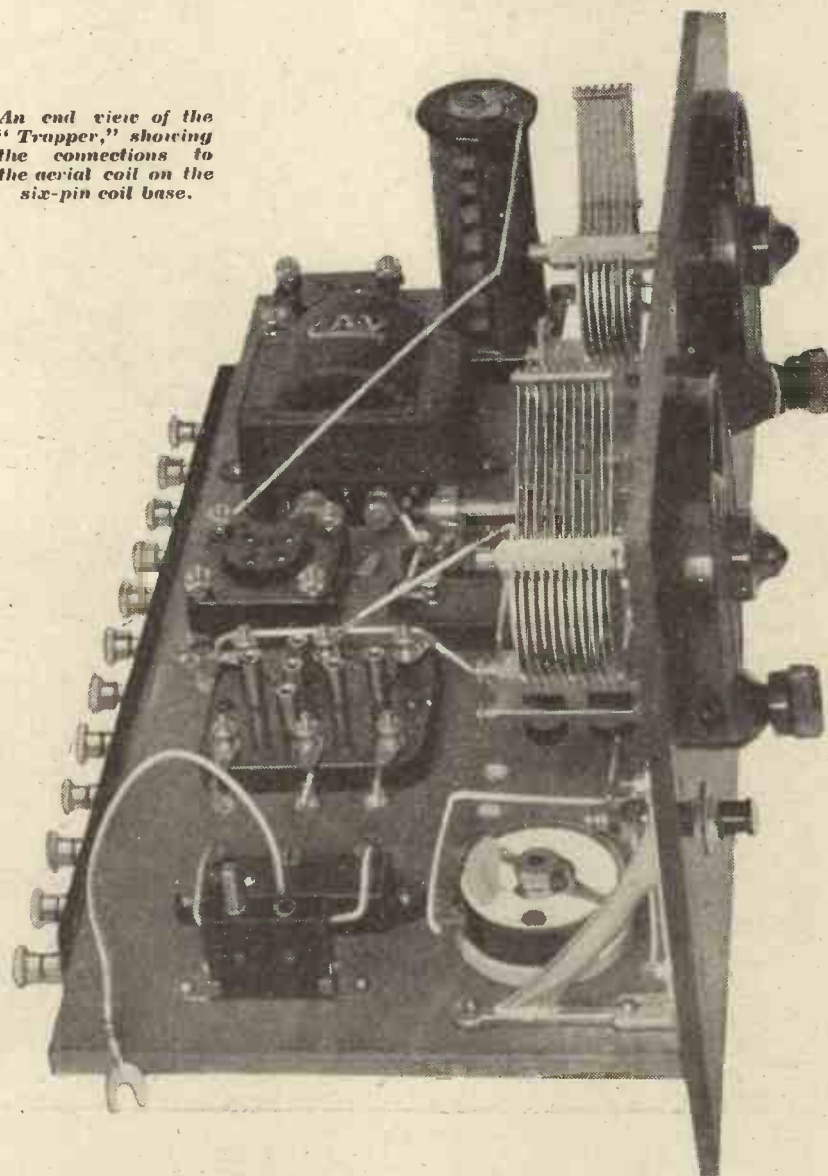
valves, and both should take the same current. If, however, you want to use valves of different current, it is a very simple matter to use separate resistors. In the case of the 2-volt valve the baseboard resistor can be put to the "full on" position, and then it does not matter if the two valves use a different filament current.

The Detector Valve

The first valve is preferably one of those normally called "high-frequency" valves, as these make excellent detectors for the Reinartz method. The second should be a good L.F. valve, and the choice of H.T.

(Continued on page 45.)

An end view of the "Trapper," showing the connections to the aerial coil on the six-pin coil base.



THE "CLOSE SEASON" IS OVER!



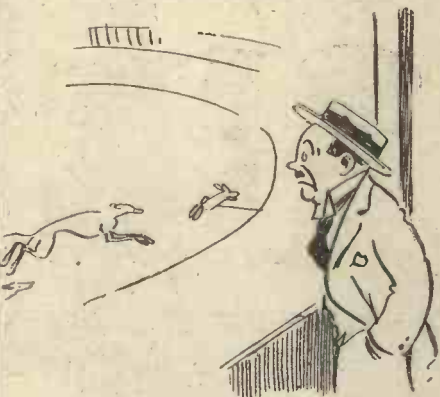
MR. HOME CONSTRUCTOR



HAS MANAGED SOMEHOW



TO EXIST



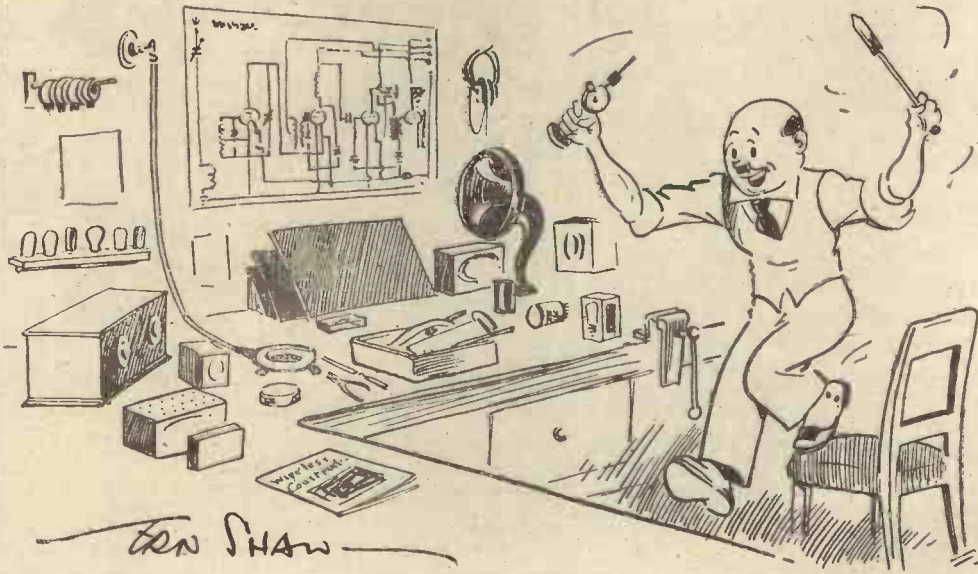
- DURING THE



SUMMER MONTHS



BUT NOW THAT THE SHORTER DAYS ARE WITH US AGAIN



- HE IS BEGINNING TO FIND ONCE MORE THAT LIFE IS REALLY WORTH LIVING!

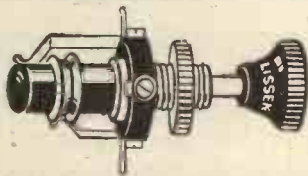
EDEN SHAW

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NO matter what may be mentioned or used in any circuit of any booklet or periodical you may be building from, remember that the best parts have not necessarily been used. There are many advertising manufacturers—all expect a share in the use and mention of their products, and they usually get it. LISSEN gets a share, too, but obviously it is not possible for the periodical to use all one maker's parts, although they may be known to be the best. Remind yourself of that when building—remember, too, that the best parts are LISSEN, and that if you build with them you will use all the energy available, and get louder, clearer signals from near and far in consequence.

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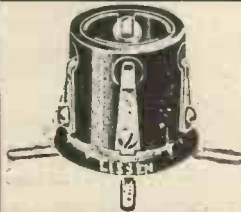
	Previously	NOW
LISSEN 2-way	2/9	1/6
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Fixed condensers should be leak-proof, and if they are LISSEN which DELIVER ALL THEIR STORED UP ENERGY ALL THE TIME, nothing is lost. Note the case in the LISSEN condenser, how it can easily be used upright or flat. Then the price of LISSEN FIXED CONDENSERS is half what it was a year ago. The plates are properly laid in a LISSEN—they are homogeneous with each other, and cannot move or come apart. Capacities .0001 to .001, 1/- each (much reduced). Capacities .002 to .008, 1/6 each (much reduced).

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Patented, Previously 1/8
NOW 1/-

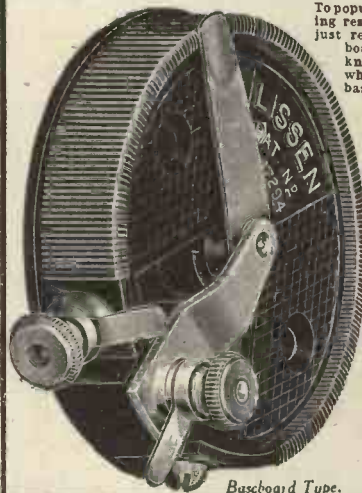


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They do not alter—they are perfectly silent. You can put a LISSEN half-megohm leak in circuit direct on to a 220 volt supply and leave it on indefinitely—it will not alter. It can then be put straight into a critical radio circuit—it will be absolutely silent. LISSEN grid leaks have been further tested by exposure to rain and sun on the roof of the LISSEN factory. They never altered, never varied. Patented.

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	From	Jan.
Previously 7 ohms	2/6	1/6
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400 Potentiometer	2/3	1/6

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LISSEN ONE HOLE FIXING, OF COURSE.

Baseboard Type.



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2 mfd. 4/8 ; 1 mfd. 3/10.

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A "close-up" of the electrodes of the shielded valve.

SOME POINTS ABOUT THE NEW SHIELDED VALVE

Some interesting practical details contributed by the actual designer of the new "S" valve.

By CAPT. H. J. ROUND, M.I.E.E.

THE Editor wishes me to confine myself in this article to purely practical questions with regard to the new shielded high-frequency valve, and he is elsewhere in this journal describing the erection of a three-valve set, using this valve to illustrate one type of circuit in which the valve can be used. I propose to deal here with the use of these valves as high-frequency amplifiers, for, although they may be of value elsewhere, at the moment we know of no

In the filament circuit it is advisable to put a rheostat on the positive side for the purpose of giving some control of signal strength, which current variation will do within certain limits without distortion of signals, and this effect is extremely valuable when one has more than one valve in cascade.

Using an Ordinary Holder

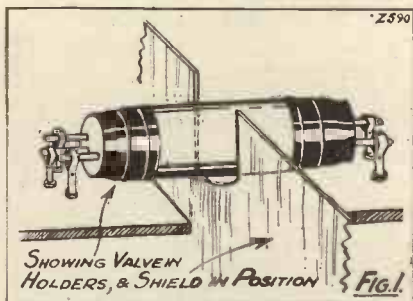
The two filament pins and the grid pin are intentionally placed at the opposite ends of the valve to the plate pin, although it would not matter very much if the outer grid pin were brought to the same end of the tube as the grid and filament pins. This placing of the outer grid pin at the plate end is chiefly a convenience in construction, so that both ends of the valve will be more evenly loaded with conductors. The outer grid, which we will call the shield grid, is usually connected to earth through an H.T. battery of about 80 volts, and this effectively earths the shield for high-frequency alternating currents, except in so far as the inductance of the connecting lead on the shorter waves may be sufficiently long to give a potential drop, in which case, as I will point out later, it will be advisable to put a blocking condenser from the nearest point of the case to the valve pin. When using the valve for very short waves, or when several stages of the valve are in use, this blocking condenser is rather essential.

the mounting is horizontal, as the pins are correctly dimensioned for this purpose; only, if this type of valve holder is used, it will be necessary to have one of them movable to get the valve out.

There is one general over-all idea to use in making up circuits with this valve. The grid circuit and the plate circuit must be kept electrically well separated, because it is useless making a valve in which special precautions are taken to separate the grid from the plate if we couple the remainder of the circuit otherwise. There will, no doubt, be many schools teaching the best way for separating these circuits, but the various precautions I take personally are as follows. All my tuning coils I wind astatically.

The Final Precaution

Secondly, I mount these coils with their axes at right angles to a comparatively large metallic sheet, through which the valve is also mounted. (Figs. 1 and 2.) The shielding grid of the valve is lined up with this shielding plate. In addition, further metallic shielding to separate electrically the leads and condensers



use which is so important as their employment for that purpose.

The Two Grids

The S type of valve, as the various illustrations in this issue indicate, is a double-ended valve with two grids, the second one being there with one main purpose in view, that is to prevent amplified energy flowing back from the plate to the grid. The first grid is equivalent to the normal grid of a triode, and should be treated in an exactly similar way. It should be connected to the top of the input tuning circuit, and, if required, a little grid bias can be applied in any of the well-known ways, although as a general thing in simple circuits I have not found this necessary.

The plate, being situated on the opposite side of the outer grid to the inner grid, is fairly effectively shielded from this grid; care should, however, be taken that the shielding case acts as an extension to this shielding grid in a way that I show in the figures.

The valve can be mounted horizontally, as I always prefer, with the special clips illustrated in Fig. 1, or it may be mounted vertically, but this vertical mounting makes the shielding rather awkward to carry out effectively. There is, however, no reason why ordinary four-pin valve holders should not be used, even if



This photograph shows the filament, grid, and shielding grid arrangement of the S.625 valve.

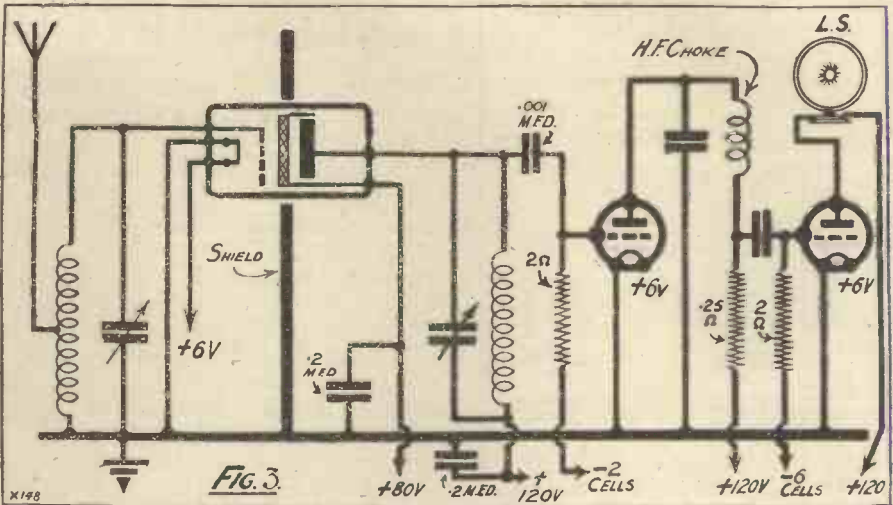
Some Points About the New Shielded Valve—continued

should be employed, and the two figures indicate what will be sufficient shielding in the cases of one valve and two valves.

The final precaution to take is to see that the circuits are not coupled via the filament or H.T. battery common leads, and blocking condensers of the Mansbridge type of a value of .2 mfd., attached as shown in the diagram, are sufficient usually for this purpose, but it would be worth while for any reader who is interested in this subject to look up an article of mine in this journal (March, 1927, page 391), which was actually written as a result of experience with these four-electrode valves, although in that article the ordinary valve was used to illustrate the action of these circuit separators.

Using Two Shielded Valves

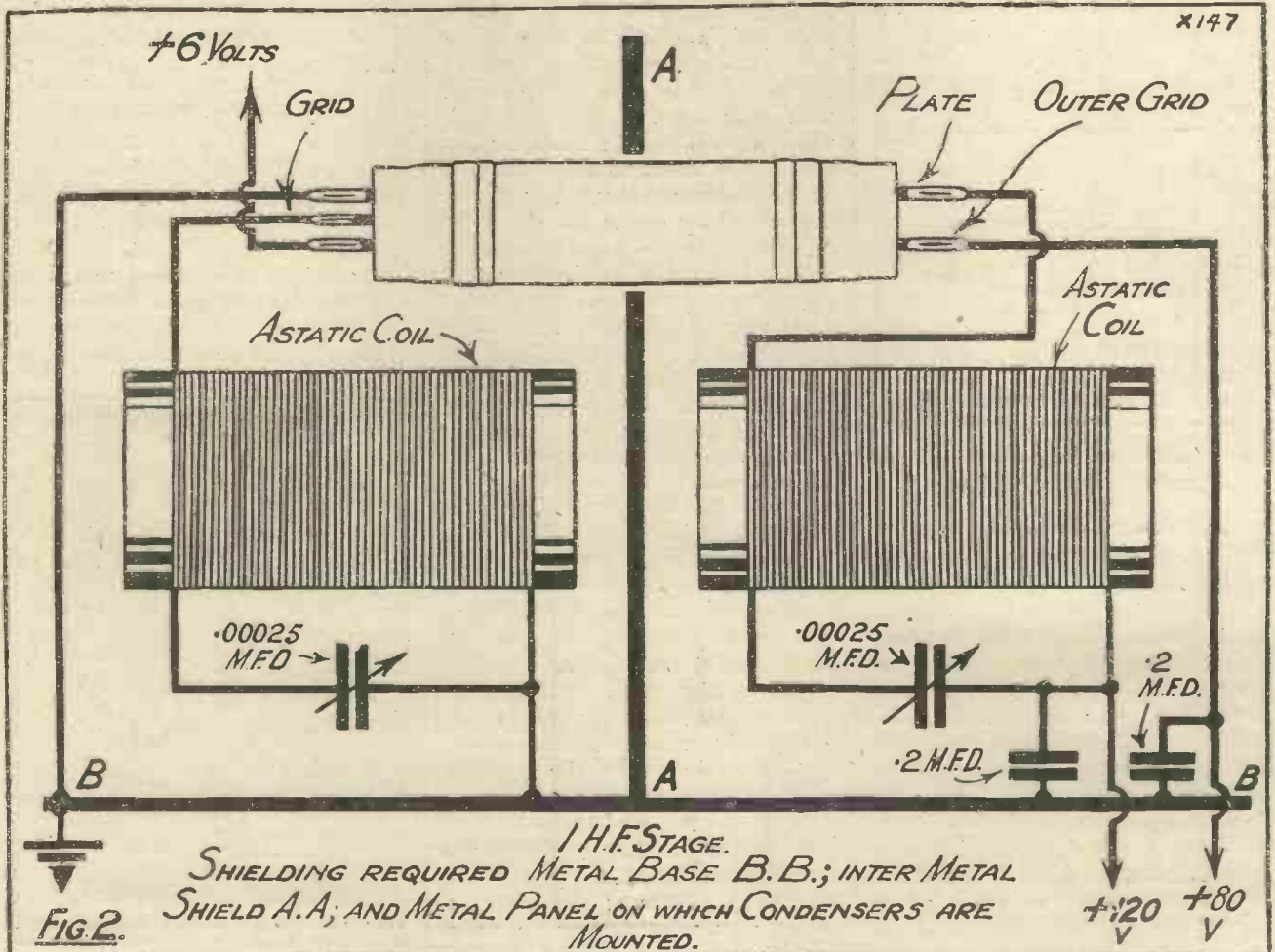
In sets using only one of these valves for high frequency constructors will meet with very little trouble, and they will no doubt get very



surprising results right away, but I should advise moving very carefully towards two valves only after having gained experience with one valve, not because there is any serious difficulty in cascading two valves, if sufficient care is taken, but the

magnification will be so large that the small amount of permissible back-coupling will hardly be recognised at first.

Aside from the question of the prevention of reaction by means of these
(Continued on page 447)



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—from RHYL, N. WALES : " We found the set in every way a splendid job, and at about 11.50 p.m. on August 1st, we tuned in on the speaker on the short wave band 16 stations in approximately one minute."

—from CREDITON, DEVON : " As a 3-Valve Set it is the limit of efficiency—excellent in tone, volume and simplicity. Daventry and Cardiff are sufficiently loud enough for pleasure on two valves on the speaker, and when dark it is really remarkable the number of European stations that are perfectly available."

—from ROCHESTER : " The tuning is very simple and gives great selectivity, and my small son of seven can tune in any station as quickly and as quietly as I myself. . . . The set is astonishingly good, and undoubtedly the very best 3-Valve Set yet devised."

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"Radidea" of the Allied Newspapers, Ltd., says:

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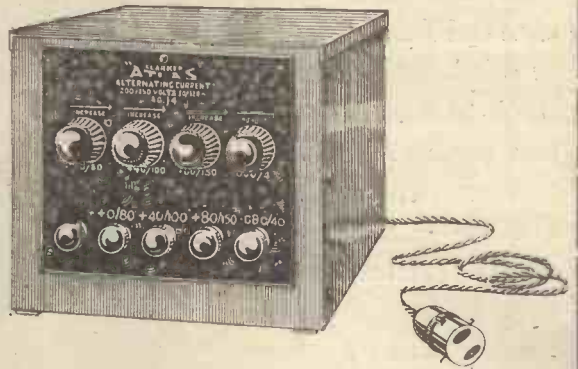
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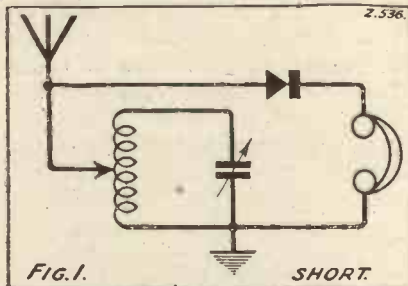
The "LOCALONG" CRYSTAL SET

by Harry P. Wootton

Two programmes are available, the change over being made by a single movement of the switch.

THE "Localong" is not just a "stunt" crystal receiver containing an obvious rearrangement of a well-known circuit. It contains an entirely new feature which gives the set an advantage over any other type, while in other respects the efficiency is in no way sacrificed. Indeed, the set includes several advantages not possessed by the average set, in addition to the novelty which is its special feature.

For millions of the inhabitants of the British Isles every crystal receiver can be a "two-station" set,



as 5 X X and the local station are both within crystal range of a considerable proportion of the population. The ordinary crystal receiver can be arranged to tune in the local station, and when it is desired to listen to 5 X X, either the coil is removed and a "Daventry" coil substituted for it, the set being retuned by the variable condenser, or else a loading coil is inserted in series with the local coil, the retuning being effected as before. Both methods can be equally efficient from the electrical point of view, and both require a little delay in effecting the change.

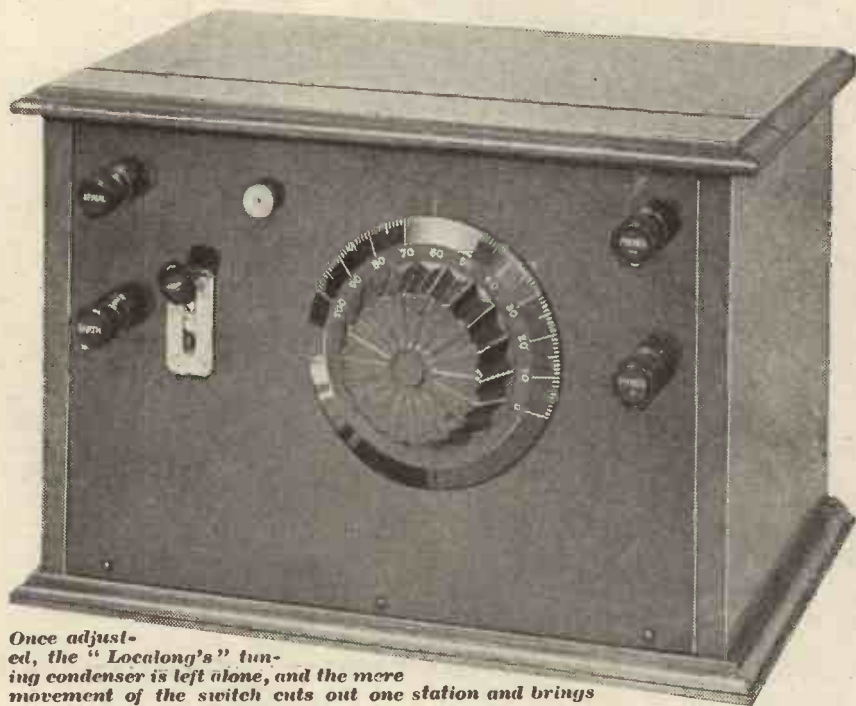
Previous Designs

A few sets have been designed with a switch so that the addition or substitution of the Daventry coil can be effected in a moment; but here, again, there is a little delay while the set is retuned by the variable

COMPONENTS NEEDED.

- 1 ebonite panel, 10 in. × 7 in. × 1/8 in. or 3/16 in. Ebonart, Radion, Resiston, Pilot, or any other well-known brand.
- 1 .0005 mfd. variable condenser of good quality. (That shown is a Cyldon.) Here, also, you have a wide range of alternatives. Bowyer-Lowe, Brandes, Formo, Igranic, Ormond, Peto-Scott, Raymond, etc., can be used.
- 4 terminals for aerial, earth, and telephones. The bakelite-covered Belling-Lee indicating terminals give a smart appearance, but any terminals will do.
- Pair of brackets. (Camco, Magnum, Peto-Scott, etc.)
- One baseboard-mounting coil socket.
- 1 adjustable condenser, .0001 to .0005 mfd. range. There are two alternatives here, the Formo-densor or the X-L Variodensor, Model G5.
- 1 double-pole double-throw change-over switch. Two very suitable

- switches for this purpose are the Wearite and the Utility.
- 1 cartridge-type detector. That shown is the R.I.-Varley. No special crystal detector is required in this set, and if any other type has previously given you satisfaction it will give just as good results in this set as in any other.
- 1 piece of Pirtooid tubing, 3 in. diameter by 3 1/2 in. long. This tubing is made by Messrs. Clarke, makers of the Atlas components. It is distinctly preferable to the ordinary cardboard tubing both in efficiency and convenience.
- Quantity of No. 22 D.C.C. wire.
- 2 spring clips. Very efficient and inexpensive clips for this purpose, known as the "Quickgrip," are made by Messrs. Ward & Goldstone, price 2d. each.
- 1 baseboard, 7 in. deep.
- 1 cabinet to take set. (Artcraft, Camco, Caxton, etc.)
- Wire for wiring up.



Once adjusted, the "Localong's" tuning condenser is left alone, and the mere movement of the switch cuts out one station and brings in the other.

The Localong Crystal Set—continued

condenser. Up to the present, to the best of the writer's knowledge, the only set in which the complete change without retuning can be made in a second is one in which two complete receivers, one for the local station and the other for 5 X X, are built in the same box, the change from one to the other being effected by a switch.

In the "Localong" a new switching arrangement and the use of one of the new types of variable condenser, together with an ingenious arrangement of the tapped circuit, enable not only very sharp tuning to be obtained without loss of signal strength, but also a complete change-over to be effected by the flick of a switch, without any alteration or adjustment of tuning dials. For the circuit and arrangement of this receiver the writer is indebted to the Editor, who showed him the virtue of it in his laboratory.

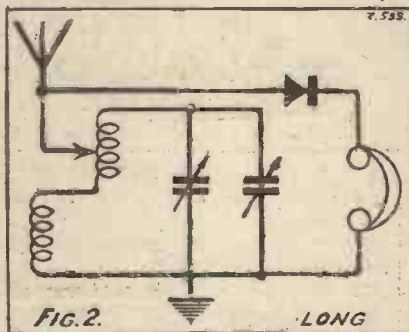
A Simple Receiver

Fig. 1 shows the circuit. The set comprises a home-made single-layer coil, a standard plug-in loading coil, a double-pole double-throw change-over switch, a .0005 mfd. variable condenser, a small adjustable con-

denser, and a standard type of crystal detector.

Two Circuits Available

It has long since been found that for high efficiency it is better to tap both the aerial and the crystal down to the tuning inductance and not to



include the whole of this latter in the aerial and detector circuits.

A number of sets have been made with separate tappings for the aerial and crystal, and experimentally this arrangement gives excellent results. Mr. Harris has simplified the design by making the crystal and aerial tap the same, and if the right point of tapping is chosen there is a very considerable sharpening of the tuning with practically no loss of signal strength. Dwellers on the South Coast who are

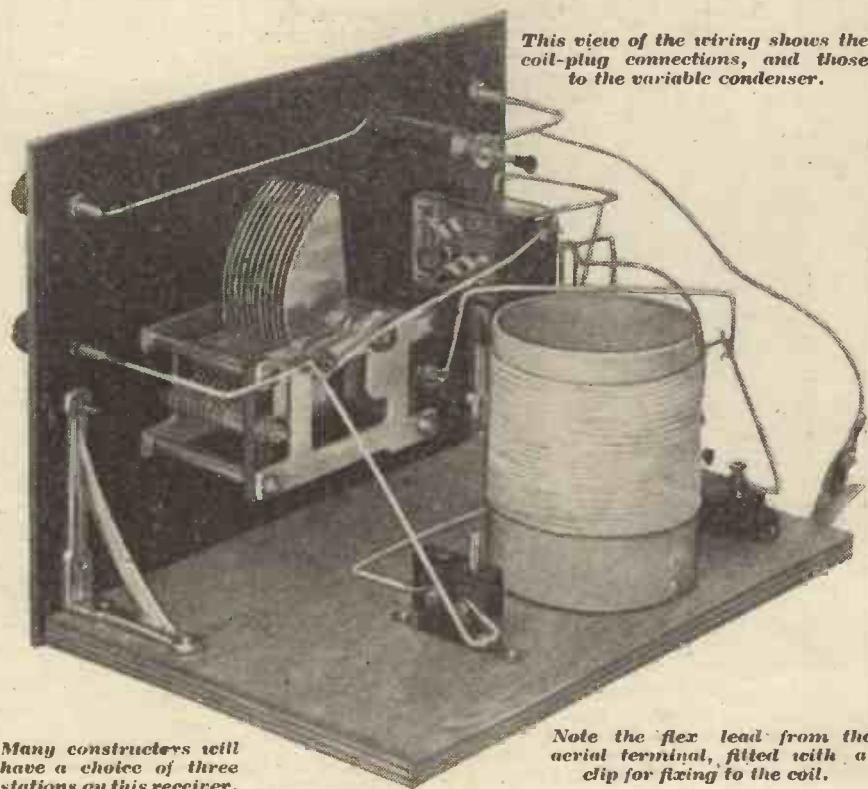
greatly troubled by Morse interference will appreciate this point.

Figs. 2 and 3 are simplifications of the main circuit to show the two arrangements possible with the switch. Fig. 2 shows the arrangement for the local station. Here aerial and crystal are tapped down the tuning inductance in the ordinary way, and tuning is effected once and for all on the .0005 mfd. variable condenser. The loading coil is disconnected, and once the local station has been tuned in on the condenser the set needs no further adjustment for this wave.

Fig. 3 shows what happens on the Daventry range. By changing over the switch the loading coil is inserted in series with the inductance, and if nothing else were done a resetting of the tuning condenser would enable Daventry to be tuned in. Why is it necessary to alter the adjustment of the variable condenser? Only because the capacity needed across the total tuning inductance for 5 X X in ninety-nine cases out of a hundred is different from that usually needed for the short-wave coil alone on the local station. The particular novelty of this set is that when we change over to the long-wave side an additional variable condenser of special type is placed in parallel with the normal condenser, adding to the total capacity across the inductance.

How It Works

To explain how this additional capacity works let us imagine a case in which, of the .0005 mfd. available, .0002 are required to tune the short-wave coil to the local station, and .0003 mfd. to tune the combined coils to the Daventry station. The difference between the two is .0001 mfd., and it follows that if in changing over from the short to the long wave we leave the variable condenser at .0002 mfd., and add to it .0001 mfd., then we shall exactly tune the combined coils to Daventry, without altering the setting of the main tuning condenser. This is precisely what is done in the "Localong" set, the small additional condenser being adjustable between about .0001 and .0005 mfd. As the short-wave inductance is tapped it is possible to arrange that the difference in capacity needed for changing from one tuning range to the other shall always fall

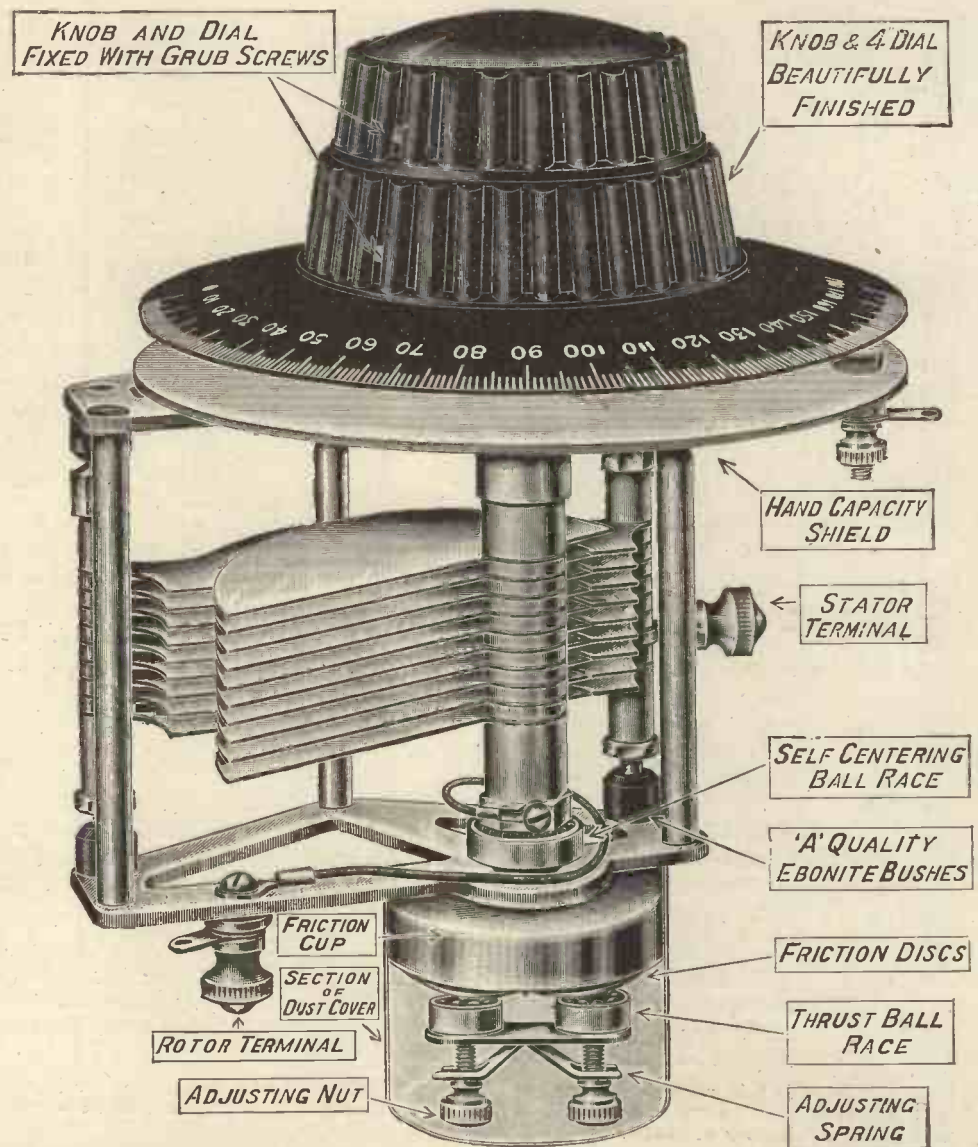


THE ORMOND LOGARITHMIC CONDENSER

When two or more similar tuned circuits are used and Ormond Logarithmic Condensers are fitted to the set, the dial reading of each condenser may be adjusted to the same figure, say 90 degrees, after tuning in a certain station. On tuning in another station, all dial readings will then be found at the same figure, say 120 degrees. These readings will be in step throughout the tuning scale. For ease in searching, using multi-tuned circuits, these condensers are essential.

This type of condenser has been designed to follow the Logarithmic law, that is, the capacity change, or resulting wave-length or frequency change, varies logarithmically.

The construction is similar to the Ormond S. L. F. Condenser, and efficiency at radio-frequency potentials is of the same highest standard.



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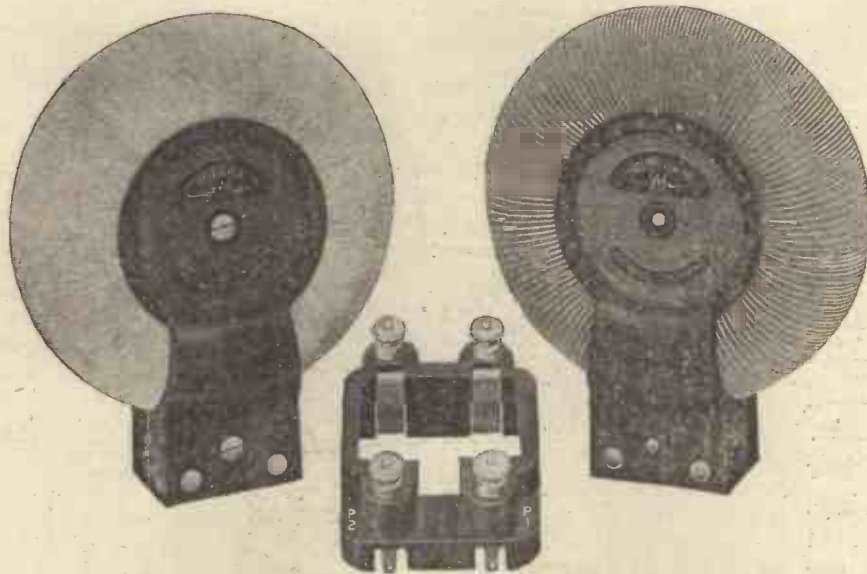
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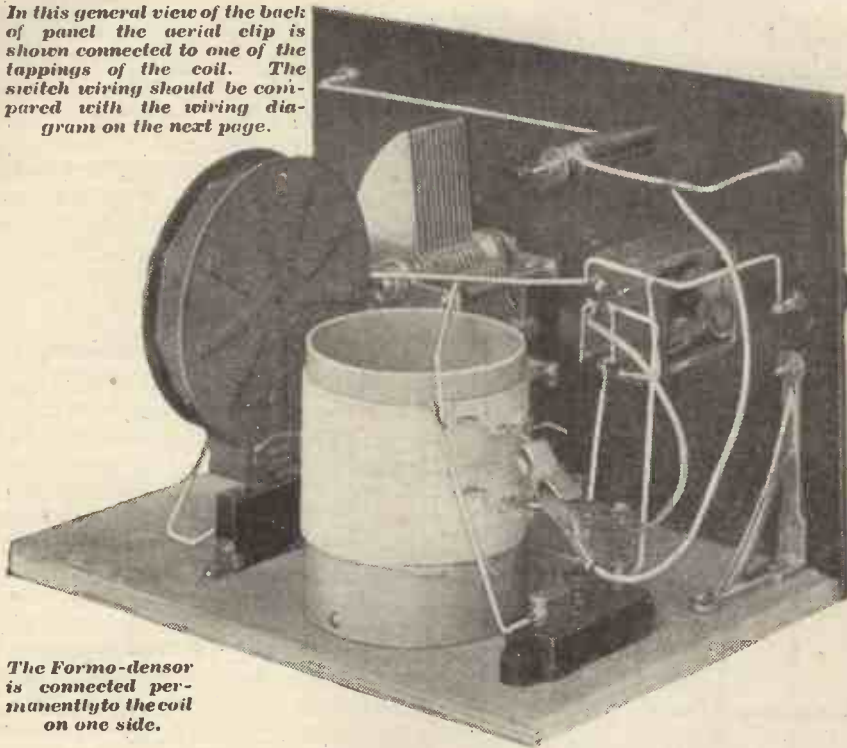
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T.C.29.

The Localong Crystal Set—continued

In this general view of the back of panel the aerial clip is shown connected to one of the tappings of the coil. The switch wiring should be compared with the wiring diagram on the next page.



The Formo-condenser is connected permanently to the coil on one side.

between the limits of the special condenser.

One of two things can happen in changing over in this set. Either the capacity needed for tuning to Daventry can be *more* than is needed for the shorter wave, in which case the additional adjustable condenser is paralleled on going over to the Daventry range, or it can be *less*, in which case the additional adjustable condenser is paralleled on the short wave. It is impossible to predict what will happen in any particular case, and only trial will show, for the wave-length of the local station may vary by 200 metres for different parts of the country, and at the same time aeri-als differ very considerably in their characteristics. A very simple trial shows which connection suits your particular conditions, as the writer will explain later.

The Short-Wave Coil

The first step is to wind the short-wave tapped coil. To do this punch two small holes half an inch from one end of the former. Thread the end of your No. 22 wire in one hole and out the other, leaving about one inch projecting. Now wind on exactly fifty turns as a single layer with turns touching, and when you have come to the fiftieth turn punch two more holes, side by

side, and thread in and out as before, leaving about one inch projecting. The winding will occupy about two inches on the former and will thus end about an inch from the end of the former.

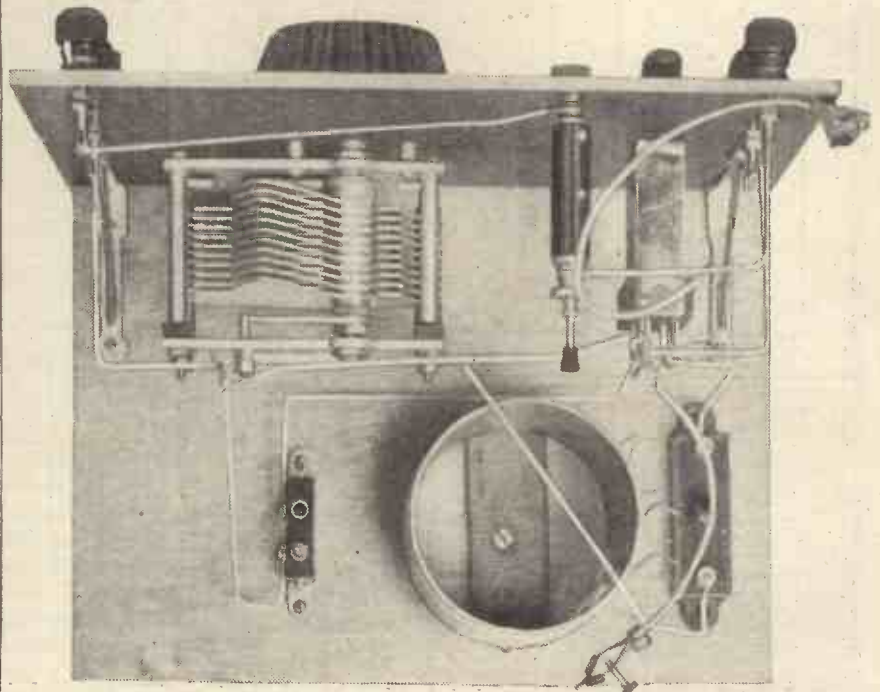
The next step is to count down five

turns, insert a sharp-pointed instrument under the fifth turn and prise it up sufficiently to slip underneath it a small piece of wood such as a match. Repeat the performance at the tenth and fifteenth turns, "staggering" the tapping points. Repeat the performance from the opposite end, tapping at five, ten, fifteen and twenty. When mounted these last tappings are at the lower end.

Making the Tappings

The next step is to make the actual tappings. This is done by scraping away the cotton covering from the wire above these matches and carefully tinning with a hot soldering iron. Now solder short lengths of stiff wire to each of the tapping points. These wires should project about three-quarters of an inch. On these the spring clips will grip. The small pieces of match can be left in position, or if you like you can warm the coil in an oven and paint it with shellac or celluloid varnish. When this is done and the coil is dry the matches can be withdrawn and there will be no risk of the turns loosening.

The coil is secured to the base-board by a very simple arrangement. Take a piece of wood about half or three-quarters of an inch thick, and



A "looking-down" photograph which shows the method of coil-fixing and the spacing of parts mounted on the baseboard.

The Localong Crystal Set—continued

cut it so that it just fits inside and across the bottom of the former. Secure the coil former to this piece of wood by two wood-screws through the sides, and a central screw through the transverse piece will now hold it in position on the baseboard. Do not mount the coil in position yet, as

position, by the terminal screw on the front of the panel. The wire for contact can be gripped between the end of the detector and the panel itself.

The "Wearite" double-pole double-throw switch has eight contacts projecting at the back. The two middle

Notice, too, that the earth terminal is connected to the left-hand top contact on the D.P.D.T. switch, also to the moving plates of the variable condenser and to the loading coil, as well as to the telephones. The earth, too, is connected to one of two contacts on the switch. Which of the two you need must be determined by experiment, so do not make this connection yet.

The Switch Connections

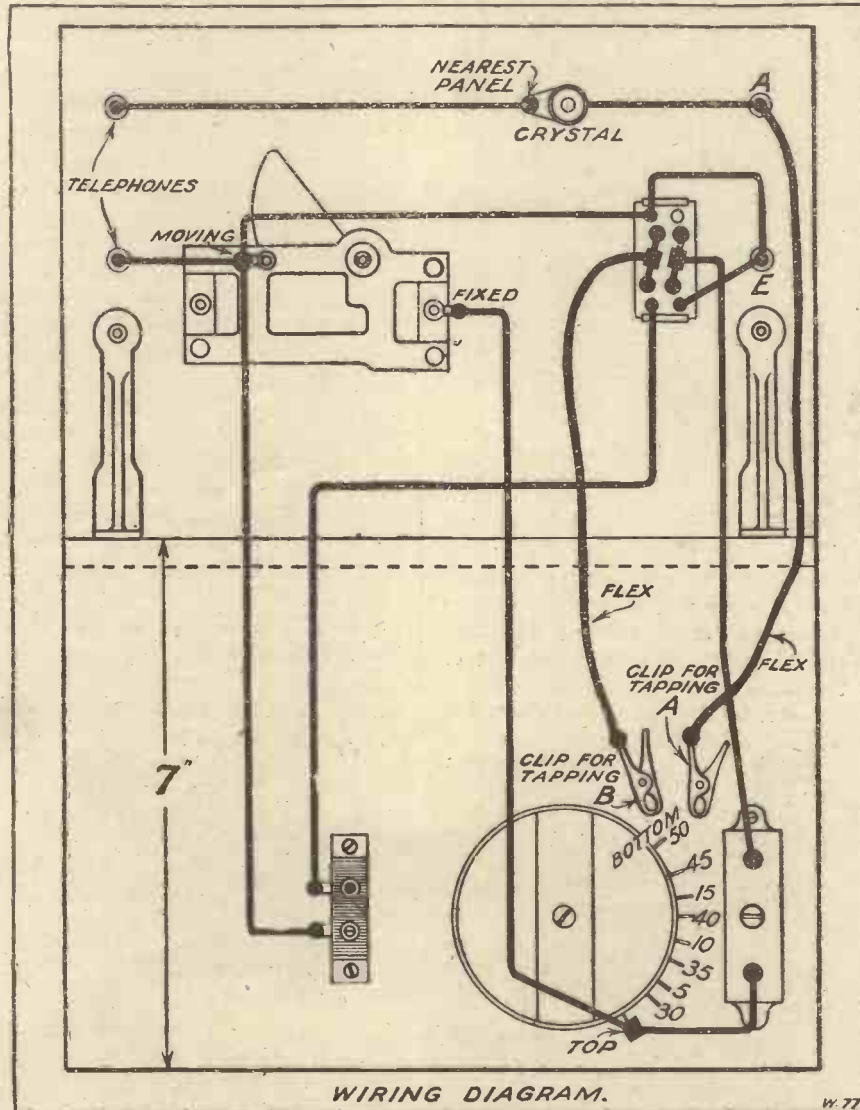
As shown in the wiring diagram this connection is made to the bottom right-hand connection of the switch, which causes the small adjustable condenser to be put in parallel with the main condenser on the long wave. If it is necessary to put it in parallel on the short wave, then this earth connection must be taken to the top contact of the switch, which is now shown free.

The fixed plates of the variable condenser are taken permanently to the top of the coil and to one side of the small adjustable condenser. This is the only permanent connection to the coil. Notice that a flexible lead is taken from the two middle terminals of the left-hand side of the change-over switch to a clip. When the switch is on the short-wave side this clip is connected directly to earth, and its object is to enable you to adjust the position of your variable condenser reading to suit the particular circumstances. The other side of the small adjustable condenser is taken permanently to the middle contacts of the right-hand side of the change-over switch.

Preliminary Tests

The loading coil should be either a Gambrell D or a No. 100 of numbered series. The Gambrell D seems to suit this arrangement very well.

When all of the connections have been made, with the exception of the special one referred to, fit the loading coil into place, then push the change-over switch right down (local-station position), clip your "aerial-and-crystal" clip to about the tenth turn down from the top, and then vary the lower clip and the variable condenser until your local station tunes at about the middle position of your variable condenser. The nearer the bottom you place this lower clip the less



its exact position will depend upon that of other components.

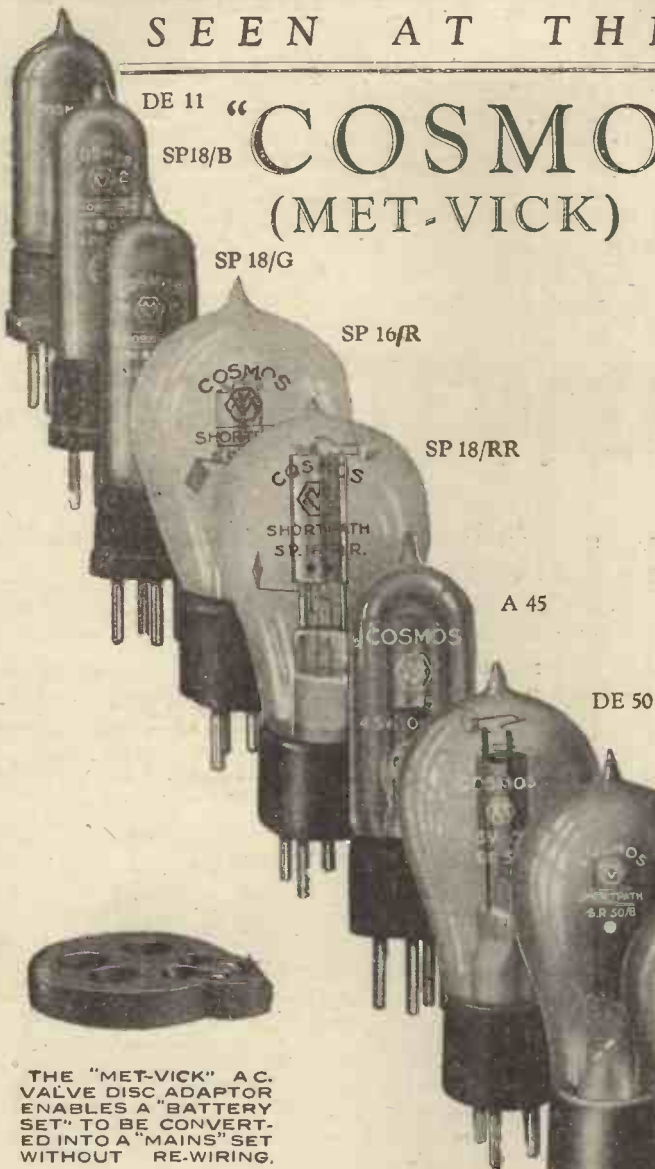
Fixing the Detector

Now mount the variable condenser, panel brackets, terminals, crystal detector, and double-pole double-throw switch on to the ebonite panel. A very simple way of fixing the cartridge type of crystal detector is to drill a small hole, undo one of the terminal screws, push the shank through the panel, and hold it in

pairs should be joined together as shown. The "Utility" has only six, and will thus not need the joining wires. Wiring up is very simple if it is done as in the diagrams. Notice that a flexible lead is taken from the stiff wire which joins the aerial to the crystal detector, this flexible lead terminating in a spring clip. Another flexible lead is taken from the two middle left-hand contacts of the double-pole double-throw switch (looking from the back).

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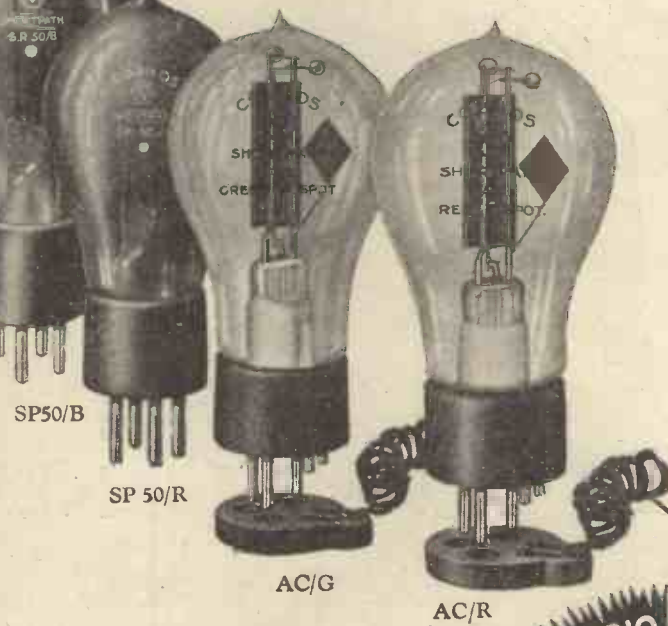
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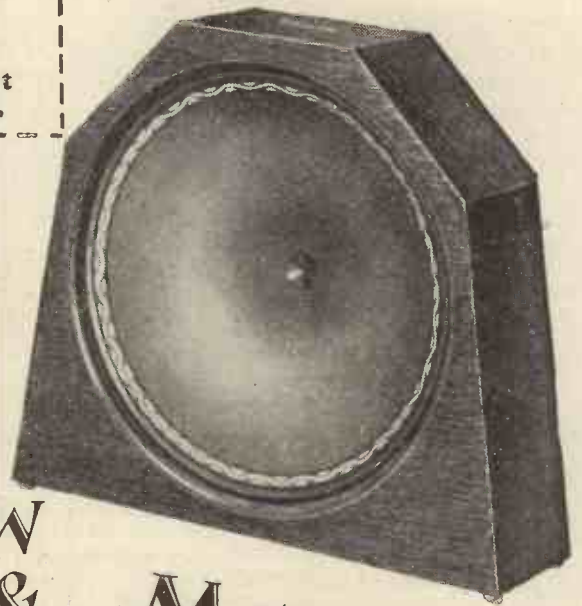
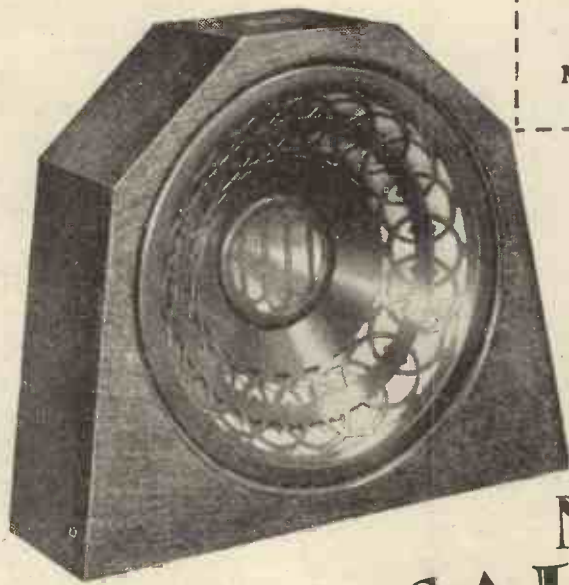
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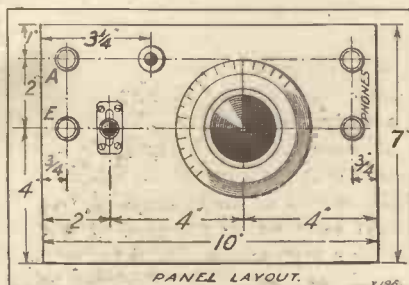
The Localong Crystal Set—continued

condenser will be required to tune your local station.

Now throw over your switch to the long-wave position and, having carefully noted the reading for the local station, vary the dial until you pick up Daventry at best strength. Note the position on the dial. If the dial reading for Daventry is *higher* than that for the local station, join the bottom right-hand contact of the switch to the wire joining the top left-hand and the earth. If the reading is *lower*, then join the top right-hand contact of the switch to the wire joining the top left-hand lug to the earth terminal.

Setting the Condenser

Having made this connection, turn again to the front of the receiver and proceed as follows: If the Daventry setting has been *higher* than the local reading, push the switch down, tune carefully to the local reading, and *without altering the variable condenser setting* turn the switch over to the Daventry range again (upwards), and



with a piece of wood cut to resemble a screwdriver slowly turn the knob of the adjustable condenser until you hear Daventry at best strength. If all is well you should go past the position with ease, and be able to come back to it with certainty.

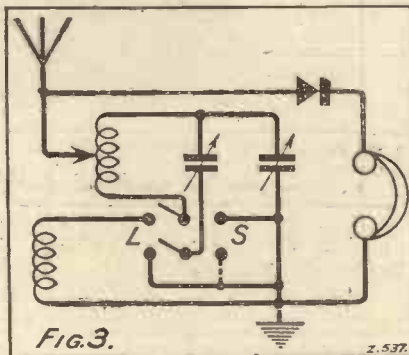
If the Daventry reading is *lower* than that of the local station, first put the switch on the long-wave position (upward) and tune in to Daventry at best strength on the variable condenser. Now, without changing the setting of the tuning condenser, throw the switch over to the local (downwards) position, and with the wooden screwdriver adjust the small variable condenser until you hear the local station at best strength.

Varying the Tappings

When either of these methods has been adopted you will find that throwing over the switch will change

at once from the local station to Daventry, or vice-versa, without a second's delay.

A good general position for good strength and sensitivity is with the



upper clip on the tenth turn from the top, but here you may care to try experiments to find which suits you best. The lower the tapping the higher the selectivity, but if you take the tapping too low with your particular aerial you will lose signal strength. Remember that when you make this adjustment you will have to reset the two condensers as previously described, but once you have found the best position to your aerial the new adjustment can be made in two or three minutes.

Remember that the small adjustable condenser has a rather high minimum, and if the difference in capacity between the two tuning points is less

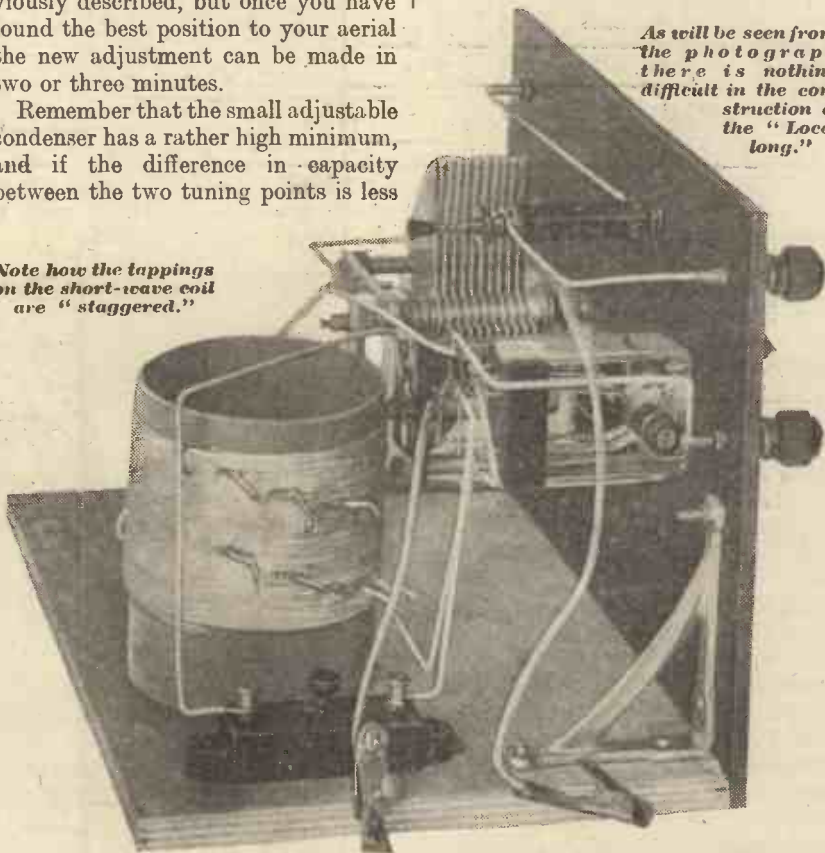
than the minimum of this adjustable condenser you will not be able to find the station you are seeking. To remedy this it is only necessary to alter the position of the lower clip, which will automatically vary the difference of capacity between the two tuning points.

Daventry "Junior"

Tested in Mr. Harris's laboratory this set was found to have an efficiency as high as any other crystal set tested there, and furthermore the presence of the loading coil permanently in the socket did not make the slightest difference to the efficiency of the short-wave working. An interesting point was that tapping at the tenth turn down the signal strength was within 5 per cent. of the strength obtainable by using the whole of the coil, but the selectivity was far sharper than when using the whole of the coil.

For the reception of the new Daventry experimental station (5GB) you will, of course, have to retune the condenser on the panel, keeping the switch in the low wave-length position.

Note how the tappings on the short-wave coil are "staggered."



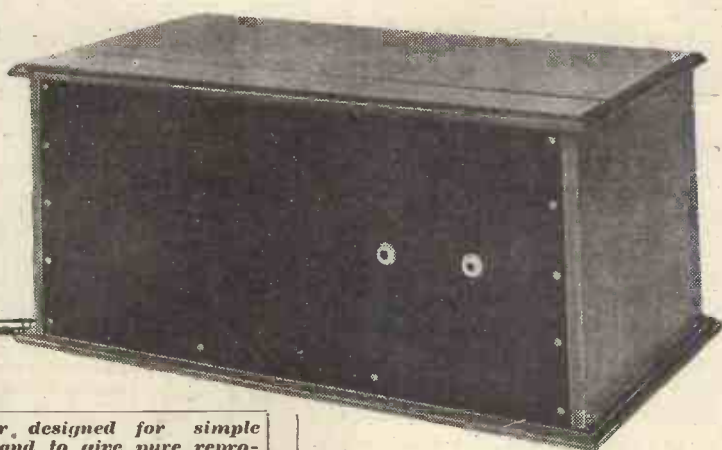
As will be seen from the photograph there is nothing difficult in the construction of the "Localong."

In the foreground is the adjustable condenser with which the long-and-short wave stations are "balanced."

FOOLPROOF RADIO!

The "Knobless" Three

By R.W. HALLOWS M.A.



THIS is a set designed particularly to give very pure reproduction of the transmissions of the local station and to be so completely fool-proof that it can be operated by even the youngest member of the family.

A receiver, designed for simple operation, and to give pure reproduction from the local station.

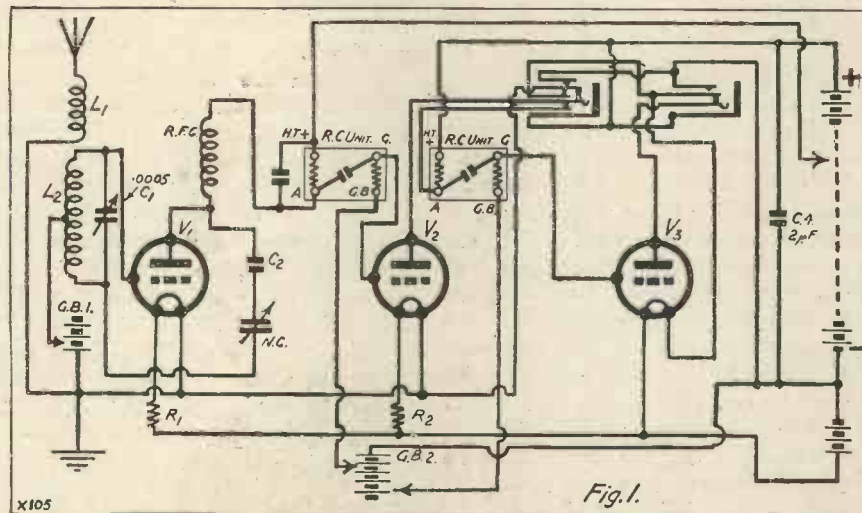
members of their family to use will find the "Knobless Three" ideal for

tuning condenser and of the small neutralising condenser which acts as a volume control. These, however, are inside the cabinet and neither need be touched (unless, of course, the local station makes a change in its frequency) after the set has once been tuned and adjusted to give the most enjoyable volume of sound.

The Circuit Employed

The circuit actually used in the set under description is seen in Fig. 1. It consists, as will be seen by an examination of the diagram, of an anode-bend rectifier followed by two resistance-capacity-coupled not-magnifying valves. V_1 is a valve of the 20,000- to 25,000-ohms impedance class, V_2 a small power valve, and V_3 a super-power valve. The couplings between V_1 and V_2 and V_2 and V_3 are Polar units, one of the Red Seal and the second of the Green Seal pattern.

It may be wondered that a valve with a high amplification factor is not used as rectifier, with an anode



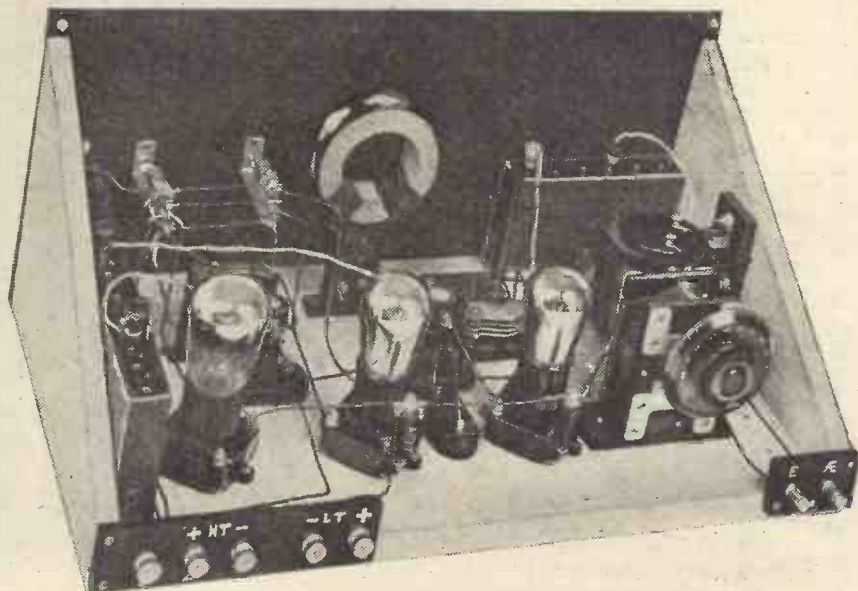
It will appeal especially to those living in broadcasting centres who desire to have receiving apparatus which eliminates all the bother of tuning and enables the programmes to be switched on whenever they are required with even less trouble than is needed for starting up a gramophone.

the purpose. To be strictly accurate, there are two knobs, those of the

Simple Panel Layout

As will be seen from the photograph of the complete receiving set, the panel contains nothing but two jacks. The insertion of the loud-speaker plug into the first of these automatically switches on the first two valves, and brings the apparatus into play. If the second jack is used all three valves are in operation. The removal of the plug from either jack puts the set "to bed," so to speak, by automatically performing the necessary switching off. These are the only operations necessary, once the apparatus has been adjusted.

Experimenters who desire something that they can safely leave for



The completed receiver with valves and coil in position. When once tuned the setting is left, and the set is operated by a switch.

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VALVE
WITH THE
WONDERFUL
Mullard
P.M. FILAMENT**

Mullard
THE · MASTER · VALVE

10/6
TWO TYPES
FOR 4 VOLTS
AND 6 VOLTS

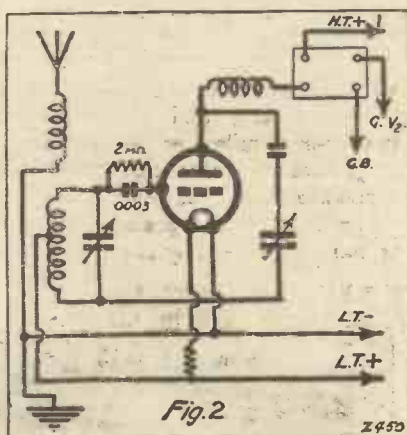
THE MULLARD WIRELESS SERVICE CO. LTD., MULLARD HOUSE, DENMARK STREET, LONDON, W.C.2

Foolproof Radio—continued

resistance of several megohms in its plate circuit. There are two reasons for this. In the first place a high degree of amplification per stage is not aimed at, the chief object of the design being to ensure that each valve shall be working well within its powers. Much greater purity is obtainable when only a comparatively small amount of amplification per stage occurs.

Avoiding Overloading

The second reason is that the introduction into the plate circuit of



a valve of a very high resistance does not make for quite the purity of reception that is desirable in a short-range set designed specially for quality. Since either V_2 or V_3 may be the output valve, according to the jack into which the plug is inserted, both must be capable of handling the

energy required for working a loud speaker.

COMPONENTS REQUIRED.

- 0005-mfd. variable condenser (any good make or type).
- Dimie No. 1 coil with base (McMichael).
- 3-inch length of ebonite tube $1\frac{1}{2}$ -inch diameter (Becol).
- 0003-001-mfd. fixed condenser for C. (Dubilier, Lissen, T.C.C., Igranic, etc.).
- Fixed condenser, any capacity from ·0003 mfd. upwards, for C. (Dubilier, T.C.C., Lissen, Igranic, etc.).
- Fixed condenser 1 or 2 mfd. (T.C.C., Dubilier, or Lissen).
- Baseboard-mounting coil holder and No. 400 coil (or standard radio-frequency choke for broadcast wavelengths).
- Baseboard-mounting neutralising condenser (Peto-Scott).
- 3 valve holders (any good make).
- 1 Red Seal and 1 Black Seal resistance-capacity coupling unit (Polar).
- 7 terminals.
- 5 wander plugs, 2 red and 3 black.
- 1 single filament and 1 double filament jack (Edison Bell, Lotus, Igranic, or Bowyer-Lowe).
- 1 5-terminal strip and 1 2-terminal strip.
- Baseboard 16 in. \times 10 in., with panel supports.
- Panel 16 in. \times 8 in. (ebonite or hard wood may be used).
- Suitable cabinet.

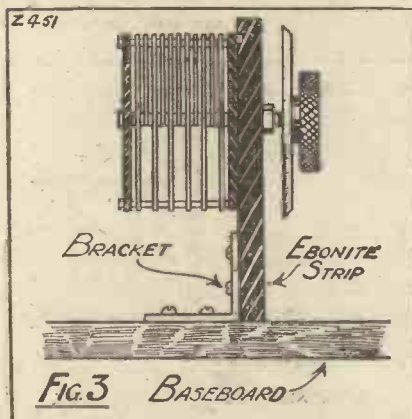
FILTER UNIT.

- 0005-mfd. fixed condenser (any make previously mentioned).
- 2 1-mfd. fixed condensers (ditto).
- Audio-frequency choke, value about 30 henries (Pye or other good make).
- 2 terminals.
- Suitable box measuring $6\frac{1}{2}$ inches in length by $3\frac{1}{2}$ inches in width and $3\frac{1}{2}$ inches in height—all inside measurements.

A super-power valve is used in the last holder, not because an enormous

volume of sound is produced, but again from considerations of purity of reproduction.

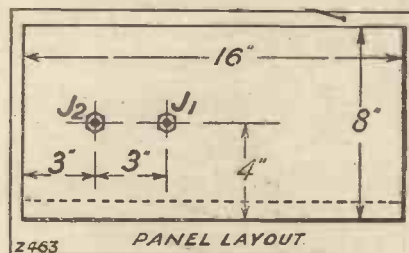
Anyone who cares to make the experiment with any loud-speaker set of wiring a milliammeter into the plate circuit of the last valve and watching its needle when a musical item is being reproduced, will find that



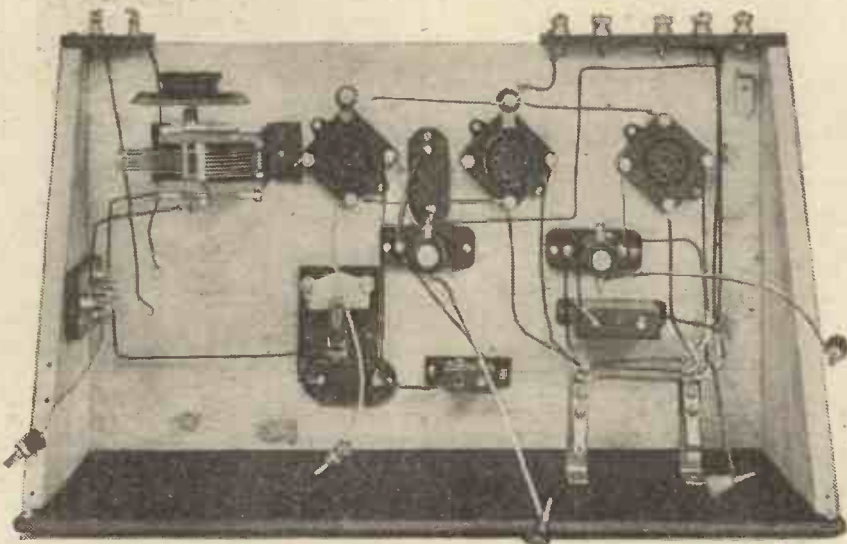
careful grid biasing and proper adjustment of the plate voltage, suffice to keep the needle normally quite steady when an ordinary power valve is used in the last holder and the loud speaker is producing an ample volume of sound. It will, however, be noticed that some notes of certain instruments—the piano in particular—cause a marked kick to occur. A similar kick may be observed during vocal solos and when loud beats on the drum or the cymbals occur.

Tracing Distortion

These movements of the needle are due to the fact that the last valve is being somewhat overloaded by the



arrival on its grid of voltage swings with which it is unable to deal faithfully. Actually, the grid-swings produced by sounds of the kind mentioned may be surprisingly large. The ordinary small power valve can deal with swings up to 15 or 18 volts, and this is sufficient to prevent distortion when what we may call all ordinary

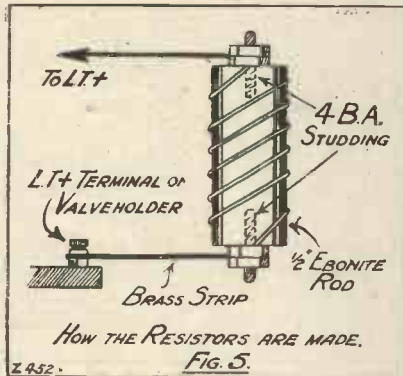


This photograph shows very clearly the layout of the components, and the simple nature of the wiring.

Foolproof Radio—continued

sounds are coming in. During reception, however, at good loud-speaker strength in a room of average size occasional voltage swings on the grid of the last valve due to certain sounds may reach an amplitude of 30 volts or more.

The super-power valve can deal with such grid swings without being overloaded, and its use therefore means that the set can be made to

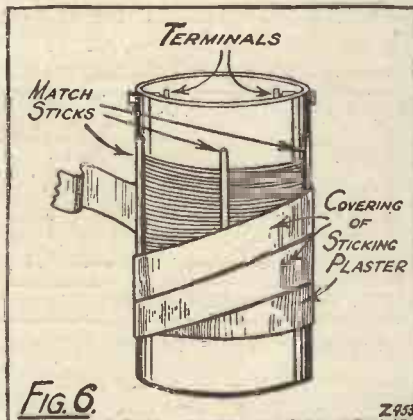


reproduce music of all kinds without even an occasional trace of harshness.

The Fig. 1 circuit is intended for working off a small indoor aerial within about five miles of 2 L O or three miles of other main stations of smaller power.

When Frame is Used

When used at very short ranges the set will work quite satisfactorily if leads from the ends of the windings of a frame are taken to the aerial and earth terminals. The grid tuning condenser seems to "pull" the frame,



and brings it into resonance, the tuning being remarkably sharp. At longer ranges, however, and in any case where the set is intended to be used always with an aerial of this

type, it is better to employ a centretapped frame and to eliminate altogether the two inductances within the receiving set. In this case connections are taken from the two contacts of the grid tuning condenser to the aerial and earth terminals, and a third terminal is mounted between them, to which is taken a flex lead attached to the first grid battery negative wander-plug. The ends of the windings of the frame are connected to the outside terminals and its centre-tapping to the middle terminal. Tuning still remains sharp, and the volume is controllable in a rather convenient way by the act of turning the frame slightly in one direction or another.

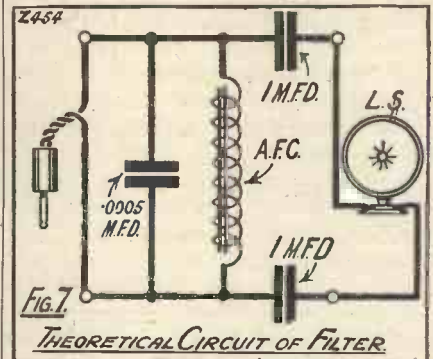
With an anode-bend rectifier followed by resistance-capacity coupling containing an anode resistance of high value it is impossible to obtain full, smooth-controlled reaction effects. By the use, however, of a 20,000- to 25,000-ohm valve, with a radio-frequency choke and a resistance of modest value (that of the Polar Red Seal unit is about 80,000 ohms) in its plate circuit, delicate and very effective volume control can be obtained by means of a small neutralising condenser in the position occupied by that marked N.C. in Fig. 1. The fixed condenser C_2 , which is placed in series with the neutralising condenser, is a protective device which prevents any possibility of a short-circuit taking place either through an actual contact between the fixed and moving vanes of the small variable condenser or through the accumulation of dust upon them.

Extending the Range

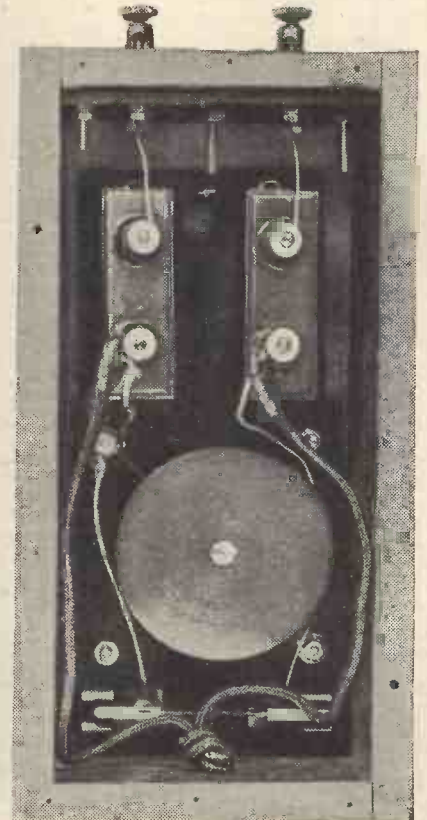
Should it be desired to use the set at greater distances than those mentioned, the simple alterations indicated in Fig. 2 will very much extend its range. In this case the first grid battery is eliminated, the lead from the centre-tapping of L_2 being taken direct to L.T. positive: A .0003 mfd. condenser with a 2-megohm leak in parallel is inserted between the grid of V_1 and the coil. Full reaction effects are now available by means of the neutralising condenser, so that good signal strength at considerable range from the local station is obtainable.

Both range and signal strength may be still further increased by

using a high μ valve for V_1 , and a Cosmos R.C. unit or an R.F.-Varley Type B unit between V_1 and V_2 . Neither of these alterations in any



way affects the ease of operation of the apparatus, and at ranges of twenty-five miles or so the high-magnification valve and an anode resistance of large value will give reproduction that is probably as pure as can be obtained by any method.



The internal arrangement of the filter, the choke and condensers.

It will be noticed that though V_1 is an anode-bend rectifier, no potentiometer is used for regulating its

*Fight your way to Stand 141
and see the most wonderful
Valve yet designed!*



You have all read about this amazing valve in your Wireless papers. Come to our Stand now and see it. Find out how you can get absolutely Perfect Reception. A full range of the famous Six-Sixty standard Valves for 2, 4 and 6-volt accumulators are available in the Non-Microphonic type. This is the only valve which can be truly said to be utterly free from all interferences. It is mounted in a complete vacuum, which means that you can dispense with anti-microphonic valve holders, and more than that, you are free from external influences which affect the filament through the bulb of the valve.

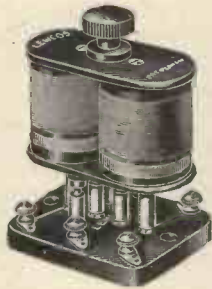
STANDARD PRICE 21/6

Don't forget the Stand Number—141.

**SIX-SIXTY
GLOWLESS VALVES**

The Electron Company, Ltd., 122-124, Charing Cross Road, London, W.C.2.

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BINOCULAR COILS

Type.	250/550 m.	1000/2000 metres.
Split Primary ..	Ref. BSP5 Price 15/-	BSP20 20/-
Split Secondary ..	Ref. BSS4 Price 10/-	BSS15 12/-
Reinartz Transformer ..	Ref. BRT5 Price 10/-	BRT20 12/-
Split Sec. Tapped Prim.	Ref. BTP4 Price 10/-	BTP15 12/-
Aerial Coil ..	Ref. BAC5 Price 10/-	BAC20 12/-
Rectangular 6-pin base	Ref. SPB	2/9

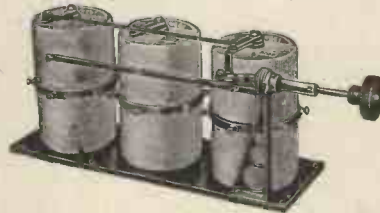


CENTRE TAPPED COILS

CT 25	Price	CT 100	Price	
CT 35		3/6		CT 125
CT 40				CT 150
CT 50				CT 200
CT 60				CT 300
CT 75				

LEWCOS "X" COILS (Double Tapped)
 X60 .. 4/9 X200 .. 7/-

DUAL COILS



The set of Coils DSP/3 is particularly suitable for the conversion of existing Solodyne Receivers, as the set of three coils will fit exactly into the space occupied by the old type of three separate screens and bases.

Ref. No.	Single Coil Units.	Price.
DRA/1	REINARTZ AERIAL COIL	£1-12-6

Ref. No.	Multi-Coil Units.	Price.
DSP/2	1 S.P. Aerial Coil and 1 Split Primary H.F. Transformer with Reinartz Reaction, complete with panel control ..	£3-7-6
DSP/3	1 S.P. Aerial Coil and 2 Split Primary H.F. Transformers, the last with Reinartz Reaction complete with panel control ..	£5-0-0



SIX PIN COILS

Type.	250/550 m.	1000/2000 metres.
Split Primary Aerial Coil ..	Ref. SPA5 Price 6/-	SPA20 6/-
Split Primary Transformers ..	Ref. SPT5 Price 10/-	SPT20 10/-
Split Secondary Transformers ..	Ref. SST4 Price 10/-	SST15 14/-
Reinartz Transformer ..	Ref. RT5 Price 10/-	RT20 14/-
Magnetic Reaction Trans. ..	Ref. MRT5 Price 10/-	MRT20 14/-
Split Secondary Tapped Primary	Ref. SSTP4 Price 10/-	SSTP15 14/-
Screen and Base	Ref. SCB	9/8

FRAME AERIAL WIRE

3/6 per 100 feet. Colours—Red, Blue, Green, Marone, Brown, Old Gold.

BATTERY LEADS

4-way 5/6, 5-way 6/6, 6-way 7/6, 7-way 8/6, 8-way 9/6.

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14/36 11/- per 100 yards, 23/36 15/- per 100 yards, on cardboard reels,

GLAZITE
BRITISH MADE REGD

COLOURED CONNECTING WIRE

10 ft. coils, 10d. per coil.
2 ft. lengths, 9d. per packet of 4 lengths.

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9/38 LZ2138 .. 4/- per 50 yards.
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Send for complete catalogue of LEWCOS Radio Products

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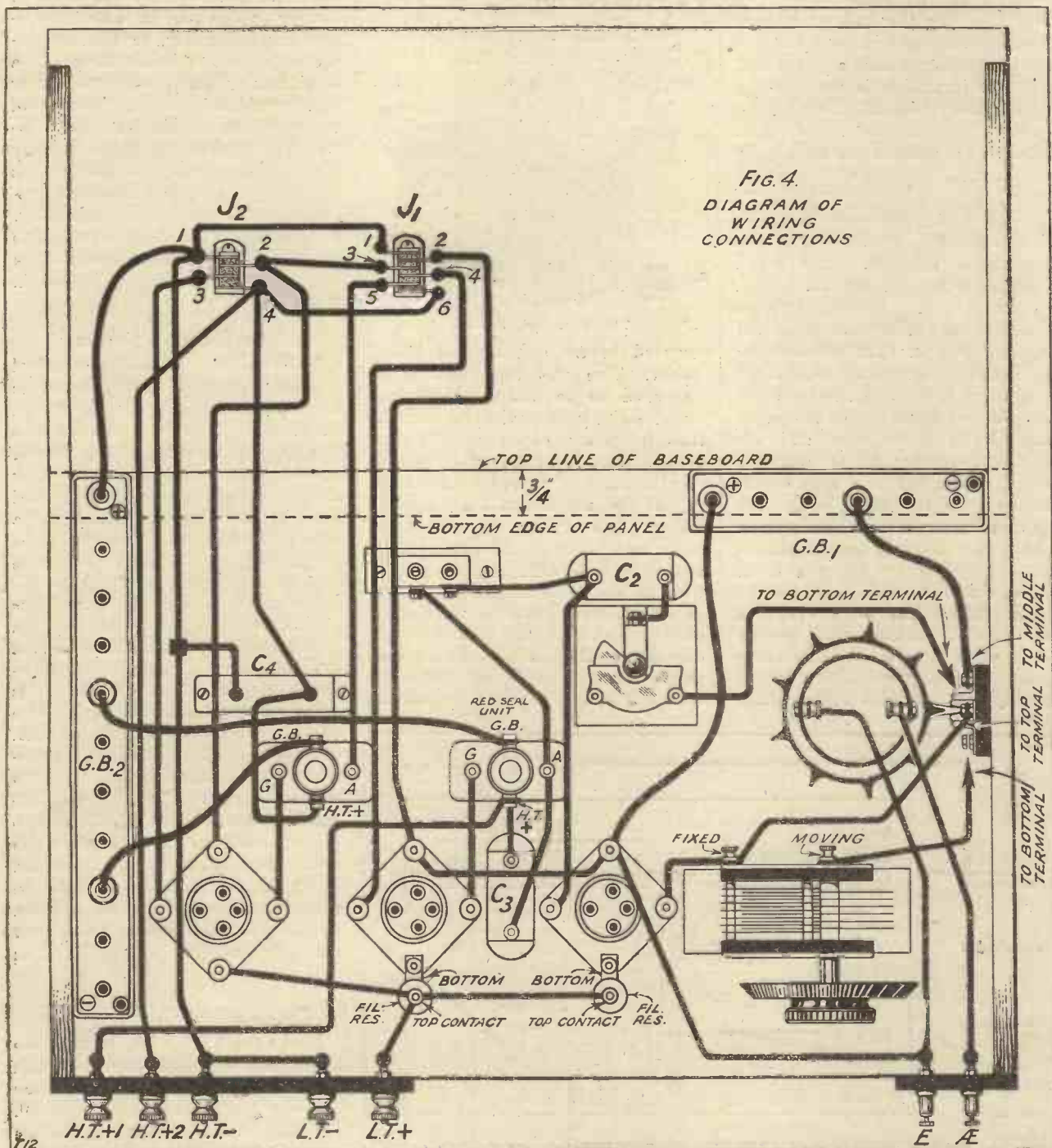
Foolproof Radio—continued

steady grid potential. A study of static curves would lead one to believe that the working-point of an anode-bend rectifier was quite critical, being situated just at the top of the lower bend.

Under actual working conditions, however, the position is very different, for the introduction of a resistance into the anode circuit has the effect

of flattening out the characteristic considerably. There is, in fact, no sharply defined lower bend, and the valve rectifies almost equally well over a surprisingly wide range of negative grid potentials. When the set was first constructed a potentiometer was connected across the L.T. leads and the positive of the grid battery was wired to its slider.

It was found, though, that any of the various makes of valve inserted into the first holder gave excellent results when the slider was moved right over to the negative end, and adjustment of the grid potential performed merely by the use of the $1\frac{1}{2}$ -volt tapings of the grid battery. It was felt, therefore, that the potentiometer might be eliminated



Foolproof Radio—continued.

without loss, thus saving a knob, even if an invisible one.

An ebonite panel was actually used, but this was done purely for the sake of appearances. Since the only components in electrical contact with the panel are the two jacks, whose frames are both at the same potential, there is no need that the insulation should be good, or, indeed, that there should be any insulation at all. To those who like the look of ebonite I would recommend in cases like the present one, in which a very high degree of insulation is unnecessary, second quality ebonite. This material is extremely cheap and, if of good make, its appearance leaves nothing to be desired.

Easy to Build

The construction of the set is a very simple business. The panel, having been marked out and drilled, is attached to its supports, and the baseboard and the two jacks are mounted upon it. The coil base for L_2 is fixed by screws to the right-hand panel support, as looked at from the rear, the two middle terminals being linked by a short wire, and the variable condenser C_1 is mounted vertically near the rear edge of the baseboard at the same end. The condenser seen in the photographs is an Ormond square-law, which was mounted simply by fixing a small strip of ebonite to the ebonite portion of its frame. The strip was then secured to the baseboard by screws.

Any other type of one-hole fixing condenser can be mounted as shown in Fig. 3. The positions of the other

components are plainly shown in the diagram of actual wiring connections given in Fig. 4. The two grid batteries are placed one at the back of the panel at the right-hand end and one against the left-hand panel support. They are held in position either by the use of grid-battery clips or by employing, as I have done, Meccano angle pieces, which are obtainable from any toyshop.

Little Soldering Required

The radio-frequency choke seen in the photographs is a No. 400 coil



The filter output unit.

mounted in an ordinary baseboard holder. This was used because it happened to be available and was found to give good results; a standard radio-frequency choke will answer even better, and if this is substituted it may be mounted upon the baseboard in the position shown for the coil-holder. The wiring may be done either as shown in the photographs with Glazite or by means of flexible wire, for the set lends itself admirably to Mr. Harris's Radiano method of construction. The only parts which cannot be "Radianoed" are the two jacks, since connections must be soldered to their tags. Why has no

enterprising maker yet brought out a fan-tailed jack provided with small terminals?

Between the positive low-tension busbar and the filament positive terminals of the valve-holders of V_1 and V_2 fixed resistors are used. None is required for V_3 if a 4-volt accumulator is used, since there are several 4-volt super-power valves which require no reduction of the filament battery potential. A fixed resistance must, however, be used in connection with this holder as well if a 6-volt accumulator is employed. Any type of commercial fixed resistor of suitable value may be used, but those seen in the photographs are actually home-made, and their construction is so simple that many readers will probably like to make their own. Fig. 5 shows how this is done. Into either end of a piece of $\frac{1}{2}$ -inch ebonite rod is screwed a short length of 4 B. A. studding.

The Fixed Resistors

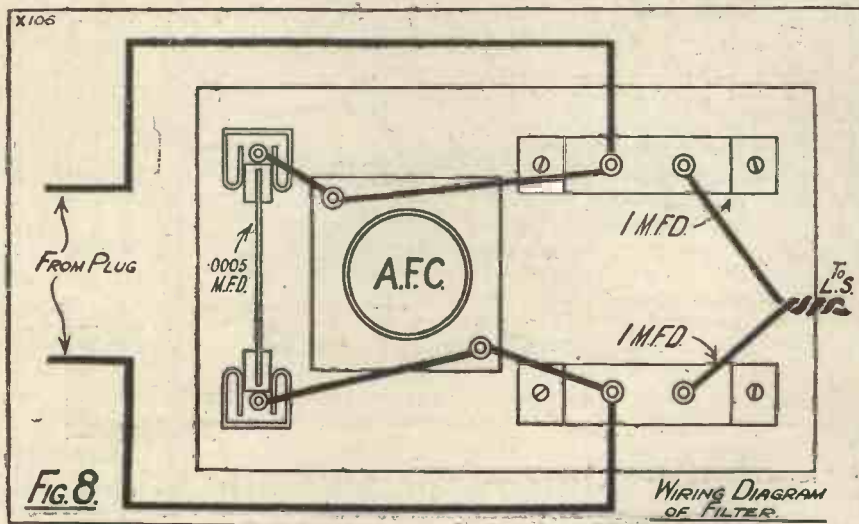
To one of these is fixed by means of a nut a brass strip, through a hole in which passes the L. T. positive terminal of the valve holder. Connected also to this piece of studding is one end of the resistance-wire winding, its other end being connected to the second piece of studding and fixed by a nut. A second nut on the top piece of studding enables the L.T. positive lead to be attached to it.

The coil L_1 , which slips inside L_2 , is also home-made, the former being a 3-inch length of ebonite tube $1\frac{1}{8}$ inch in diameter. That seen in the photograph has an end-piece, but this is quite an unnecessary fitting. Close to one end of this drill two 4 B. A. clearance holes diametrically opposite one another, and in these mount a pair of small terminals. Attach the end of a reel of No. 30 D.C.C. wire to one of these and wind thirty turns evenly and tightly on to the former. When all the turns are on, cut the wire, leaving several inches to spare, and slip a small rubber band over the last few turns to keep them in position.

Completing Construction

Drill a small hole in the former close to the last turn, pass the end of the wire through it, pull tight and attach to the second terminal. Now cut off the heads of half a dozen long wooden

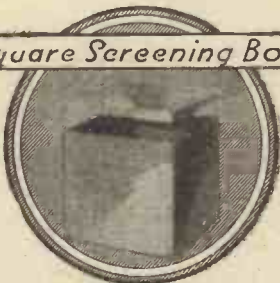
(Continued on page 444.)



NEW COMPONENTS for 1928

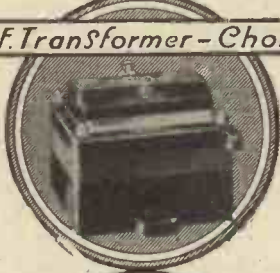
These new 1928 Bowyer-Lowe components represent the latest phase in component design and performance. It is only after exhaustive tests and trials in the Bowyer-Lowe laboratories and works, when absolute accuracy and the highest standard of performance are assured, that they are offered to the public.

Square Screening Box



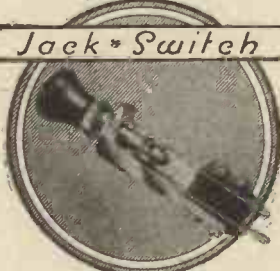
SQUARE SCREENING BOX
Matt finished aluminium, supplied with baseboard and fixing screws. Packed flat and can be assembled in a few minutes.
List No. 283. 6/-

L.F. Transformer - Choke



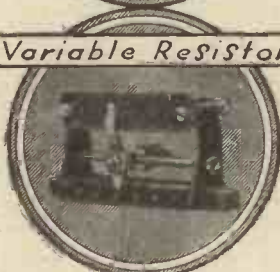
LOW FREQUENCY TRANSFORMERS AND CHOKE
Bowyer-Lowe Low Frequency Transformers made two years ago are still giving excellent service, but the large amount of copper and iron necessary for the construction of an efficient transformer made them expensive. Owing to recent developments we can now supply this transformer at an economic price and for those who want the best possible reproduction there is no other choice. Supplied in two ratios for first and second stage.
List No. 284. Ratio 3-1 22/6
List No. 285. Ratio 6-1 25/-
Also in Multi ratio giving 1.8, 3, 3.66, 4.5, and 6 to 1.
List No. 286 27/6
Also Low Frequency Choke.
List No. 287 20/-

Jack Switch



JACK SWITCH
Fills the need for a simple and positive On and Off switch, is similar to our jacks in construction, and fits the panel in the same manner.
List No. 281. 3/-

Variable Resistor



VARIABLE RESISTOR
Better than the panel rheostat and an advance on the fixed resistor, for use on the baseboard of the receiver and graduated so that settings may be repeated. Wound under tension on a non-shrinking former and providing maximum air cooling. Base is of Bakelite, made in two resistances.
List No. 289. 5 ohms 3/-
List No. 290. 30 ohms 3/-

Whiteline Valve Holder



A great advance over all previous types of springy valve holder. Inter-electrode capacity is at a minimum and always constant, making it ideal for the Super-Het and short-wave receivers. Initial amplitude of vibration under shock is large, yet

damping is quick and gentle. Made of Bakelite, supplied with marked terminals, soldering tags and fixing screws. Base 1 1/2 inch square overall with projection adjacent to plate leg of valve "Whiteline" for safety.
List No. 282 2/3

SIX SOCKET BASE
Has sockets to the standard "Southern Cross" arrangement, and is for use in the Square Screening Box or when the six pin coils and transformers are to be used without a screen. Provided with six terminals correctly numbered. Made of Bakelite.
List No. 291 3/6

Six-socket Base



MARK II WAVEMETER
Covers all wave-lengths between 150/2000 metre. Fitted with a buzzer, self-contained battery, and a lamp to indicate resonance for transmitting and other uses where more convenient. Tuning is very sharp. Two coils with calibration charts are contained in case. A high class instrument which every serious experimenter should possess.
List No. 226—
In oak case .. £6 0 0
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Mark II Wavemeter



TWO SPEED DIAL
Manufactured under Burndept Patent 243,218.
This dial is of polished Bakelite 3 1/2" diam. concealing a double reduction friction epicyclic gear, giving a reduction of 18 to 1 or a direct drive. Entirely free of backlash or noise—all the moving parts being floating and self compensating for wear. The Station recorder is provided with rereadable scales and is readily detachable.
Fits 3/16" or 1/2" spindles.
List No. 253. Complete with Station recorder 9/-

Two Speed Dial



UNIVERSAL H.F. CHOKE
The ideal component wherever a H.F. Choke is indicated. By virtue of its special sectional winding not only is the distributed capacity kept at a minimum but it will efficiently operate over a very wide range of wave lengths from the shortest to the longest.
List No. 288 Price 9/-

Universal H.F. Choke



WRITE TODAY FOR A NEW COMPLETE LIST OF PRODUCTIONS

A NEW SUPER HETERODYNE RECEIVER for amateur construction covering all wave-lengths from 35 to 2,000 metres. also the latest in SHORT WAVE RECEIVERS will be shown on our Olympia Stand.



NATIONAL RADIO EXHIBITION OLYMPIA STAND NO 124

BOWYER LOWE CO LTD LETCHWORTH



EFESCA REGENERATIVE AERIAL TUNER

The Efesca Regenerative Aerial Tuner comprises a coil wound on a cylindrical former having an inductance equal to a whole range of plug-in type coils, from No. 30 to No. 300, and by using a .0005 Variable Condenser in parallel all wave-lengths are covered from 200 metres to 2,600 metres.

A single unit with the tuning range of a whole set of coils.

Ask for free blue print of an easily made 25/- 2-valve set employing the above. Price 25/-



The "DUOTAP"

EFESCA (Junior) H.T. BATTERY ELIMINATORS for giving H.T. supply direct from the electric mains where direct current is available

Price £1 15 0

FALK, STADELMANN & CO. LTD.
EFESCA ELECTRICAL WORKS
83, 93, Farringdon Road, London, E.C. 1.
And at Glasgow, Manchester, Birmingham,
Dublin, Newcastle and Cardiff.

NEW TYPE Reactive AERIAL TUNER

The "DUOTAP," with only two tappings enabling selection of low or high wave stations by just changing a plug into alternative tappings.

Price 15/- each.

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Wireless message
to you*

Wonderful B.B.C. Exhibit
Sets for the Million
or the Millionaire

Everything that counts
in Wireless

Every Stand packed
with interest

The Royal Air Force Band
in attendance

Dancing on specially
prepared floor

THE NATIONAL RADIO EXHIBITION

OLYMPIA

16

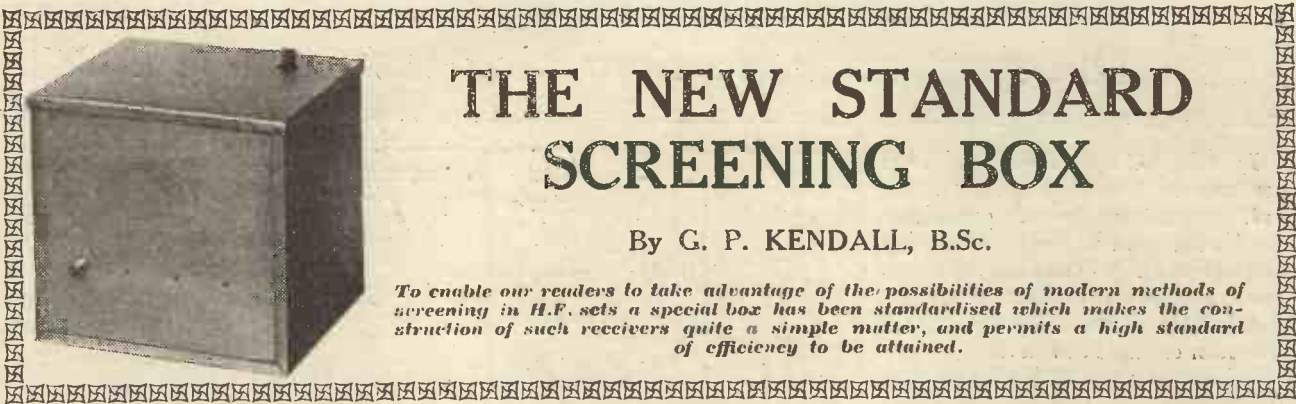
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NEW HALL

SEPTEMBER 24TH TO OCTOBER 1ST

11 A.M. TO 10.30 P.M. (TUESDAY SEPT. 27TH UP TO 5 P.M.)

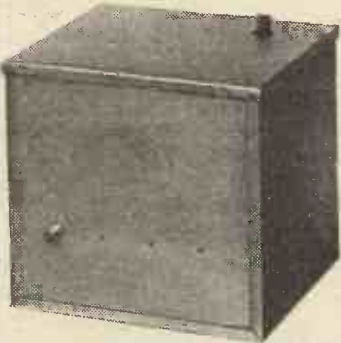
DANCING



THE NEW STANDARD SCREENING BOX

By G. P. KENDALL, B.Sc.

To enable our readers to take advantage of the possibilities of modern methods of screening in H.F. sets a special box has been standardised which makes the construction of such receivers quite a simple matter, and permits a high standard of efficiency to be attained.



Most experimenters who have had a reasonably wide experience of the various types of H.F. amplifying circuits, starting with the crude early forms of tuned anode and passing through the successive improved schemes as they were developed, must surely have acquired a feeling that there was a good deal more amplification bottled up inside the valve, so to speak, and that great things would be possible if only one could get it out in a profitable manner.

To take an extreme example, if the early tuned-anode circuit were constructed in such a manner that the valve could give anything like the full possible amplification the only result was that the whole system became unstable and oscillated, and so some scheme had to be adopted for holding it down. At first this simply meant the use of some device for introducing heavy damping into the circuits, so that extra losses were produced and the tendency to oscillate was smothered.

Later Methods

Naturally, by the time this was done the efficiency of the H.F. amplifying circuits had been so lowered that the actual magnification obtained was poor, and the possibilities of the valve were far from realised. Improved methods of controlling the tendency to oscillate of any efficient H.F. stage of the normal type have become available, methods, moreover, which do not necessarily achieve their end by introducing heavy losses, and so it has become possible to get more and more amplification from the valve.

From quite an early stage it has been realised that it would probably pay to proceed by attempting to remove the causes of the tendency to oscillate, rather than to use devices to control the tendency. Now, this tendency is the result, broadly speaking, of interaction between succes-

sive H.F. stages, or between the input and output (usually the grid and plate) circuits of each stage.

Important Benefits

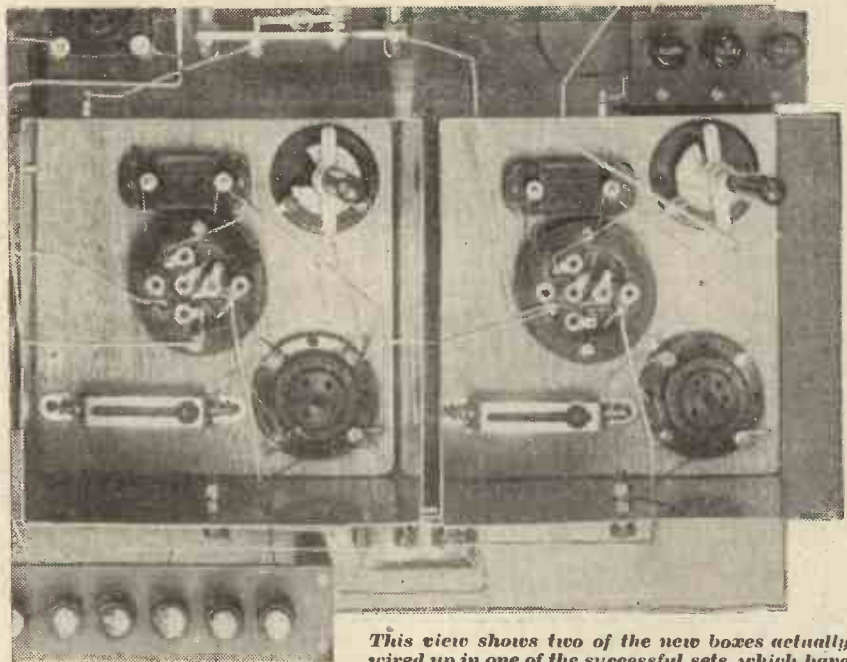
Such interaction or "coupling" takes place in three principal ways: (1) Through the plate-to-grid capacity of the valve itself; (2) by actual electromagnetic and electrostatic coupling between the coils, wiring, etc.; and (3) by virtue of conductive couplings, such as that of the resistance of a common H.T. or grid-bias battery.

With (1) we are not here concerned; it must be regarded as inherent in the ordinary three-electrode valve, and it must generally be taken care of by some stabilising device, such as a neutralising circuit. Cause (3) has not received any very great degree of notice in the past, but it is likely to require more attention in the future as sets are developed giving higher and higher magnification.

Cause (2) is the one under consideration, and this is an extremely important factor in deciding the efficiency of a set. Except in the most carefully designed sets it is one of the greatest producers of instability, and if it can be cut out the tendency to oscillate is much reduced. Moreover, its elimination brings with it further important benefits in permitting higher magnification and greater selectivity to be obtained from a given circuit.

Stick to the Design

It is natural, therefore, that all good designers should devote great care to its reduction by all the available methods, spacing out components and wiring, and so on, and this is one of the main reasons why readers of constructional articles are so frequently warned against modifying designs, cramping them into smaller space, bunching their wiring, and so forth.



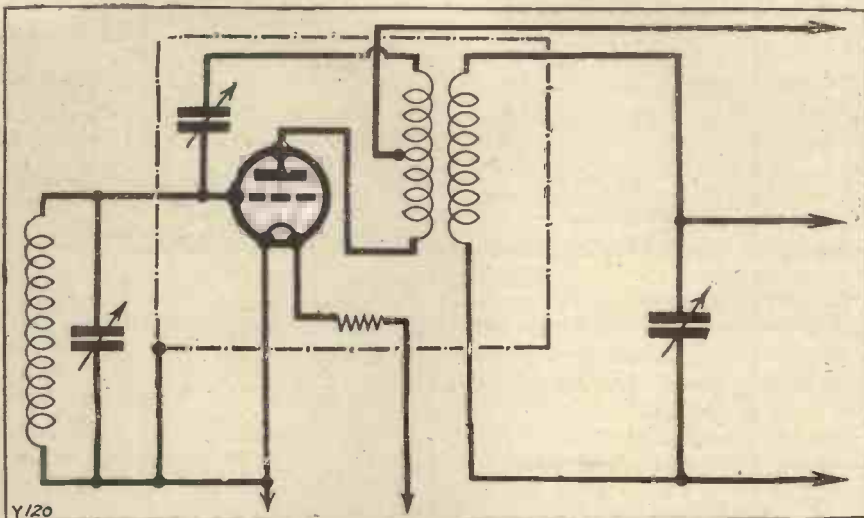
This view shows two of the new boxes actually wired up in one of the successful sets which have been produced with this system of screening.

The New Standard Screening Box—continued

In addition to the well-known methods of spacing and careful layout, numerous special expedients have been used to help in reducing interaction. For example, one of the main factors is magnetic coupling between coils, and much ingenuity has been expended in devising means of eliminating, or at least reducing, such couplings, by setting the coils at special angles, screening them, using so-called "fieldless" coils, and so on.

Logical Screening

Screening is undoubtedly an extremely promising method, and offers a practically complete solution of the problem when properly applied. A good deal can be accomplished by the use of partial screening (between the coils, for example), or partial screening combined with "fieldless" coils, but it would seem that the logical method is to screen each complete H.F. stage as a separate unit, enclosing it in a closed box or case, or in one compartment of a larger system of screens. In such a box, for example, might be placed the



A typical use for the new box.

valve and its associated control devices, the tuning coil of either its grid or plate circuit (but not both, of course), and the tuning condenser.

The advantages of such complete screening as this are quite well understood and appreciated, but it has hitherto scarcely been within the reach of the amateur on account of

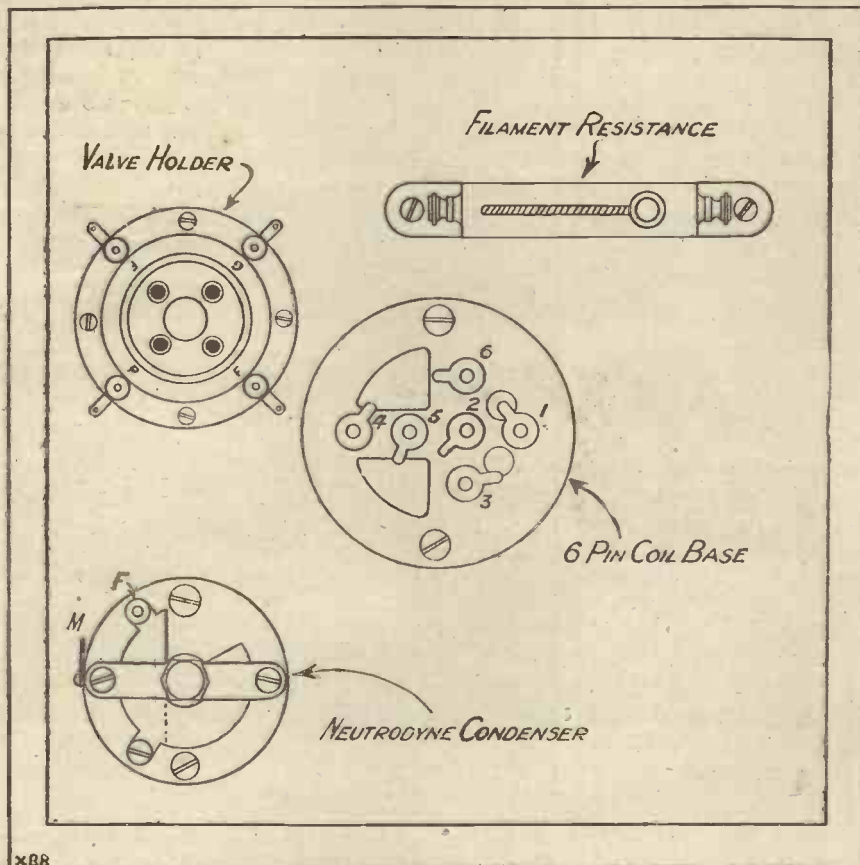
the difficult constructional work involved and the expense incurred if the necessary boxes were specially made up by a manufacturer for use in a single set. It has been felt, however, that an effort should be made to render these benefits available to the home constructor, and accordingly a design has been worked out for a standard stage-screen box for use in WIRELESS CONSTRUCTOR, "Modern Wireless," and "Popular Wireless" sets.

This box is so arranged as to be applicable to a great variety of sets and circuits, and since it is an absolutely standard piece of apparatus it is being put on the market by a number of firms at quite moderate prices. The details have been so arranged, moreover, that no difficult constructional work is involved, the layout and assembly of a set using these boxes being actually much easier than when the H.F. stages are built up of separate components spread out on the baseboard.

The Specification

The two main obstacles in the way of the use of complete stage screens by the home constructor have thus been removed, and some very interesting possibilities in the way of sets using this method of isolation are at once opened up. The box itself is rectangular, being six and a half inches square and six inches deep, with a detachable lid giving access to the interior. Copper and aluminium are the usual metals.

(Continued on page 451.)



The standard layout of components in the box.



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This mass plate cell is ideal for sets not taking more than $\frac{1}{4}$ ampere. The charge can be spread over months without danger of sulphation. Supplied dry charged and ready for use after filling with acid.

2 VOLTS 20 AMPS.
5/-

RADIO EXHIBITION
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GROUND FLOOR
212
GALLERY



H.T. 18

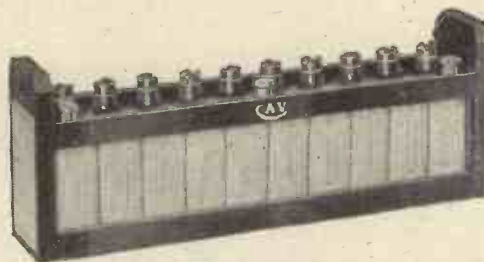
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The Remler Drum Dial gives a full 15 inches of dial space divided into 200 divisions.

Calibration strips are rigidly mounted, easily removable and renewable. Call letters readily written in. Spiral gear drive gives quiet operation and no back-lash. Socket and 6-volt lamp furnished for illumination. Easily mounted, round drilled hole required for panel plate.

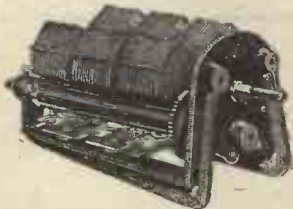
The Remler Drum Dial will drive all Remler condensers either single or in gangs of one, two, or three condensers. Mounting template is included in each carton. Right- or left-hand mounting. Supplied for either clock-wise or counter clock-wise rotation of dial. Price 25/- each.

3-IN-LINE CONDENSER

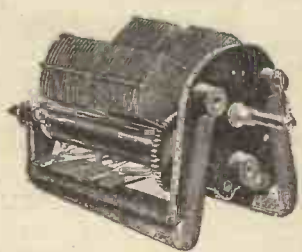
The new Remler Three-in-Line Condenser offers definite advantages found in no other gang condenser.

Complete insulation of each rotor permits its use with any system of neutralization.

Balancing condensers are integral with the main unit and are quickly adjusted by means of conveniently located regulating screws. Ample space is allowed between sets of plates. Frame is die-cast aluminium with black crystalline enamel finish. All insulation is of genuine Bakelite. Maximum capacity of each section, .00035 mfd. Size over all, 7 ins. deep by 3 1/2 ins. wide. Price 73.6 each.



2-IN-LINE CONDENSER



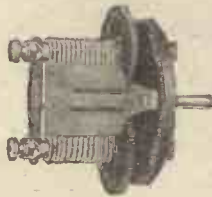
The Remler Two-in-Line Condenser is identical in construction and design with the Three-in-Line Condenser described above, except that it is of the two-gang type.

Size over all, 5 1/2 ins. deep by 3 1/2 ins. wide. Maximum capacity of each section, .00035. Price 56/-

TWIN-ROTOR CONDENSER

Rotation of the dial through a full 360 gives greater separation of stations at all wavelengths than is possible with the usual 180° dial.

Both sets of plates rotate. They are driven by Bakelite gears operated by a brass pinion. This construction results in complete insulation of the dial shaft from the plates, allowing the dial to be grounded and completely eliminating body capacity effects. Price 29/6 each. Maximum capacity .00035.



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THIS SEASON'S VALVES

A brief classification of typical examples of the latest British valves.
By KEITH D. ROGERS.

FOR the benefit of constructors this month I am attempting to classify in table form some of the latest of the valves on the British market so as to provide somewhat of a guide for those who are building new sets or who wish to know what valves are available on the market at the present time.

In order that the choice shall be made as easy as possible the valves have been divided up according to the various tasks for which they are best employed. Even so, it will be found that many valves fall into more than one class, where they are suitable for different operations.

In such cases an asterisk has been placed in the class for which, in the writer's opinion, the valve is best employed. Thus, the D.E.L.610 appears in several sections with an asterisk against it on the H.F. side.

In this way I hope the guide will help those who are doubtful about the uses that can be made of various valves, though some may not agree with certain of the groupings—they are not necessarily those listed by the manufacturers, but are based on personal experience.

H.F. VALVES OF RECENT DESIGN.

Type	Make	Fil. Volts	Fil. Amp.	Impedance	Mu	Price	
S.P.18G.	{ Benjamin Cosmos }	2.0	0.3	17,000	15.0	s. d. 10 6	
B.4H.*	{ B.T.-H. }	6.0	0.25	28,000	20.0	10 6	
B.21		2.0		32,000	16	10 6	
B.54		4.0	0.06	55,000	17.5	10 6	
H.512	{ Burndept }	6.0	0.12	40,000	18.0	10 6	
H.310		4.0	0.10	55,000	17.0	10 6	
610H.F.		6.0	0.1	20,000	20	10 6	
410H.F.	{ Cossor }	4.0	0.1	20,000	20	10 6	
210H.F.		2.0	0.1	41,000	22	10 6	
E.S.5H.F.*	{ Ediswan }	6.0	0.1	30,000	20	10 6	
S.625 (Shielded grid)		6.0	0.25	175,000	110	22 6	
D.E.L.610*	{ Marconi or Osram }	6.0	0.10	13,000	15	10 6	
D.E.H.612		6.0	0.12	33,000	20	10 6	
K.H.1 (A.C. mains valve)		3.5	2.0	30,000	40	22 6	
D.E.L.410	{ Osram }	4.0	0.1	14,000	13	10 6	
D.E.H.410		4.0	0.1	70,000	40	10 6	
P.M.5X.*	{ Mullard }	6.0	0.1	19,000	17.5	10 6	
P.M.3		4.0	0.1	16,000	13.5	10 6	
P.M.1H.F.		2.0	0.1	18,000	8.9	10 6	
S.S.610R.C. and R.C.T.	} "T" type more ex- pensive (non- microphonic)	6.0	0.25	27,500	20	10 6	
S.S.610H.F.*		Six-	6.0	0.1	20,000	20	10 6
S.S.4075R.C. and R.C.T.		Sixty	4.0	0.075	64,000	34	10 6
S.S.610H.F.T.*		(Electron Co.)	6.0	0.1	20,000	20	10 6
S.S.410 H.F. and S.S.410H.F.T.*			4.0	0.1	18,500	13	10 6
S.S.210H.F. and H.F.T.*			2.0	0.1	27,500	13	10 6
S.T.61B.		{ S.T. Valve Co. }	6.0	0.1	20,000	20	10 6
S.T.41		4.0	0.1	16,000	13	10 6	
S.T.21		2.0	0.1	26,000	16	10 6	

RECENT DETECTOR VALVES

S.P.18G.*	{ Benjamin Cosmos }	2.0	0.3	17,000	15.0	10 6
S.P.18B.		2.0	0.09	70,000	35.0	10 6
D.E.55		6.0	0.09	18,000	9.0	10 6
S.P.55B.	{ B.T.-H. }	6.0	0.09	55,000	35	10 6
B.5H.		4.0	0.06	55,000	17.5	10 6
B.4H.		6.0	0.25	28,000	20.0	10 6
B.21	{ Burndept }	2.0	0.1	32,000	16.0	10 6
B.22		2.0	0.1	14,000	7.5	10 6
H.L.213		2.0	0.13	23,000	6.5	10 6
H.310	{ Cossor }	4.0	0.10	55,000	17.0	10 6
H.512		6.0	0.12	40,000	18.0	10 6
210 Det.		2.0	0.1	22,000	9.0	10 6
410 H.F.	{ Ediswan }	4.0	0.1	20,000	20	10 6
610 H.F.		6.0	0.1	20,000	20	10 6
E.S.5 H.F.	{ Ediswan }	6.0	0.1	30,000	20	10 6
E.S.5 L.F.		6.0	0.1	10,000	7.0	10 6
R.C.610.		6.0	0.1	100,000	40	10 6
R.C.410.	{ Marconi or Osram }	4.0	0.1	120,000	40	10 6
D.E.L.610		6.0	0.1	13,000	15	10 6
D.E.H.610		6.0	0.10	70,000	40	10 6
D.E.H.612	{ Osram }	6.0	0.12	33,000	20	10 6
D.E.H.410		4.0	0.1	70,000	40	10 6
D.E.L.410		4.0	0.1	14,000	13	10 6
D.E.2 L.F.	{ Mullard }	2.0	0.12	22,000	7.0	10 6
K.H.1 (A.C. mains)		3.5	2.0	30,000	4.0	22 6
P.M.5B.		6.0	0.1	74,000	37.0	10 6
P.M.5X.	{ Mullard }	6.0	0.1	19,000	17.5	10 6
P.M.3		4.0	0.1	16,000	13.5	10 6
P.M.3A.		4.0	0.1	63,000	35.0	10 6
P.M.1 H.F.	} "T" type cost extra	2.0	0.1	18,000	8.9	10 6
P.M.1A.		2.0	0.1	72,000	36.0	10 6
S.S.610 H.F. and H.F.T.		6.0	0.1	20,000	20	10 6
S.S.610R.C. and R.C.T.	{ Six- Sixty (Electron Co.) }	6.0	0.1	27,500	20	10 6
S.S.410 H.F. and H.F.T.		4.0	0.1	18,500	13	10 6
S.S.4075 R.C. and R.C.T.		4.0	0.075	64,000	34	10 6
S.S.210 H.F. and H.F.T.		2.0	0.1	27,500	13	10 6
S.S.210 R.C. and R.C.T.		2.0	0.1	68,000	35	10 6

Type	Make	Fil. Volts	Fil. Amp.	Impedance	Mu	Price
S.T.61A.	S.T. Valve Co.	6-0	0-1	70,000	35	10 6
S.T.61B.		6-0	0-1	20,000	20	10 6
S.T.41		4-0	0-1	16,000	13	10 6
S.T.21		2-0	0-1	26,000	16	10 6
RECENT R.C. L.F. VALVES.						
S.P.18B.*	Benjamin	2-0	0-09	70,000	35-0	10 6
S.P.55B.*		6-0	0-09	55,000	35-0	10 6
S.P.18G.	Cosmos	2-0	0-3	17,000	15-0	10 6
B.8*	B.T.-H.	2-0	0-12	180,000	50	10 6
B.4H.		6-0	0-25	28,000	20-0	10 6
B.5H.		4-0	0-06	55,000	17-5	10 6
H.512 (2nd stage L.F.)	Burndept	6-0	0-12	40,000	18-0	10 6
610 R.C.*		6-0	0-10	80,000	40-0	10 6
410 R.C.*	Coasor	4-0	0-10	80,000	50-0	10 6
210 R.C.*		2-0	0-10	70,000	40-0	10 6
Use H.F. Valves for Second-Stage Resistance Coupling.						
ES.5 H.F.	Ediswan	6-0	0-1	30,000	20	10 6
R.C.2		2-0	0-1	150,000	30	10 6
R.C.610*		6-0	0-1	100,000	40	10 6
R.C.410*		4-0	0-1	80,000	35	10 6
D.E.H.610*	Marconi	6-0	0-1	70,000	40	10 6
D.E.H.612		6-0	0-1	33,000	20	10 6
D.E.L.610 (2nd stage Res.)	Osram	6-0	0-1	13,000	15	10 6
D.E.H.410		4-0	0-1	70,000	40	10 6
P.M.5B.*	Mullard	6-0	0-1	74,000	37-0	10 6
P.M.5X.		6-0	0-1	19,000	17-5	10 6
P.M.3A.*		4-0	0-1	63,000	35-6	10 6
P.M.3.		4-0	0-1	16,000	13-5	10 6
P.M.1A.		2-0	0-1	72,000	36-0	10 6
S.S.610 R.C. and R.C.T.*		6-0	0-1	27,000	20	10 6
S.S.610 H.F. and H.F.T.	Six-Sixty (Electron Co.)	6-0	0-1	20,000	20	10 6
S.S.4075 R.C. and R.C.T.*		4-0	0-075	64,000	34	10 6
S.S.410 H.F. and H.F.T.		4-0	0-1	18,500	13	10 6
S.S.210 R.C. and R.C.T.*		2-0	0-1	68,000	35	10 6
S.S.210 H.F. and H.F.T.		2-0	0-1	27,500	13	10 6
S.T.61A.*		S.T. Valve Co.	6-0	0-1	70,000	35
S.T.61B. (2nd stage)	S.T. Valve Co.	6-0	0-1	20,000	20	10 6
S.T.41A.*		4-0	0-1	—	—	10 6
S.T.21A.*		2-0	0-1	—	—	10 6
RECENT L.F. AND SUPER-POWER VALVES.						
S.P.18/G.	Benjamin	2-0	0-3	17,000	15-0	10 6
S.P.18/R.		2-0	0-3	7,500	7-0	10 6
S.P.55/R.R.		6-0	0-25	3,500	6-0	10 6
S.P.18/R.R.	Cosmos	2-0	0-3	4,500	6-0	10 6
S.P.16/R.	B.T.-H.	2-0	0-09	16,000	6-5	10 6
B.23		2-0	—	—	—	10 6
B.4	B.T.-H.	6-0	0-25	6,000	6-5	12 6
B.11		6-0	0-5	2,500	3-5	30 0
L.240		2-0	0-4	6,500	6-0	12 6
H.L.425	Burndept	4-0	0-25	10,000	9-0	12 6
L.525		6-0	0-25	7,500	6-5	12 6
L.I.525		6-0	0-25	3,000	3-3	20 0
210 L.F.	Coasor	2-0	0-1	22,000	9-0	10 6
220P.		2-0	0-2	5,000	5-0	12 6
410 L.F.		4-0	0-1	10,000	10-0	10 6
410 P.		4-0	0-1	5,000	5-0	12 6
610 L.F.		6-0	0-1	8,000	8-0	10 6
610 P.		6-0	0-1	3,000	3-5	20 0
ES.5L.F.	Ediswan	6-0	0-1	10,000	7-0	10 6
P.V.5D.E.		6-0	0-25	6,000	6-0	12 6
P.V.6D.E.		2-0	0-5	10,000	6-0	12 6
P.V.2		2-0	0-15	9,000	6-0	12 6
G.P.2		2-0	0-1	16,500	10-0	10 6
P.V.4		4-0	0-35	9,500	6-0	12 6
P.V.8D.E.		4-0	0-12	10,500	6-0	12 6
D.E.L.610		6-0	0-1	13,000	15-0	10 6
D.E.L.612		6-0	0-12	9,000	7-0	10 6
D.E.P.610		6-0	0-1	4,500	7-0	12 6
D.E.2L.F.		2-0	0-12	22,500	7-0	10 6
D.E.P.215		2-0	0-15	6,250	6-25	12 6
D.E.L.410	Osram	4-0	0-1	14,000	13-0	10 6
D.E.P.410		4-0	0-1	6,250	6-25	12 6
K.L.1 (A.C. valve)	3-5	2-0	5,500	7-5	22 6	
P.M.1L.F.	Mullard	2-0	0-1	18,000	8-9	10 6
P.M.2		2-0	0-15	8,750	5-4	10 6
P.M.3		4-0	0-1	16,000	13-5	10 6
P.M.4		4-0	0-1	7,000	7-0	12 6
P.M.254		4-0	0-25	3,500	3-1	20 0
P.M.6		6-0	0-1	5,700	7-1	12 6
P.M.256		6-0	0-25	3,500	3-1	20 0
S.S.210L.F.		2-0	0-1	18,000	8-5	10 6
S.S.215P.		2-0	0-15	7,300	6-0	12 6
S.S.410P.		4-0	0-1	7,000	7-0	12 6
S.S.425S.P.	Six-Sixty (Electron Co.)	4-0	0-25	3,000	3-2	20 0
S.S.610P.		6-0	0-1	6,000	7-2	12 6
S.S.625S.P.		6-0	0-25	3,000	3-2	20 0
S.T.22		2-0	0-1	16,000	10-0	10 6
S.T.23	S.T. Valve Co.	2-0	0-15	6,000	6-0	10 6
S.T.42		4-0	0-1	6,000	6-0	10 6
S.T.43		4-0	0-25	4,000	3-5	20 0
S.T.62		6-0	0-1	6,000	8-3	10 6
S.T.63		6-0	0-25	4,000	3-3	20 0



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Into Igranic Coils are wound many patents (each covering some useful invention), which only Igranic can use. That is the reason why—consistently, year after year—Igranic Coils can be relied upon to keep losses, self-capacity and H.F. resistance so low as to ensure the nearest approach to the ideal inductance. It is for this reason that constructors specify them, manufacturers of sets prefer them—why you too should plug them into your circuit.

Here are a few details of the range—

Igranic Triple Honeycomb Coils in 17 sizes (including intermediates) from 25 to 1,500.

Igranic XILLOS Coils contain many unique features for the constructor—adjustable pin and socket for low-capacity, pivot or ordinary mounting; windings totally enclosed by bakelite cover; extra low loss. In ten sizes from 25 to 250.

Igranic Centre Tapped XILLOS Coils are specially made for neutrodync circuits. The winding is in halves so as to form a single

centre tapped coil. In five sizes giving ranges between 400 and 3,500 metres.

Igranic Short Wave Coils for the 10 to 100 metre wave band. So wound of heavy gauge wire as to ensure a remarkable sensitivity to oscillation. There are four sizes of 2, 4, 6, or 9 turns.

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See them and the entire range of IGRANIC RADIO DEVICES

at your dealer's or at the Radio Exhibition. If in the meantime you would like to read about them write for publication J.268.



Igranic Centre Tapped "Xilos" (Extra Low Loss) Coil. Prices from 7/- to 10/8.



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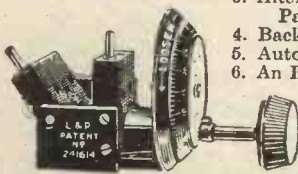
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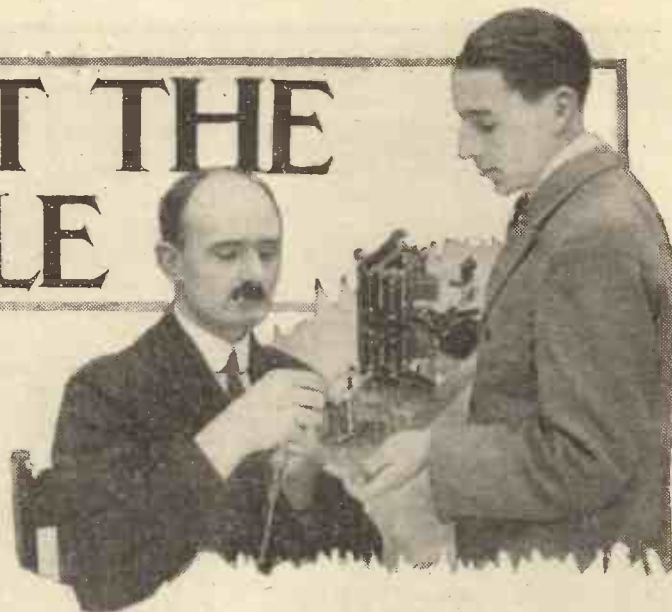
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CHATS AT THE WORK-TABLE

An article of practical interest to all radio constructors.

By R. W. HALLOWS, M.A.



IN the course of a good many years as a constructor of wireless apparatus I have tried soldering fluxes of all kinds without being completely satisfied with any of them. The trouble is this. You make a joint which *when new* is all that can be desired. The lead is firmly fixed to its point of attachment, and the apparatus of which it forms part works perfectly. But, no matter how careful and how skilful you may be, that joint does not appear to last.

Before me, as I write, is a piece of

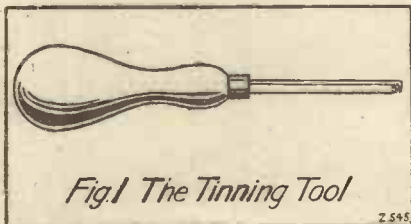


Fig. 1 The Tinning Tool

apparatus made just two years ago. It contains a six-inch length of square tinned rod which is soldered to the shanks of three terminals, one at each end and one in the middle. Now each of these joints looks in perfect condition; they are not "dry," and there is no sign of a crack or anything of that kind in any of them. Let us see if they will stand an ordinary test. I take hold of the busbar in my fingers and pull lightly. It immediately comes away from the terminal shank nearest my fingers, and as I continue to pull it is quite easy to detach it from the other two. Some of the solder remains attached to the square rod; some to the tips of the terminals.

There is no sign of verdigris, but the exposed surfaces of the joints thus pulled apart do not look healthy, the

solder being of a dull grey colour with no metallic sheen. When examined with a powerful magnifying glass the metal appears to be distinctly crystallised. If the rough surface exposed by tearing apart the joint is scraped lightly it looks rather better. The flux used for making these joints was one which is generally accepted as non-corrosive, though litmus paper shows that there is an acid content, as there appears to be in practically all fluxes.

A curious point is that if one makes a soldered joint in a metal box or something of that kind it lasts for years in perfectly good condition. Is it possible that the passage of oscillating currents through soldered connections has some effect upon the metal which causes it to become "fatigued"? Or does an electro-chemical action take place between the several dissimilar metals of which the joint is composed?

A Necessary Evil

One cannot, unfortunately, entirely avoid the making of soldered joints in wireless apparatus. Screw-down connections can be used in a great many places, but there is probably no receiving set which does not contain a certain number of soldered joints either within the components themselves or in the way of outside connections. The best course seems to be to find the least harmful flux and to make use of it exclusively for constructional work.

What flux is there that meets our requirements? I have seen it stated in several quarters recently that resin dissolved in methylated spirits makes a good flux which is both easy to

use and non-corrosive. After trying the mixture I must say that I do not find that it lives up to the claims made for it. It may be non-corrosive, but it is *not* easy to use.

The best thing that I know is pure powdered resin without any solvent. Go to a chemist's shop and have a small quantity of pure resin pulverised by means of pestle and mortar. The solder does not run quite so easily as is the case with certain liquid fluxes, and it is more than ever necessary to use a hot and perfectly clean iron. Apply the resin to the points that are to be joined by means of a soft camel-hair brush, and so long as the iron is clean a good joint should be made. One great advantage about resin is that there are no

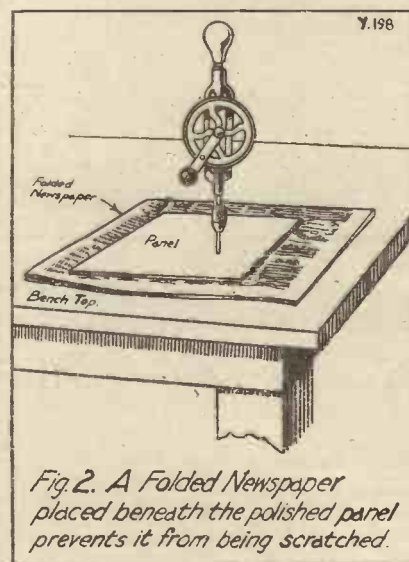


Fig. 2. A Folded Newspaper placed beneath the polished panel prevents it from being scratched.

splutterings to disfigure the panel and possibly to cause unwanted effects by setting up leakage paths. And now

Chats at the Work-Table—continued

for the method of keeping the iron clean and bright.

Keeping the Soldering Iron in Trim

For this purpose I am going to recommend very strongly the use of a flux which should never be employed for the actual making of joints in wireless sets. This is "killed spirits" which is used by tinsmiths. It can be obtained ready made under various trade names; or one can make it oneself by dissolving zinc in "spirits of salts," which is a popular name for hydrochloric acid.

There is nothing that has such a wonderful brightening and cleansing effect upon the tinned point of a soldering iron. Before you tackle any soldering job proceed in the following way, making use of the handy tinning tool now to be described. Fig. 1 shows its appearance. A strip of tin about 1 inch wide and 4 inches long is cut from an old biscuit box or something of the kind. This is folded over and hammered flat so that the result is a stout strip $\frac{1}{4}$ inch wide consisting of four thicknesses of tin. One end is tapered off and this is pushed into a file handle. After heating the soldering iron dip the tinning tool into the killed spirits, shake off any superfluous liquid, and then brush over with it each face of the iron in turn.

The result is a beautifully smooth bright surface, which is more than half the battle in making joints. If you are undertaking a long job which entails the soldering of many joints the iron should be "refreshed" every now and then with the little tinning tool. The difference which its use makes to one's own speed and to the neatness and soundness of the join has to be experienced to be properly realised.

Do *not* use the killed spirits as a flux for making any kind of joint in the wireless set. The temptation to do so is strong, for it makes the solder flow on almost like water. It has, however, a violently corrosive action, and is, therefore, quite unsuitable for our purposes.

Working Polished Panels

Most constructors nowadays probably buy their panels ready cut. To do so saves an enormous amount of trouble, for getting the edges perfectly square and true is a longish business even for the skilled in the

average workshop. Those who supply panels are able to cut the ebonite with a bandsaw and the edges are afterwards ground true with the help of suitable machinery. Where a fine surface is desired it is also an advantage to order one's panels ready polished, for the job of producing the almost mirror-like surfaces that the manufacturers obtain is an exceedingly laborious one for the amateur, even if he has the necessary tools at his command.

To obtain a very high polish the panel has to undergo the process known as hand matting, which consists in rubbing it down by hand with the finest grade of emery paper. It is then finished on a buffing wheel revolving at a very high rate of speed.

One difficulty that the constructor experiences is that of avoiding the scratching of highly-polished panels during the process of marking out and drilling. Here is the best way of ensuring that the panel shall come through unscathed.

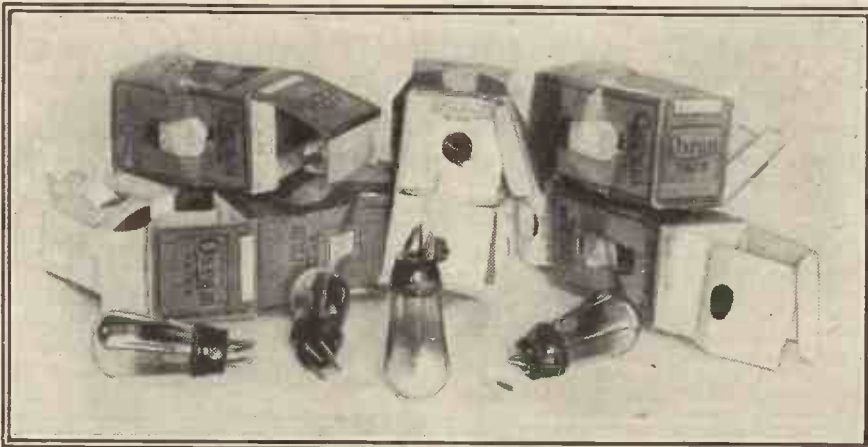
First of all, marking out must be done upon the unpolished back of the panel. If you attempt to do it on the other side two results will almost certainly follow: you will scratch the panel slightly with your set square, or your ruler, and it is quite likely that you will make some mistake, since, for obvious reasons, you cannot scribe long lines. Now layout diagrams are drawn, in order to avoid confusion, for the front of the panel. They must, therefore, be reversed when the marking out is done at the back. The simplest way of doing this, if you cannot rely upon yourself to do it in your head, is to

lay a sheet of tracing paper face upwards beneath the blue print and then to go over all the lines of the print with a sharp pencil.

When you turn the print over you will now have a reversed or "looking-glass" copy of it on its back. If tracing paper is not available, simply prick through the centre with the point of a pair of compasses and mark in the dimensions on the back. When marking out, do not lay your panel face downwards straight on the wooden top of the bench. Beneath it place an old newspaper folded up (as seen in Fig. 2). It is better still to have a sheet of soft tissue paper between the panel and the newspaper. If these precautions are taken, scratching will not occur whilst marking out is being done.

The protecting paper should be used also whilst drilling is in progress, whether this is done with the hand or the bench drill. In the latter case, place a flat piece of hardish wood on the table of the drill, lay on top of this two or three folds of newspaper and a sheet of tissue paper. In either case, make sure that the panel is held so that it cannot revolve just as the drill is making its exit.

Be careful, too, after each hole has been drilled, to lift up the panel and to brush away from the paper beneath any little chips or shavings of ebonite that may have been brought through by the drill. If these are left on the paper they may cause scratches should the panel be moved. Since the panel is not in direct contact with a hard surface, a little more care than usual is required in drilling, for otherwise little pieces may be cracked off.



This is a bunch of Osram valves which received such rough handling in the post that their boxes were broken and their pins bent, but nevertheless all their filaments were found to be intact!

OUR NEWS BULLETIN

Some of the More Interesting Happenings in the Radio World this Month

A Prophecy

WITHOUT going so far as to claim the gift of prophecy, and without any intention of infringing on the patent now held by Old Moore, I am, nevertheless, going to foretell the future! I can see it coming. Signs and portents are writ in unmistakable fashion, omens proclaim it, everything points to one unescapable fact. And that fact is that we are going to have some radio season this year.

The Radio Exhibition

For one thing, valve prices are down and quality is up. (That's a blessing!) For another thing, the really essential components and accessories are cheaper. (And that's a help!) On top of that our newest station, 5 GB, the forerunner of alternative programmes, has fairly

started. (Good luck to him!) And now comes this National Radio Exhibition, and with it a host of new valves, new gadgets, new hook-ups, and new hopes.

In view of which I proclaim and repeat that the coming radio season, opus 1927-28, is going to be some season.

A Season of Promise

I'm not going to say much about the Exhibition, because doubtless you'll be going if you can, or reading about it if you can't. But whether you buy your new season's goods at Olympia, or at one of the big radio stores, or at Woolworth's, or even from Old Joe's stall (next to the hokey-pokey man's), you can rest assured that never before has radio offered so many attractions to the set-builder and set-owner. It's going

to be one big winter in the ether, so mind you tune in your share.

Germany's Big Noise

According to the latest reports from Germany, the new super-station at Zeesen should be on the air by the time these lines are in print; and, with a power of 120 kilowatts, it should prove to be a regular snorter, so developments on 1,250 metres should be well worth watching. Just at first the engineers there may not like to step on the gas too hard, but when they do we shan't find much difficulty about picking up Zeesen, I'll be bound!

5 GB Starts Up

Whatever may be the final results of 5 GB's preliminary canter along the ether, it is a great satisfaction to know that powerful programmes haven't absolutely paralysed all the land stations. Only a few months before Daventry Junior started up, the Dillys, Dallys, and Jeremiahs-in-Office gloomily predicted the worst. They said that if more broadcasting were allowed it would jam the Army stations, blot out the Air Force, drown the Navy messages, and generally create Aged Henry

(Continued on page 436.)

CONSTRUCT THE "TWIN-TUNE" FIVE.

As described in this issue.

1 Mahogany Cabinet, 21 in. by 7 in., with baseboard	£	s.	d.
1 Ebonite Panel, 21 in. by 7 in. by 1/8 in., ready drilled	0	10	0
2 Panel Brackets	0	2	6
1 Brandes '0005 Slow-Motion Condenser	0	15	6
1 Brandes '0003 Slow-Motion Condenser	0	15	0
1 Bruno Two-Gang Condenser '0005	2	15	0
3 Copper Screening Boxes	1	17	6
3 6-Pin Bases	0	6	0
2 Neutralising Condensers	0	10	0
5 Benjamin Valve Holders	0	10	0
2 Fixed Resistors with bases	0	5	0
1 Igranite-Pacnet 10-ohm Rheostat for panel mounting	0	2	6
1 Igranite On-and-Off Switch	0	2	6
1 Dubilier Grid Condenser '0002 and 2-meg Leak	0	5	0
1 Dubilier Fixed Condenser, '01	0	4	0
1 Dubilier Leak, '25 meg., and Dumetohm Holder	0	3	6
1 M.H. H.F. Choke	0	9	6
2 R.L. Varley R.C. Units, type A	2	2	0
1 Pye Output Choke, 20 henries	0	12	6
1 Lissen Fixed Condenser, '0003	0	1	0
12-Elelex Terminals, as diagram	0	4	6
2 Split-Primary H.F. Transformers and Aerial Coil, 250/550 metres	1	6	0
1 Terminal Panel 7 1/2 in. by 1 in. drilled	0	0	9
2 Terminal Panels 2 1/2 in. by 1 in. drilled	0	0	4
Glazite and Sundries	0	4	5

NOTE.—Drop-front Cabinets can be supplied at an extra cost of £2. £18.00

Any of the above parts supplied separately as required.

MAGNUM SCREENED RECEIVERS



These highly efficient Receivers are the result of considerable research in our laboratories, with the object of producing Sets simple to construct and

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PRICES:

Screened 3, Complete set of parts, £8 15s. or ready wired and tested, £10 15s.
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Special Offer. Magnum Screened Receivers. During Exhibition Week, Sept. 24th to Oct. 1st, a Blue Print and full constructional details will be supplied at a reduced price of 1/- post free. The following Blue Prints are available:

Purity 3	Screened 3
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Please state type required. Make a point of seeing these remarkable Receivers at Stand No. 123.

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As described in this issue.

1 Special Cabinet and Baseboard, as described	£	s.	d.
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1 R.I. Choke	0	9	6
1 C.A.V. A.P. L.F. Transformer	0	15	0
2 Benjamin Valve Holders	0	4	0
1 6-Pin Base	0	2	0
1 Reinartz Coil, 250/550 metres	0	10	0
1 Single Coil Holder	0	1	9
1 Formo-denser	0	2	6
1 Igranite-Pacnet B/M Rheostat	0	1	8
1 Lissen Potentiometer	0	2	6
2 Formo Condensers with Slow-Motion Dials	2	0	0
1 Lotus 4-point Jack	0	2	6
1 Lotus Plug	0	2	0
1 Dubilier Leak 2 meg. and Lissen Combinator	0	3	6
1 Lissen Fixed Condenser, '0003	0	1	0
1 Magnum Terminal Panel with 12 terminals	0	6	0
2 Angle Brackets	0	1	6
1 On-and-Off Switch	0	1	3
Connecting Wire and Sundries	0	3	4

£7.15.0

Any of the above parts supplied separately as required.

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That's the P. & R. Indicator-Ball Battery. Just glance at its Ball Floats and you can see whether the battery is charged, half-charged, or run out.

Price? Just about two shillings more than the price of any other good battery of the same voltage and capacity.

Write for leaflet to Peto & Radford, 50, Grosvenor Gardens, London, S.W.1, giving particulars of this and the other six-months-guaranteed batteries.

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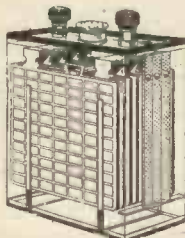
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WHEN buying Condensers for your resistance coupled circuit you have two alternative choices. You can buy Condensers that are nameless, that are backed by no guarantee. Or you can choose T.C.C., Condensers that are guaranteed up-to-the-hilt. If you buy unknown condensers you court failure. If you buy T.C.C. Condensers you go a long way to assure the

success of your set. For T.C.C. Condensers are thoroughly reliable. The strenuous tests each one passes before it leaves the factory safeguard you against inefficiency. Every T.C.C. Resistance Capacity Coupling Condenser is guaranteed. In its insulation qualities, impervious to climatic conditions. In its capacity... to be within 10% accurate up to .09 mfd. and 5% above .09 mfd. Guaranteed... to be utterly leakproof; never to break down.



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.05 mfd.	5 8		.25 mfd.		19 6
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CONDENSERS

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9374



OUR NEWS BULLETIN

—continued from page 434

with wireless signalling. Let's hope that now they've taken the plunge the Post Office will stop these panderings to mandarins.

Empire Broadcasting

Did you read the B.B.C.'s official announcement about Empire broadcasting? It concluded:

"Meanwhile, the B.B.C. wishes amateur transmitters every success in their efforts, which it is hoped may contribute to the solution of a problem still baffling in many essential respects."

Now, isn't that a good, true, kind, pure, noble sentiment?

Short-Wave Broadcasting

"Which of the German stations is it that talks right below twenty metres?" ask several correspondents who have been investigating the very short waves.

Reports from other correspondents point to this having been A G A, the Nauen station, which apparently has been doing some evening telephony tests on 13.5 metres.

2 L V and 2 L W

Mr. Robert Tingey, M.I.R.E., formerly the holder of call-signs 2 L V and 2 L W, tells me that these calls have now been allotted to other amateur transmitters. Later on Mr. Tingey hopes to take the air again, with a new call-sign, but in the meantime will readers please note on their lists that he has relinquished 2 L V and 2 L W.

The DX Paradise

Which is the best place in the world for long distance wireless reception? These tight little islands have a good claim, judging by the number of world records held. And I see that New Zealand also fancies its chance of being the true DX Paradise. One listener there recently re-broadcast Holland in the morning, spent the afternoon with Schenectady (W G Y), and finished up with Tokio on the loud speaker for an hour. No wonder short-wave sets are all the go!

Washington Radio Conference

The Department of State at Washington did the handsome and sensible thing in sending to the Geneva authorities an invitation to the forthcoming Radio-Telegraphic Conference.

The meetings are to begin at Washington in October, and Europe's Union Internationale de Radiophonie has nominated Captain P. P. Eckersley as its delegate. This conference will be a momentous one for listeners, so it is cheering to know that we shall be cheerily represented by the B.B.C.'s popular Chief Engineer.

Pay As You Listen

I see that the American stunt of deferred payments for wireless sets is steadily gaining ground in this country too. One big firm announces that no references from the purchaser are required, proposal forms are unnecessary, and the transactions are now strictly private. And pampered customers are already asking—will they lay the earth free of charge, are the valves insured, and can delivery be expected from the famous plain sealed vans?

More Dual Programmes

An interesting feature of America's Autumn wireless activity is the large number of new short-wave broadcasting stations. Following W G Y and K D K A, many of the large stations are regularly duplicating their programmes below 100 metres. W L W

(Continued on page 438.)

HOW DAR SAVES YOU MONEY.

If you have an old sulphated accumulator you can, for a few shillings, cure it of sulphation and reactivate it with DAR, thereby saving the cost of a new one. If, on the other hand, you treat a new accumulator with DAR, you can prevent sulphation, thereby doubling its ordinary life.

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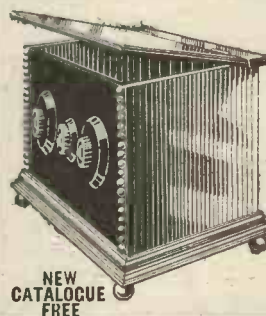
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**H. CLARKE & CO. (Mcr.) LTD., THE Insulating Materials
Manufacturers, Atlas Works, Old Trafford, MANCHESTER**
Telephones: Trafford Park 683 & 793. Telegrams: "Pirtoid, Manchester."

**ARTCRAFT RADIO CABINETS
BRITAIN'S BEST VALUE. NEW 1928 MODELS.**



AMERICAN POPULAR TYPE (as illus.)

Panel Size	Baseboard Depth	Price in	
		Oak	Mahogany
9 x 6 x 6	6	8 0	12 0
10 x 8 x 6	6	10 0	14 0
12 x 8 x 8	8	14 0	18 0
16 x 8 x 8	8	17 6	22 6

Baseboards Free. Hinged Lids 1/6 extra. Add 1/- for crate. All Cabinets sent Carriage Paid.

RADION, RESISTOR and EBONART PANELS AT STANDARD PRICES.

The Artcraft Company,
156, Cherry Orchard Rd., Croydon

NEW CATALOGUE FREE

OUR NEWS BULLETIN

—continued from page 436

(Cincinnati) is one of the best of these newcomers, working every night, except Fridays, on 52 metres.

By the way, K D K A, apparently not content with its present channels, is now blossoming out on 14 metres as well!

A Radio Invasion

Readers who remember the broadcasting by Father Knox of a revolution skit, will sympathise with Ade'aide listeners. During the broadcasting there of a one-act play called "An Imaginary Invasion," two or three nervous ladies, picking up the phones and hearing bombs, bangs, and "enemy-landing bulletins," promptly fainted away!

In at least one place the police were called up, but telephone enquiries soon explained that it was merely a radio drama.

Radio in the Arctic

No less than four expeditions have been equipped for wireless communication during recent Arctic explora-

tion work. One of these parties went to Greenland, where atmospheric depressions arise, and sent out radio reports and weather warnings "straight from the horse's mouth." Another expedition, quartered on Baffin Island, spent its time experimenting at the magnetic pole. In all cases radio was the explorers' only link with civilisation.

British Legion Result

The result of the "R.C. Three-some" competition has now been announced. The lucky number is 3223, and the holder of this should communicate with J. Jones, Esq., 4, Bartholomew Street, Birmingham.

Remarkable Radiano Reception

According to an announcement in the Singapore "Straits Times," the short-wave Radiano set described in this journal last June has been busy out there. In one instance it was hauling in Holland, at a distance of 9,000 miles! Reception on the two valves was "clear and distinct," and apparently it caused something of a sensation upon the Han Yang Estate, all amongst the rubber and the palm trees!

The King's Microphone
Did you know that the King always broadcasts by means of a specially selected microphone, which is reserved for his use? It is covered by a silver cage bearing the Royal Arms, and on a gold plate affixed to it is a record of the Royal broadcasts.

The first of these took place three years ago, and the best-remembered occasion was the opening of Wembley Exhibition in 1925, since when His Majesty has broadcast at the opening of the Great West Road, of the British Medical Association new buildings, and at the Royal Air Force Pageant at Hendon in 1925.

Four-Fold Wave-length Scheme

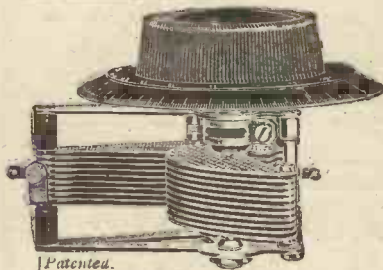
The new South African Beam service, successfully inaugurated a few weeks ago, is worked on a four-fold wave-length scheme. The Bodmin (Cornwall) station transmits to Milnerton, South Africa, on 16-146 metres by day, and 34-013 metres by night.

The African transmitter at Klipheval replies on 16-077 metres (day service) and on 33-708 metres (night service). The British receiving station is at Bridgwater, and the whole service is estimated to be able to handle about 160,000 words per day, in each direction.

(Continued on page 440.)



Don't miss the PERFECT FIVE Stand No. 85 NATIONAL RADIO EXHIBITION



J.B. Log. Plain.

Fitted with nickel-plated brass skeleton end plates. Ball-bearing centre spindle. Pigtail connection. Brass Vanes. Rotor vanes tied at tips. This model is fitted with a variable Turning Tension.

Prices, complete with 4-in. Bakelite dial:—

•0005 mfd. 11/6; •0003 mfd. 10/6;
•00025 mfd. 10/-; •00015 mfd. 10/-.

The J.B. S.L.F.

•0005 mfd. 11/6; •00035 mfd. 10/6;
•00025 mfd. 10/-; •00015 mfd. 10/-.

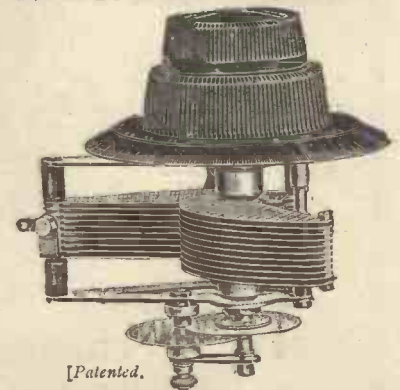
Make a special point of visiting our Stand, and you will find there the results of radio research embodied in five Condensers which are as perfect as modern science can make them. Our New Logarithmic models, illustrated, combine Accuracy and Precision to a point never before attained in any condensers.

Our S.L.F. models are famous throughout the radio world for their perfection of design, workmanship, accuracy and finish. Conclusive proof of their excellence is that they are being consistently recommended by the Technical Press.

Our Neutralising model is the Neutralising Condenser which cannot go wrong. Far and away ahead of all older models, it eliminates all trouble from any Neutrodyne Receiver.

Remember the Perfect Five.

- 1. J.B. Log. Plain.
- 2. J.B. Log. Slow Motion.
- 3. J.B. S.L.F. Plain.
- 4. J.B. S.L.F. Slow Motion (J.B. True Tuning S.L.F.).
- 5. J.B. Neutralising.



J.B. Log. Slow Motion

Fitted with a Double Reduction Friction Drive, Ratio 60-1, and complete with 2-in. Bakelite knob for vernier control and 4-in. Bakelite Dial for main control.

Prices:

•0005 mfd. 16/6; •0003 mfd. 15/6;
•00025 mfd. 15/-; •00015 mfd. 15/-.

The J.B. S.L.F. Slow Motion (True Tuning S.L.F.)

•0005 mfd. 16/6; •00035 mfd. 15/6;
•00025 mfd. 15/-; •00015 mfd. 15/-.

JACKSON BROS.
8, POLAND ST- OXFORD ST
LONDON - W.1. Telephone: GERRARD 7414

GAMBRELL

MEANS EFFICIENT RADIO

Gambrell Centre Tapped Coils

These coils are unlimited in their use, not being confined only to centre tapped circuits. Fitting all standard coil sockets; and occupying the minimum of space on baseboard. Prices quoted are for standard coils. Centre Tapped 6d. extra.



Size.	Price.	Approx. No. of Turns.	Size.	Price.	Approx. No. of Turns.
a2	4/10	18	D	6/3	100
a	4/10	25	E1	6/9	150
A	5/-	30	E	7/9	200
B1	5/3	40	F	8/6	300
B	5/6	50	G	10/-	500
C	5/9	75			

THE GAMBRELL NEUTROVERNIA

This balancing or neutrodyne condenser fairly bristles with good points, inasmuch as it has the largest capacity range, approx. 2/38 m/mfds., is totally enclosed, dustproof and dampproof, mounts on or through panel, or on baseboard. Will not short. Ebonite di-electric. Refuse substitutes. **PRICE 5/6**

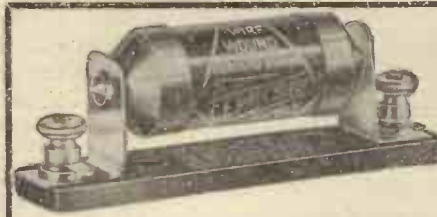
SEE THE GAMBRELL MAINS RECEIVERS AT STAND 66 OLYMPIA EXHIBITION.

These Mains Receiving sets will be the outstanding exhibit at Olympia. Excellent capacity for long-distance reception and a perfectly natural tone are only two of the outstanding features, and when these are added to the fact that they work direct off the electric light mains, it places them on a different plane to any other commercial receiving set. Prices range from £17 to £39. Complete with valves and coils. Royalties paid. Be sure to see them on Stand 66. The Model illustrated is the Cabinet Four. Supplied for either D.C. or A.C. Get full particulars for your non-technical friends.



GAMBRELL BROS. LTD.

76, VICTORIA ST., LONDON, S.W.1.



C. E. PRECISION
WIRE WOUND
A N O D E
RESISTANCE

—the wire costs fifteen pounds a pound!

The wire used in their manufacture is specially made for the purpose, and the component is designed and most carefully manufactured to give the purest reproduction obtainable. Each value is absolutely constant.

PRICES:

20,000 to 50,000 ohms	-	-	3/9
60,000 to 100,000 ohms	-	-	4/9
150,000 to 200,000 ohms	-	-	7/-
250,000 ohms	-	-	8/-
500,000 ohms	-	-	15/-

Other values to order. Clips and base, 1/3 extra.

C. EDE & CO., Ltd., BYFLEET, SURREY

Telephone: Byfleet 226
Telegrams: 'Ceprecise,' Byfleet.



There are also the famous C. E. PRECISION Rheostats, Dual Rheostats and Potentiometers, Sectionally Wound Fixed Resistors, Coils, Grid Leaks and Floating Valve Holders. The latter, as illustrated, are anti-capacity and non-microphonic, and cost 2/- each.

WRITE FOR FULL LIST OF C. E. PRECISION COMPONENTS

Use REDFERN'S Ebonart RADIO PANELS

THEY provide all the requirements necessary in a radio panel. Easy working, positive insulation, beautiful appearance, and an entire freedom from surface leakage.

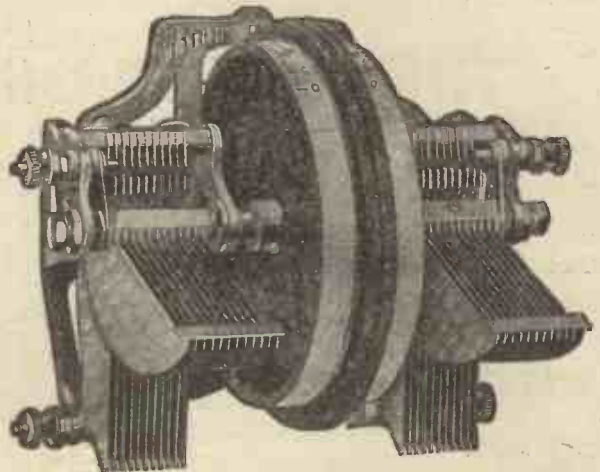
In black and a beautiful mahogany grain, in nine standard sizes and prices.

Every panel safely packed in a damage-proof carton containing a station log chart.

Send for the Book of Ebonart which contains full directions for easy working.

Obtainable from all reputable dealers.

REDFERN'S RUBBER WORKS LTD.,
HYDE, CHESHIRE.



Simplicity of construction, ease of control and neatness in appearance are the marked features in design of 1927-1928 Receivers.

The Bruno Model 2 C. Unitone Unit used by Mr. A. Johnson-Randall in his efficient Five-Valve Receiver described in this issue consists of two modified S.L.F. Condensers, having insulated spindles, and mounted on drum controls which protrude from the panel. A face plate, handsomely etched, is furnished with each Condenser. Condensers can be tuned separately or simultaneously.

You can obtain the Unitone from your dealer. If in difficulty, write us.

List Price - - each, 55/-

THE ROTHERMEL
RADIO CORPORATION OF GT. BRITAIN, LTD.
24-26, Maddox Street, Regent Street, London, W.1.
Telephone: Mayfair 578-9. Telegrams: "Rothermel, Wesdo, London."

OUR NEWS BULLETIN

—continued from page 438

The Beam Services

The new Marconi Beam station at Dorchester promises to be one of the most talkative transmitters on earth. In addition to the New York service, there is to be one for Egypt, another "beam" for Buenos Aires, and another for way down Rio.

On top of all that loquacity, Dorchester hopes to be equipped for saying a few kind words to the Far East when necessary. And if all these beams transmit simultaneously I guess listeners in the vicinity will wish that their aerials were far from that madding crowd!

Rugby's Time Signal

In order that the 10 a.m. and 6 p.m. daily time signals shall go out from Rugby on the absolute tick, the Admiralty, Board of Trade, Post Office, and Greenwich Observatory officials are all working on the various problems involved.

There is to be a master pendulum, a slave clock, and a 61-to-the-minute pendulum, with all sorts of auxiliary apparatus, dingbats, and whatnots.

It seems a pity that the clock is of the slave-y type—if domestic experience is anything to go by, this is the weak link in the chain.

A Threat From Wigan

A chap up in Wigan has written to the B.B.C. to say that if they don't cut out all these talks after 7 p.m., he will give up his set.

They say that the secretary who opened the letter and read this bit of bad news burst into tears, and I hear that C—pt—n E—k—s—y hasn't had a wink of sleep since!

World's Biggest Valve

The proudest station in the whole world to-day is 2 X A G, Schenectady, New York. Here is installed the biggest valve in existence, which weighs about 100 lbs. and stands well over 7 ft. high! This monster has been evolved by the General Electric Company in their experiments with wireless transmission. It takes about 10 horse-power to light the filament, so it will not be coming into general use on receivers—at least—not this week!

Ether Daylight-Saving Scheme

A rather good point, which might prove worthy of the B.B.C.'s consideration, has just been made by

certain broadcasting authorities in America. Some bright boy over there has suggested that as daylight halves the range of a broadcasting station, why not increase the power during daylight transmissions? Listeners could then get full strength all day, and the interference would be no worse than at night—rather like a Willett's Daylight-Saving Scheme. But Will it be allowed?

RETOUCHING
SCRATCHED CABINETS

EVERY serious experimenter has two or three wireless cabinets in his collection and some of them may have a badly scratched appearance. If you have such a cabinet why not try and restore its original good looks? It is by no means difficult.

Dark oak cabinets with a dull finish are the easiest of all to restore. If the scratches have cut through the polish they will show light. The first thing to do is to restore the colour. A touch of oak varnish stain or a solution of permanganate of potash

(Continued on page 442.)

THE BEST TERMINALS IN THE WORLD

AT

STAND No. 207 Olympia (Gallery)

THE NAME DOES NOT ROTATE
THE HEAD DOES NOT COME OFF

SOLDERING NOT NECESSARY
STEM WILL NOT TWIST LOOSE

WRITTEN GUARANTEE AND
CARTON FOR EACH TERMINAL

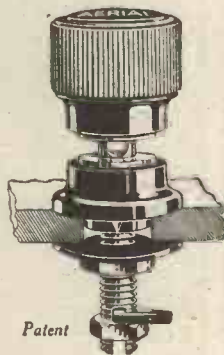


Patent

The names cannot be put on the wrong stems.

Highly polished black Bakelite Insulation.

Electric shocks prevented, and burnt-out valves minimised.



Patent

Soldering can be dispensed with by using the slot and extra nut. The smooth stem at the clamping gap prevents fine wire binding up in the thread. The collar has an insulation bush for wood or metal panels, and a wedge to prevent working loose.



30 different useful letterings.
Price 9d. each
(Type B)

OTHER TYPES AVAILABLE

TYPE "M" Non-rotating names as Type "B," but not insulated. Price 6d. each.

TYPE "R" Name engraved on rotating, non-removable insulated head. Engraved in white on black Bakelite. Price 3½d. each.

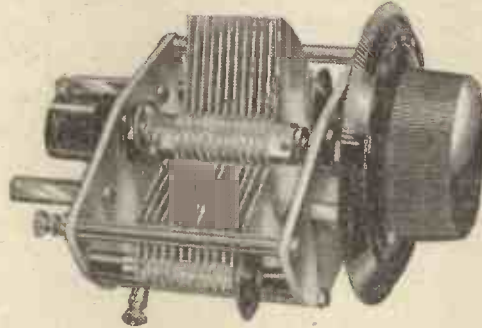
Obtainable from all Dealers, but in case of difficulty send your order to us, enclosing your dealer's name and address.

BELLING & LEE, Ltd.,
Queensway Works, Ponders End,
Middlesex.



Here is the Condenser you want for your new Receiver the Keystone Universal Logarithmic

Adaptable to different circuits... Easily ganged together... Plates insulated from frame... Vernier adjustment... Rigidly constructed.

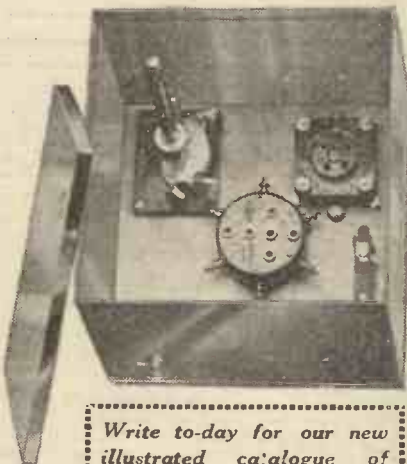


HERE is a Condenser which has several unique features that you have been wanting. It is adaptable to different circuits—a great advantage. Two or three single condensers can be ganged together to form a double or triple gang, in a few moments, with the aid of only

a spanner. Both fixed and moving plates are insulated from the frame—another unique feature! A patented vernier adjustment is provided, enabling the capacity to be varied to fine limits. Rigidly constructed from finest materials. British made.

Single, .0005 mfd. less dial 13/6
 Single, .0003 mfd. less dial 12/6

PRICES :
 Twin-Gang, .0005 mfd. less dial 27/6
 Triple Gang, .0005 mfd. less dial 42/-

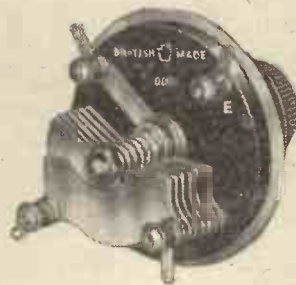


Write to-day for our new illustrated catalogue of components and accessories

KEYSTONE 'MIDGET' REACTION CONDENSER

Ideal for the many positions where a small capacity condenser is required. Aluminium shield prevents hand-capacity effects. Special taper bearing giving smooth movement. Capacity .0001 mfd.

Price 5/6



PETO-SCOTT CO., LTD.

77, City Road, London, Eng.

BRANCHES :- 62, High Holborn, London, W.C.1. 4, Manchester St., Liverpool.

When Buying Screened Coils — Say COPEX



Cōpex 'Popular Model' Coil Screen & Base

THIS screen and base is made from high-grade copper—the best metal for screening coils. Terminals are arranged in such a manner that it is impossible to "short" them when replacing screen. Perfect electrical and self-cleaning contact. Finest British workmanship—tested and guaranteed. Screen and interchangeable 6-pin base (Patent No. 259,459) 9/6

CōPEX "O.C." COILS

By reason of a patented feature incorporated, these coils give the following advantages over all other coils:—

- (1) Oscillation perfectly controlled;
- (2) Higher amplification is obtained;
- (3) The coils are guaranteed matched within one metre, this accuracy being obtained by stringent tests against a Quartz oscillator, the reliability of which is well known.

Prices :
 250-550 metres 6/-
 1,000-2,000 metres 10/8

Aerial Coil ..	6/-	10/8
Split Primary H.F. Transformer ..	10/8	10/8
Split Secondary H.F. Transformer ..	10/6	14/6
Reinartz Type Coil ..	10/-	14/-

CōPEX 6-PIN BASE

Standard spacing with terminals arranged for easy accessibility. For use where the standard 6-pin coils are utilised without the actual screen. 2/9



KEYSTONE NEUTRALISING CONDENSER

Suitable for neutralising the electrode capacities of all types of valves. Low minimum capacity. Wide spacing of vanes renders accidental "shorting" impossible. Board mounting (as shown) 5/-



Panel mounting, 6/3

See these Sets and Components — and more — at

STAND 163

National Radio Exhibition, Olympia

RETOUCHING SCRATCHED CABINETS

—continued from page 440

apply with a fine brush will do this, and if the scratches are very deep they can be filled in with wax. Do not use sealing wax. Modelling wax, which can be obtained from any toy shop, is easier to melt and certainly easier to work.

Apply a surplus of the wax and then cut off level with the cabinet surface with a sharp dinner knife. A brisk rub with a cloth will do much to restore the polish to the cabinet, and if the work is carefully done the marks will be completely obscured.

Mahogany cabinets are a little more difficult. Red ink and a little black mixed with it to get the necessary shade, will do for colour matching, or even water colours if you have them available. Deep scratches can be filled up in just the same way as with the oak cabinet.

Furniture polish or one of the excellent motor-car polishes now sold and a good hard rubbing, will work wonders with any wireless cabinet.

H. W. P.

WHAT TO SEE AT THE EXHIBITION

—continued from page 380

loud speakers and horns—the firm specialises in wooden horns, etc.—together with portable and self-contained cabinets for the construction of wireless receivers.

Watmel Wireless Co., Ltd. Stand No. 1.

Among various exhibits the following new lines are of interest to the home constructor. A fixed grid leak, fixed grid condensers, earthing clips—all at “knock-down” prices, while the ordinary listener will be attracted by a new two-valve set for broadcast reception.

The Wet H.T. Battery Co. Stand No. 16.

The Standard Wet H.T. Battery is a fairly new type of wireless battery, and a good deal of interest should be shown in this exhibit.

Batteries of different voltages are shown in sizes to suit from one-valve receivers to nine-valve super-heterodyne sets. An interesting demonstration is that of a seven-valve

super-heterodyne supplied with H.T. current from a No. 3 size 91-cell battery.

Whittingham, Smith & Co. Stand No. 97.

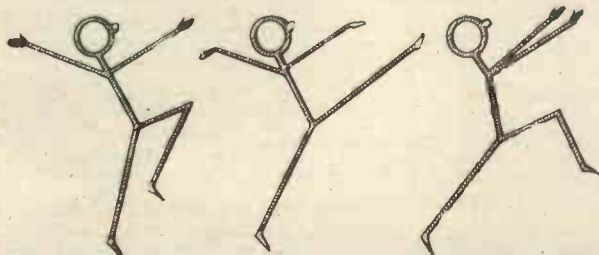
Two new receivers form the main exhibit of Messrs. Whittingham, Smith & Co., under the trade name of “Portadyne” sets. The first is a “standard” five-valver and the other is an attache case model, also employing five valves, but being completely portable.

Wright & Weaire, Ltd. Stand No. 253.

Among many interesting exhibits on this stand, mention must be made of a new automatic dual coil holder which takes three ordinary plug-in coils, for high and low range, the centre coil being the reaction coil. When swung over to the right the set is ready for 5 X X and when to the left the local is being received; when the coil is dead centre the set is switched off, the aerial and earth being shorted and the filaments turned off.

Don't Forget to Come and See Us on Stands 74 & 75.

Care-free Radio



AT STAND 230
NATIONAL RADIO EXHIBITION

“JUNIT”

SELF - SOLDERING WIRE
&
THE “PEERPOINT” SOLDERING IRON

COME AND SEE HOW
EASY “JUNIT” IS GOING
TO MAKE YOUR WORK
THIS WINTER

THE JUNIT MANUFACTURING CO., LTD.,
24-27, HIGH HOLBORN, LONDON, W.C.1.
Tel. Holborn 8042.

—AND NOW YOUR OLD LOUDSPEAKER CAN BE BROUGHT RIGHT UP TO DATE!

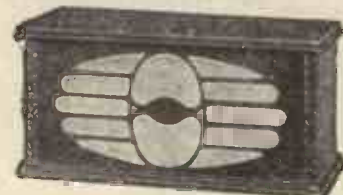


Our full-size Swan-neck model only 27/6, fit any movement.

The manufacturers of the new and wonderful W.B. ALL-WOOD LOUDSPEAKERS are now prepared to supply their various all-wooden horns to fit to any type of speaker base. Thus, by merely scrapping your tin or metal horn and purchasing the most suitable shape in an all-wooden one you can not only improve your results one hundred per cent, but you have also the beautiful appearance of the most expensive models now available.

If you are in any doubt as to the advantages of an all-wooden conduit, just ask your dealer for a demonstration. If your existing magnetic unit is reasonably well made it is worth the expense of one of our horns—

THE RESULTS WILL SURPRISE YOU
Write for our catalogue and send us the name of your dealer.



Our G.I. cabinet model with all-wooden conduit inside and arranged to receive any type of movement, 40/-

STAND
99

NATIONAL RADIO
EXHIBITION.

ALL SIZES AND SHAPES AVAILABLE

Sole Manufacturers:

WALKER BROS. (Guildford) LTD.
BRAMLEY

GUILDFORD

Tel: Bramley 117.

JUST A REMINDER! FULL LISTS FREE

FERRANTI A.F.3, 25/1, 4, 17/6. Output 1.1, 20/1; 25.1, 21/. Marconi Ideal, 25/. P.Ve. 17/6, 20/-. MULLARD, B.T.H., Ediswan, Cossor, Cosmos, Marconi valves, latest stocked. WEARITE 2-way coils, switches, M.O. 3 and 4 coils, Screening Boxes, etc. P.F.T.O.T.T. (Keystone, Copex), screens, bases, H.F.T. Neutralising, all parts. Screening Boxes. PERLESS RESISTORS, 1/3. BURNEDEPT Rheostats, Dials, Potentiometers, Resistors, and Holders. R.I.-VARLEY R.O.O. Unit, 20/-. Tuner 39/6. Anode do., 25/-. Multi L.F., 25/-. Perm. Detector, 4/-. Chokes, 7/6. Anodes res., 9/6 to 18/-. Double Choke, 32/6. Latest Tuner, 47/6. DUBILIER Grid Leaks, W.W. Anodes, Mansbridge Condensers, fixed do. LEWCO'S C.T. Coils, wound litz wire, 60, 3/6; 200 5/3. Frame aerial wire, 3/6 100 ft. coil; Multiwave Battery Leads, 4-way, 5/8, 5-way, 6/6, 6-way, 7/2, 7-way, 8/6 (5 feet in length); Glazite, 10 ft., 1/4 (4 colours); Screens, Bases, H.F. Transformers. Inductance Coils, 25, 35, 50, 3/6 each; 75, 100, 4/-. each; 150 and 200, 4/6 each; 250, 5/6. LISSEN Valve Holders, 1/- Fixed Coil, 1/-. LISSEN Valve Holders, 1/6, 2/6; Latest 2-way Cam Vernier, 4/6; Rheostats, 2/6; B.B. 1/6; Lissenola, 13/6; L.F. Transformers, 8/6; 100-v. H.T., 12/11; 60-v. H.T., 7/11; Coils, 60x, 6/4. 250x, 9/9. Stats, minor, major, all parts. C.A.V. Multiple, 5/-. CARBORUNDUM Units, 12/8. Detector, 5/-. FORMO Variable Condensers, 7/6. FORMODENSER, .0005 and .0001, 2/6 each. CYLON, IGRANIC, WEARITE RESISTOR, BENJAMIN, NEWBY, P.VE, BOWYER-LOWE, COLVERN, PERLESS components all stocked here. ZAMPA (mic.), Tuner, 200/2000 metres, 19/6. MARCONI Switches, Leaks, Condensers, Valves, etc. do. LOTUS V-Holders, 2/3, 2/6. Remote Control, 30/-. Coil Plug, 8d. GAMBRELL Coils, 4/10 to 10/-. O.T. 6d. each extra. LOUD SPEAKERS: Dr. Newby Cabinet, 52/6. Amplion One A.C.3, 75/- Celestion, 110/-. 140/-. Sterling, and all good makes. McMICHAEL Unimic, 5/-; Dimic, 10/-; Bases, 2/6; Fixed Cond., 2/6, 3/-; Bases, 1/-; 3-pt. Switch, 3/6; 6-pt. 4/6. BREMER TULLY S.W. Unit, 43/6. BULGIN P. Pult, 1/6. DIALS: DR. JACK OF PANELS, 2-way, 3/11, 4/6, 7/6. BELLING-LEE Terminals, BRITMAX Tuner, 18/6. VERNIER Dials, Ethervolter, 9/-. K.K. Port Dial, 10/-. Pilot, 4/6. Ormond, 5/-. All makes stocked. UTILITY Friction, .0002 10s. 8/6, 12/-. Friction Ver., .0005, 16/6; .00035, 15/6; .00015, 15/-; S.L.F. .0005, 11/6; .00035, 10/6; .00025, 10/-; .00015, 10/-; Sq. Lav., .001, 9/6; .0005, 8/1; .0003, 7/1; Neutralising, 3/6. MANSBRIDGE Condensers, T.C.O. 2 mid., 4/6; 1 mid., 2/10; A.C.3 cap. stocked. High Voltage (500-v.) 4 mid., 13/10; 2 mid., 7/10; 1 mid., 5/8. (Dubilier and Lissen stocked).

WE STOCK ALL LINES IN GENERAL DEMAND. SPECIAL WEST-END AGENT FOR BURNE-JONES (MAGNUM). BEST WAY IS TO MAKE OUT A LIST WITH MAKERS' NAMES AND SEND FOR QUOTATION. THIS IS IMPOSSIBLE TO ADVERTISE EVERY COMPONENT NOW ON THE MARKET.



THREE-VALVE LOUD-SPEAKER SET. NOTE THE WONDERFUL VALUE. TRY ONE OF THESE! (The set shown is two-valve.) Gets Local, Daventry and many Continental stations. THIS MAGNIFICENT 3-VALVE S.E.D. SET (D. & L.F.), includes Handsome enclosed American-Type Cabinet (all parts enclosed), Dubilier Valves, Tuning Coils, H.T. & L.T. Batteries, Aerial Equipment, Leads, Loud Speaker or 'Phones. Tax paid. Carr. fwd. case 2s. JUST THINK of a 3-Valve Set at £5/19/6! It sounds so brilliant, doesn't it? 2-VALVE SET EXACT TO ABOVE £4/12/6

SETS OF COMPONENT PARTS

RADIANO "THREE" (March, '27, Wireless Constructor). All parts as specified with Terminals. 2 Ormond S.L. Variables, with friction gear; 3 Coil Sets; T.C.O. .0003 and Clips and 2-meg. Leak; 3 Benjamin Valve Holders; 3 Fixed Resistors and Bases; On and Off Switch; Telephone List Stage L.F.; B.T.H. 2nd Stage L.F.; Engraved Strip, with Terminals and Nuts; 2 B.L. Terminals for Front Panel; 4 Gross Pinch-on Spades; Rubber Flex, £4/10/0 lot, post free U.K. EDISWAN B.C. TERREBOME. Set of Parts: 2 Ediswan B.C. units; Ediswan P. 2 Valve; 2 Ediswan R.C.2 ditor; 3 Lotus V.H.; 3 Fil. Rheostats; 9-v. Grid Bias; Lotus 2-way L.F.; .0005 Tuning Condenser. £3/5/0 the lot, post free U.K. SIGNAL BOX (P. Harris, May, '27, W. Cons.) 1 Ormond S.L.F. .0005 and 2 .0003, with friction gear; 2 6-pin bases; 2 Ormondrom 1 Neutralising; 4 Y.H.; 4 Resistors; .0001 and stand; R.P. Choke; 100,000 Anode and Base, 3 o/o Switches; Carborundum Unit; B.I. Multi; Ferranti do.; 4 Strips and Terminals; .015 Dubilier; Glazite; 6-pin H.F. Trans., S.S. type; Do. S.P. for Broadcast Range. Components as specified. The lot, post free net, £7/10/0 U.K. FAMILY FOUR PARTS (Percy Harris, Aug, '27.) 14 Belling-Lee Terminals; 4 Anti-Micro V.H.; 4 Burned Res. & Bases; 1 30-ohm B.B. Rheostat; 2 six-pin Bases; 1 Formodensers; Dubilier .0003 with clips; 4 meg. and 4-meg. Leaks; .015 Fixed, 61D type with Series Clip; 100,000 ohm Wire Wound; 300,000 ohm ditto Resistances (Dubilier or R.I.-Varley); Neut. Condenser, B.B.; R.P. Choke; Geophone L.F.; 2 "J.B." .0005 and 2 S.M. Dials; Popular .0003; Igranic o/o Switch; 2 Lotus D. H. Jacks and Plugs; Binocular Coils 250/550 H.T.; 2 Ormondrom; 2 Formodensers; 1,000/2,000 metres; S. Secondary ditto for Daventry. THE COMPONENTS, ALL AS SPECIFIED, SENT POST FREE NETT FOR £8/8/0 U.K. PANELS, CABINETS, VALVES, PHONES, LOUD SPEAKERS, TO YOUR REQUIREMENTS.

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MARCONI .. 12/6 P. .. B.T.H.
EDISWAN .. 20/- S.P. .. COSMOS

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2-1/2 do. 7/11, 6/-, 50,
9/6; 2-v. 80, 12/6; 2-v.
100, 14/6; 4-v. 40, 13/11;
4-v. 60, 17/11; 4-v. 80,
23/6; 6-v. 60, 26/6; 6-v.
80, 35/6. ALSO another
good make, 1/16 extra on
each of above. Post 1/- each
BENJAMIN. - Battery
Switch, 1/- Valve Holder,
2/-; with Grid Leak, 5/3.
With Condenser and Leak,
7/-. Rheostat, 2/8.
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de Luxe, 3/6; with con-
denser, 4/6. Anode, 3/6.
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VERNIER DIAL (with
Etholor Station Indicator,
18/- 9/-.
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Detector only (No. 30), 5/-.
Stabilising Detector Unit,
with No. 10 Detector, 21/6.
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-Oak, 110/-; Do. "A2",
130/-; Do. "A3", 150/-.
Mahogany same price;
walnut extra.
CLIMAX. - Potential
Divider, 5/-. Special Choke,
10/6. Shock Absorbers, 3/-
pr. Earth Tubes, 5/-. L.L.
Holders, 1/-.
GOLVERN SCREENED
COILS, 3/- Former & Base,
5/-. 6-pin Base, 1/6. Former
only, 4/-. Screen and Base,
8/6. S.P.H.F.T., 9/6. S.S.
do., 6/6. 2 Monodial, 19/6.
DUBILIER. Duwirohm
Wire-wound, 20,000 to
100,000 ohm resistances,
5/- each; Base, 1/6. 'o/o
Control Unit, 7/6. Duval-
leak, 7/6. Dumohm
Holder, 1/-.
DUBILIER MANS-
BRIDGE. -1, 2/6; -2,
2/6; -25, 10/-; 3/-; -4,
3/3; -5, 3/6; 1 mid., 4/-.
2 mid., 5/-. 3 mid., 8/-.
DUNHAM "ALL-
WAVE" TUNER will
enable you to dispense
final triode of a
Vernier coil-holders and sets
of coils. Covers all wave-
lengths from 150 to 2,000
metres, and is complete
in every way. "All-
wave" Tuner, 9/6.
EVER-READY H.T.
Popular 66-v., 9/6; Do.
108-v., 15/6. Standard
66-v., 12/6. 108-v., 21/-.
L.T.H. (4 v.), 1/6. Flash
Lamp, 4/5. 6-v. dozen. Grid
Bias 9 Tapped 11-v., 2/-.
USUAL LINES STOCKED.
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Gang, £1 2s. 6d.; Triple-
Gang, £3 3s.
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Ormond, with dial, 32/-.
Cylton, no dial, 50/-.
Triple .0005
Ormond, with dial, 40/-.
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HONEYCOMB INDUC-
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5/6; 500, 7/1; 750, 9/6; 1,
12/6, 14/-; 1,500, 16/-.
ALL PARTS STOCKED
GRAMM F.R. H.
Bakelite Mica Condensers,
have S.P.G.L. clip. .0001 to
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1/6; .007 to .01, 2/6.
Grid Leaks, 1/3; .0003
and Leak, 2/-.
SETS REPAIRED OR
RECONSTRUCTED.
Panels drilled. Low
Charges.

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Try our NEW VARIABLE
CONDENSERS, made on
the Log-Mid-Line principle.
.0005 or .0003, with a 4-in.
Triolite Dial, the best you
can buy, for the moderate
price of 5/11 each,
post 1/6 free
HELESEN
(post free), 66-v., 12/6; 99-v.
21/-; Grid Bias, 9-v., 2/-.
4-v., tapped 14-v., 1/2.
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Grade A, cut to size, 4d.
sq. inch, 3/16, or 3d. for
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CABINETS. Large stocks
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kept, or made to order. Solid
oak. Glass finish. American
type, hinged lid, baseboard.
Post 1/6 each extra.
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Extra quality oak or
Mahogany, 5/- each extra,
worthy of any set.
RADIO MICRO
2-v. .2, 5/11; 3.5-v. .06,
5/11; 2-v. Power, 10/6.
3.5-v. Power, 5/11. SUPER
POWER, 3.5-v. 1 amp
latest valve, 12/- each.
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Scott, 5/-. 6/3, 7/6. Or-
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7/-. Magnum, 5/-. McMichael,
4/9. Reaction (Ormond)
.0001, 4/-. J.B. 3/6.

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Condensers
with 4 in. TRIOLITE DIAL
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.0003 each 4/11
Post 6d. each.

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Low Loss. .0005, 9/6;
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no vernier) Friction
Geared, .0005, 15/-.
.0003, 14/6; .00025,
13/6. Straight Line
Frequency Friction
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.00035, 19/6. S.L.F.
.0005, 12/-. .00035, 11/-.
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DUAL, .0005, 16/- each.
Ormond Friction Dial,
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or 30 ohms, 2/-. Pote-
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Twin Gang, .0005, 32/-.
Triple, 40/- H.F. Choke,
7/6. Geared Dial, 5/-.
THE NEW No. 3

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S.L.F. CONDENSER
.00025, 5/6. .00035, 5/9.
.0005, 6/- With 4" Dial.
With Friction 55/-
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This variable
Condenser is
simply mar-
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It cannot be
equalled in
price or quality

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.0005 .. 4/11 each
By Post 5/11.
With VERNIER 1/- extra.
WEARITE 2-way geared,
5/- 6-in. of Panel, 7/6.
Countryside Four, set of
Binocular Coils, 12/6. M.O.3
Aerial and Transformer
Cable, wound on Paxolin
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B.B. 10/6. set. 5XK
12/6 set. H.F. Choke, 6/6.

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WE ARE OPEN ALL DAY SATURDAY
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If purchasing your regular wireless supplies here, you can at the same time select from these wonderful bargains, SOLD AS AN ADVT. ONLY.
1/11 and 2/3 each. Brand new Var. Condensers. .0003 and .0005 Sq. Lav. Log Mid-Line, in L.F.
(Usual price, 4/11 & 5/11).
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ALL ABOVE BRAND NEW.
BE SURE IT'S RAYMOND'S!
IN ORDER TO REAP THE BENEFIT OF ABOVE, YOU CAN ONLY BUY THESE AT RAYMOND'S WHEN BUYING OTHER GOODS. NOT SOLD AT ABOVE PRICES ALONE, OR BY POST.

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R.C. UNITS.—Ediswan 7/-; Dubilier, 7/-; Cosmos, 8/6 with V.H. 10/-; Magnum, 10/-; R.I. Coupler, 20/-; Graham Farish, 3/6.
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J.B. CONDENSERS. awarded Certificate (1926) of Merit, Radio Revue, of America. We sell them.

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AERIALS.—100 ft. 7/22. Heavy drawn wire, Extra heavy, 2/2. Phosphor 49 strands, 1/-. Electron stocked. Special INDOOR Aerials, phosphor, with ebontic separators and rubber rim, 4 x 8 strands, total 100 ft. 4/6. O.V., 2/6. Rubber Lead-in, highest quality, 10 yds. 1/6; 10 yds. 1/3; 10 yds. 1/6. Extra heavy, 2d. and 3d. yd. B. & B. Twin Flex (best), 6 yds. 10d.; 12 yds. 1/6; 36 yds. 4/-; Ins. Hooks, 2 for 1d. Edg. Insulators, 2 for 1d. Ins. Staples, 4 a d. Earth Tubes, Copper, extra value, 2/3. Climax, 5/- (also at 2/6). EASY FIX AERIALS, with 2 insulators and lead-in, 1/3. EBONITE GRABER AERIALS, sizes, 6 x 6 and 7 x 5, 1/3; 8 x 6, 1/6; 9 x 6, 1/9; 10 x 8, 2/9; 12 x 6, 2/9; 12 x 8, 3/6; 12 x 9, 4/-. CUT TO SIZE while you wait at 4d. per sq. inch 3/16th, and 3d. sq. inch for 4 in. Special cheap price for Crystal sets. TERMINAL NETS. W.O. Pillar, 'Phone, 1/6; 2 for 1d. each with N. and W.; Brass do., 10d. do. 1d. each with N. and W.; all high quality. Valve-Pins, with nuts, 2 to 4. Ormond Screws, 6 or 4 B.A. 6d. dozen with nuts; washers 12 a 1d. Brass, 10d. each. Sides, screw at side, 3/4d. Plug and Socket, Red or Black, 3/4d. Wander Plug, Red or Black, 3/4d. pr. (large, good). 'Phone Condensers, 2 d. Push panel sockets and nuts, 4 for 4d., 10d. dozen. Brass Spade Tags 6 a 1d. Nickel Tags 4 a 1d., 2 d. B.A. 6d. 3d. 5XK Nickel Valve Legs and Nuts, 1d.; 8d. dozen. Stop Pins, 2 a 1d. H.T. BAT-TERIES. Highest quality only. Best price. (Trade test award best given) 60-v., 6/11; 100-v., 12/11. Thera, 60-v., 5/11; 100-v., 10/11 (with extra Grid Bias). Eveready, 66-v., 6/11; 108-v., 15/6. Others from 5/- 1.5 L.T. Hellesen's, 2/6; Adico, 1/8; B.T.H., 2/-; Flag, 2/-; British, 1/6. P. & S. G.L.A.E. 4.5 Adico, 4/4d., 4/3 do. British, 6d., 3 for 1/3. SOLDER, with resin, 2d. foot, 1/16 sq. Bus copper, 1/6. 1 lb. Tinned copper, 1/6 and 18 gauge, round, 9d. per lb. D.C.O., 1 lb. 20 gauge, 8d.; 22 gauge, 9d.; 24 gauge, 10d.; 26 gauge, 11d.; 28 gauge, 12/6. MANSBRIDGE CONDENSERS. "Hydra", 1 mfd., 2/9; 2 mfd., 3/9. O.V. 1/3; 25 and 50, 3/3. S.P.D.T. (S.P.D.T. 100). D.E.D.T., 1/3; S.P.D.T., 8/4d. and 10/4d. Sound quality. Panel switches, with Ebontic handle, worth 10d. P. & S. 2/4; D.P.T., 1/6. Insulating Tape, 4 1/2. Copperfoil, 4d. foot (6 in. wide). Grid Bias Clips, 6d. pr. Brackets, 9d. pr. 3d. Permanent DETECTORS. Red Diamond (a topper), 2/-. Lion Micro (latest, cannot be equalled), 2/6. Brownie, 3/- Enclosed Kay Ray, 1/-, 1/3. Service Micro-meter, with crystal, 2/9. 4/6. CRYSTALS. Super-zinc, 1/6. 4-way H.F. genuine Hertzite, 8d., 1/-; Wyray, 1/6. HEAD-PHONE CORDS. Good, 1/6, 1/3, 1/6. L.S. Cords, 1/6, 1/3, 1/6. 4-way H.F. L.T. Leads, 9d. 4-way H.F. Stocked. COIL PLUGS. Rubonite on Base, 8/4d., 7/4d. Lotus, 8d. Burne-Jones, 1/9. Low Loss, 8d. Panel 8/4d. Various Stocked. GEARED COIL STANDS. 2-way, 2/3, 2/6, 2/11 up, 3-way, grand value, 5/11. Back of panel from 2/11. All ebontic.

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27 & 28a, LISLE ST., LONDON, W.C.2. Ask for back of Daly's Theatre 'Phone: Gerrard 4637. This address is opposite.

FOOLPROOF RADIO

—continued from page 422

matches, dry the sticks well, and fix them by means of shellac on to the windings at regular intervals as shown in Fig. 6. Cover them with a winding of sticking plaster or Hunt's "Clutch" tape. Now see how the coil fits inside the Dimic. With only one layer of sticking plaster it will probably be rather loose. Add sufficient to make it a good push fit so that it will "stay put" in any position. Connect the two terminals of the coil to the aerial and earth terminals at the back of the baseboard, using flex for the job.

With any set using a super-power valve it is essential to employ a filter circuit to get the best results from the loud speaker. After all, there is no point whatever is passing the whole of the direct plate current of the last valve through the loud-speaker windings.

The Filter Circuit

Even with an ordinary power valve the filter is better and its use leads in most cases to a distinct improvement in the tone. The filter used

in connection with the "Knobless Three" is seen in two of the photographs. It is a most useful type, and it will be found to give good results when connected between the output of any valve set and the loud speaker. Fig. 7 shows the circuit used. The components required will be found at end of list of components on page 417.

Constructional Details

The filter is best made up on a base consisting of a piece of $\frac{1}{2}$ -in. wood measuring 6 in. by 3 in. Fig. 8 shows how the components are arranged and wired. The leads attached to the plug go in through a hole drilled in one end of the box, a knot being tied in them inside so as to prevent them from being dragged away from their terminal connections by any unfair strain. For the loud-speaker connections two terminals are provided, mounted either in panel bushes or upon a strip of ebonite fixed to the end of the case. When this is done holes must be made in the wood sufficiently large to clear the terminals completely. One of the photographs makes this plain.

When all the preliminary wiring has been done the filter circuit is placed in its box, the baseboard being secured to the bottom of the box with a couple

of screws. The flexible leads from the plug and those which go to the loud-speaker terminals are then fixed up.

The set may now be tested out upon whatever kind of aerial is available. The H.T. voltage for the rectifier should be from 80 to 90, and that for the two note-magnifiers from 100 to 150 volts. Place the wander-plug connected to the centre tapping of the grid coil in the $4\frac{1}{2}$ -volt socket of G.B.1, and adjust the negative grid bias of V_2 and V_3 to the figures recommended by the makers. Mesh the moving plates of the small neutralising condenser completely with the fixed.

Sharp Tuning

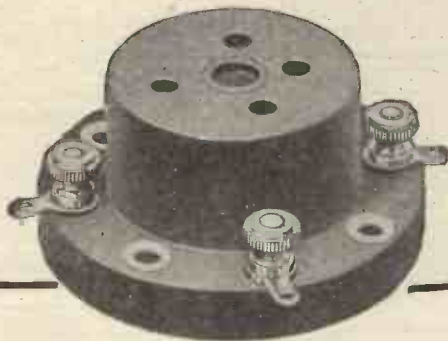
Now insert the loud-speaker plug into one of the jacks and turn the knob of C_1 slowly. With a small indoor aerial, even at very short range, the tuning will be found to be surprisingly sharp, which explains why it is necessary to have a volume control and not merely to rely upon slight detuning for the regulation of the output. It will probably be found that when the set has been tuned by means of C_1 as closely as possible to the incoming signal, the volume is a little too great with all three valves

(Continued on page 446.)

Anti-microphonic at last!

THE REDFERN Pneumatic Action VALVE HOLDER

Patent No. 269,388



Recognise them by the well-known yellow carton

A NEW INVENTION WHICH POSITIVELY ELIMINATES MICROPHONIC NOISES.

The system of suspension of the Redfern Valve Holder is one that has been sought by radio experimenters for years. Its construction is such that 100% absorption of vibratory action is effected.

It is manufactured throughout of soft pure rubber of long elastic limit, and its internal construction affords a hermetically sealed air cavity. The effect of this air cavity enclosed in a unit of soft rubber is to eliminate entirely the regenerative effect caused by vibration and by sound waves generated by the loud speaker impinging on the valves.

The Redfern Patent Valve Holder completely solves the problem of the proximity of Loud Speaker to Valves. It is anti-capacity, low loss, and has none of the moisture-absorbing properties of sponge rubber.

Sold by all reputable dealers

PRICE **2/6** EACH

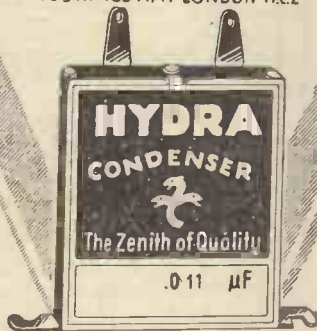
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REDFERN'S RUBBER WORKS, LTD.,
HYDE, CHESHIRE

SEEN THESE NEW PRICES?

Just take a glance at them—they will interest you. Makes you wonder how a condenser that contains so many advantages can be made at such a price! Hydra Condensers operate at high voltages with no danger of breakdown, have high megohm resistance and low variation, and are neat, rigid and compact. Use Hydra Condensers in your set and your eliminator because they work in a background of dead silence, and are made by a firm who have been manufacturing condensers for 28 years.

Capacity.	Tested on 500 volts D.C.
.001 to .009 mfd.	1/6
.01 to .05 mfd.	1/9
.06 to .1 mfd.	1/9
.25 mfd.	2/-
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1.0 mfd.	2/6
2.0 mfd.	3/6
3.0 mfd.	4/3
4.0 mfd.	5/3
5.0 mfd.	7/3
6.0 mfd.	8/3
8.0 mfd.	11/-
10.0 mfd.	14/-

Louis Holzman.
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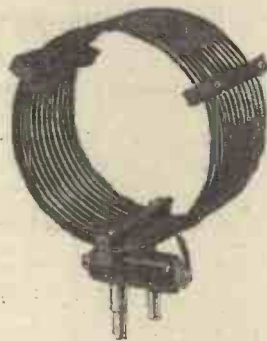
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No. 6	14-70	2 9
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No. 15	60-200	3 6

Above supplied with low-loss pins instead of standard mount if desired.

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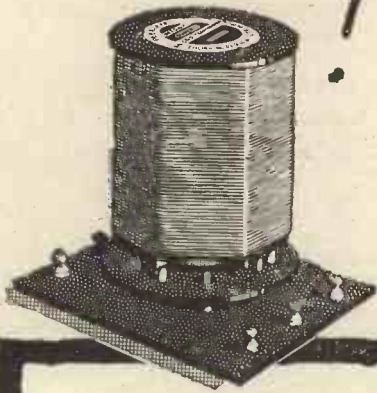
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"PEERLESS" PRODUCTS from all good dealers or direct:—

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& RADIO CO., LTD.**

**22, Campbell Road,
BEDFORD.**

FOOLPROOF RADIO

—continued from page 444

in use. A small movement of the moving plates of the neutralising condenser will reduce it, and it can now be adjusted to suit the requirements of the room and of those who will use the apparatus.

A further adjustment affecting both the sharpness of the tuning and the signal strength is provided by the movable coil L₁. Generally it is best to obtain the loudest possible signals, even if they produce distortion, with L₁ in the position which gives the greatest degree of coupling. This having been done, signal strength is moderated by means of the neutralising condenser until good volume without distortion is achieved. The lid of the cabinet may now be closed and there is no need to open it again in the ordinary course of events for some months. The two grid batteries should be changed, as a matter of routine, every ten or twelve months, but that is the only internal attention required.

Small H.T. Consumption

Owing to the fact that resistance-capacity coupling is used the H.T. consumption of the set, despite the fact that there is a super-power valve in the last holder, is not very high even with all three valves in use, provided that grid biasing is properly carried out. Still it is the height of folly to attempt to run such a set from a small, light, dry H.T. battery. Accumulator and wet Leclanche H.T. batteries, are, perhaps, rather out of place in a foolproof set, and I am strongly disposed to recommend the use of a dry battery made up of three 45-volt units weighing some eight or ten pounds apiece.

A battery of this kind will give at least a year's working, and will require absolutely no attention until the times comes for it to be changed. Using dull-emitter valves of the .1-ampere class in the first two holders and of the .25-ampere class in the last, the total filament consumption of the set works out to only .45 ampere. This means that if an 80 actual ampere-hour accumulator is provided the set will run for about eight or nine weeks off one charge.

Fixed Resistors for the "Knobless Three"

For 2- and 4-volt valves of the .1-ampere class the best wire to use

(Continued on page 447.)



Start well—

Here in the radically different COLUMBIA "B" battery is the solution of your H.T. problem. Years of research and years of manufacturing experience combine in these batteries to give you the perfect service which you require. Even, surgeless discharge; long trouble-free life.

Now that winter is nearly here and you are again turning to radio with fresh enthusiasm—forget all your last year's H.T. troubles. Start well this season with a battery that will last long enough for you to forget its existence.

Wire your set up with
**Columbia
Dry Batteries**
—they last longer

And about those new D.E. valves you've bought! Use COLUMBIA Radio "A" Cells for heating the filaments; it's the job for which they are made. They will give you months and months of consistent service. They will save you the expense of weekly recharging—and the trouble.

Drop a card for information.

J. R. MORRIS,

15-19, KINGSWAY,
LONDON, W.C.

Scottish Representative:
John T. Cartwright, 3, Cadogan St.,
Glasgow.

FOOLPROOF RADIO

—continued from page 446

in the fixed resistors is No. 30 S.W.G. Eureka, either enamelled or double-cotton-covered. I recommend the use of covered rather than bare wire, since it prevents short circuits, should adjacent turns happen to come into contact with one another. The resistance of No. 30 Eureka works out very conveniently to almost exactly $6\frac{1}{2}$ in. to the ohm.

With the average 2-volt valve of the .1-ampere type the filament potential required is 1.8 volts, which means that the resistance needed is 2 ohms. Thirteen inches of wire will therefore be exactly right. For the 4-volt valve with a working potential of 3.6 volts we need a 4-ohm resistance, which will contain 26 inches of wire. For valves of the 6-volt .1-ampere class the proper filament potential is somewhere between 5 and 5.8 volts, the exact figure depending upon the particular make.

Where the filament potential is not less than 5.5 volts, No. 30 wire may be used, the amount required being $6\frac{1}{2}$ in. for each tenth of a volt to be dropped from 6. Thus, if the recommended potential is 5.5 volts, the resistor should contain 5 by $6\frac{1}{2}$, or $32\frac{1}{2}$ in. of No. 30 Eureka. For potentials between 5 and 5.4 volts it is better to use wire of finer gauge, in order to keep the resistors compact. No. 34 is very handy for the purpose, since it works out at a fraction over 10 ohms to the yard, or approximately $3\frac{1}{2}$ in. per ohm.

Thus, for every tenth of a volt to be dropped below 6, the length required is $3\frac{1}{2}$ in. If, therefore, the filament potential is to be 5 volts, 35 in. of No. 34 should be put on to the resistor.

SOME POINTS ABOUT THE NEW SHIELDED VALVE

—continued from page 402

valves, due to reasons which I shall go into elsewhere, a much greater magnification than that obtained with triodes is obtainable with these valves, and magnifications of 50 are quite easy to obtain with care. If the valves are used without reaction this will enable many who have at present simple two- and three-valve resistance-coupled sets without

(Continued on page 448.)



"BREAK STEP!"
—else the bridge might be wrecked



These five features are exclusive to BENJAMIN Valve Holders:

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

BENJAMIN BATTERY SWITCH

For sheer simplicity, usefulness and reliability the BENJAMIN Battery Switch has not yet been equalled. Nothing to get out of order. Nothing to break. Measures only $1\frac{1}{8}$ " top to bottom. The metal parts are nickel-plated, of course, and soldering tags are built in. It's off when it's in.

Price 1/-

IT JUST shows you how serious vibration can be. Soldiers marching across a bridge are given the order to break step. If they kept in step their marching would create a regular vibration that might wreck the bridge!

Yet there are still thousands of radio men who mount their valves in old-fashioned or inefficiently sprung valve-holders, so that the rhythmical street vibration reaches the delicate filaments. And then they wonder that their valves have short lives!

Only BENJAMIN anti-microphonic Valve-holders will effectively prevent every quiver of vibration, every shock from reaching the vital filament. Bring your set up-to-date, make your reception purer and treble the life of your valves by fitting BENJAMIN anti-microphonic Valve-holders in every stage.

BENJAMIN

Anti-Microphonic

VALVE HOLDERS

2/-
each

Stand No. 79
NATIONAL RADIO
EXHIBITION
Sept. 24—Oct. 1

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If you are interested in any way in Wireless, here is a wonderfully interesting way of making money in your spare time. Simply write for particulars and by return you will be given full details how to make at home a most marvellously improved article which reduces the upkeep costs of all valve sets, gives splendidly efficient service, contains no harmful ingredients whatever, and which is in enthusiastic demand all over the country.



Is your spare time wasted time? Why not turn it to good account and change the whole of your future life for something better and bigger?

there any inconvenient demand on space. A spare room, an outhouse, or even your kitchen table can be used as your "factory"—a factory without machinery or plant or electric current. The few simple tools needed you are shown how to make yourself, or buy for a shilling or two.

Output Easily Sold.

Each article you make is protected by Royal Letters Patent so that your rights cannot be infringed. The market is immense and only one person per 50,000 of the population is granted a licence to manufacture, thus giving you a huge field for sales at a very big profit. The articles you can produce without any mechanical skill or talent are manifestly superior in quality and value for money to anything on the market, and if you have the least difficulty in disposing of your output to friends, private owners of wireless sets, wireless or electrical dealers in your district, arrangements will be made to take it off your hands, thus guaranteeing your profits!

Think of what you could do with pounds extra per week! Think of the delightful hobby you can pursue instead of finding time hang heavily on your hands! Think of the new and most interesting field opened to you as a responsible "master man" — and do not delay a single moment in sending the coupon below!

Send this form now for full particulars.

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Sirs,—Please send me at once, and FREE, full details as to how I can Make Money at Home in my spare time. I enclose 2d. stamps for postage.

Print your name and address boldly in capital letters on a plain sheet of paper and pin this coupon to it

"Wireless Constructor," October.

SOME POINTS ABOUT THE NEW SHIELDED VALVE

—continued from page 447

reaction, which do not give quite enough sensitiveness, at once without any effort enormously to increase their sensitivity.

I have calculated out that if a particular set will receive 2 L O at 10 miles with full loud-speaker strength, with the addition of one of these valves in front of the set the range should be easily 65 miles, and I do not think that this is too optimistic a figure. I remember an experiment at home some little time ago in which I had a three-valve R.C. set on a T aerial about 15 feet high, which just gave me comfortable loud-speaker strength. I was able, with the addition of one of these valves added in quite a lash-up way, to receive the same strength of signal on a 6-inch frame. In neither case was reaction used. No doubt constructors will not for a long time eschew reaction, but, personally, I propose to avoid it at all possible costs, although one must admit that it is difficult to get the tuning one would like without it.

Two Sets

There are two sets I would recommend constructors to experiment with for a start. One which is being described by the Editor, consisting of one high-frequency valve, one grid-leak detector with reaction, and one low-frequency valve, transformer coupled. This might be called a long-range set, and will also give very fair purity at short ranges. The second set (Fig. 3), which I prefer, but which is, of course, hardly a long-range set, except on telephones, consists of one high-frequency valve, one anode-bend rectifier of the H type, and one power valve, a hook-up which I illustrate with the necessary details, and with the Reinartz type of reaction illustrated dotted for those who would like to employ reaction.

One curious advantage of these tubes is that they enable us to obtain sufficient amplification without the addition of a second low-frequency valve R.C. coupled, and those who have experience of R.C. coupling know of the troubles that occur due to what is commonly called "motor-biking."

LOWEST INTERNAL RESISTANCE

Daimon H.T. Batteries—made by one of the oldest dry battery makers in Europe—are known to have the lowest internal resistance of any equal-sized battery. That means the quietest working background, the longest life and the greatest recuperative power. Improve your reception with them.

60 volts - 10/6 each.
100 " - 17/6

Also L.T. Dry Batteries, 2/- & 4/6
Obtainable from most dealers, but in case of difficulty write to:—
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A Quality Cabinet for your Set.

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20/- down buys the finest 2-valve set obtainable

Loud-speaker range 30 miles from local stations, 75 miles from Daventry. Uses components of highest quality, including Cyldon Condensers, Pye Transformers, Osram Valves, Oldham Accumulators, etc.

Write for Catalogue of this and other Sets. Components supplied on easy terms.

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Accidental Damage avoided. Descriptive List free on request.

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TRADE SUPPLIED

THE BATTERY SUPREME!

IS THE SELF-CHARGING Sae Leclanché STANDARD WET H.T. BATTERY POWER—PERMANENT—SILENT—ECONOMICAL

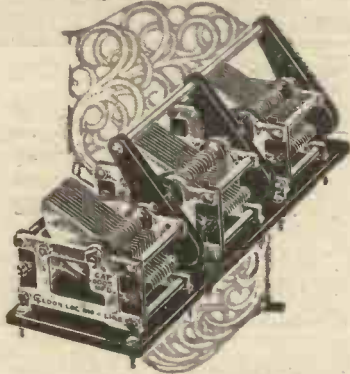
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Standard Model, 60 cell 90 volt, No. 1 Sac. ... 21/9
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Free advice given as to best battery for your set on hearing number and type of valves

WET H.T. BATTERY CO., 12, BROWNLOW STREET, HIGH HOLBORN, W.C.

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the only truly
up-to-date
condenser is the
"CYLDON"
log mid-line



The "Cyldon" Log Mid-Line is the condenser of to-day and the future. It spreads all the stations evenly over the whole dial. It prevents any "falling out-of-step" at the beginning or end. It simplifies tuning in multi-tuned circuits when individual condensers are used, by making all the dial readings exactly the same. It is the only condenser you should fit to your set now. Experts insist on using them—and recommending them.

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With 4" knob dial 2/- extra.

GANG CONDENSERS

Twin Gang - £2 : 10
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Thick aluminium plates. Large adjustable non-wearing bearings. Pigtail rotor connection. Precision finish and electrical efficiency.

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The products of the world's best brains and manufacturing resources in any trade or profession have always interested the "Cheap-Jack" imitator, the worthiness of whose products can only be compared with his lack of originality. "Cyldon" products, unfortunately, have not been spared this form of unwelcome flattery. Every genuine "Cyldon" Condenser bears our registered trade mark on the end plate. Insist on seeing this before purchasing.

CYLDON products can be obtained from stock by return, and do not believe any statements to the contrary. If any difficulty Phone: Enfield 0672, Wire: Enfield 0672, or use the C.O.D. system.

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Contractors to B.B.C., H.M. R.A.F.,
H.M. Office of Works, and all manufacturers of quality receivers.



SAVOY HILL HAPPENINGS

—continued from page 388

And I mean to see it through. And that's that.

The Handicap of Geneva

Much has been heard of the advantages of the Union of Broadcasters which has its headquarters at Geneva. Evidently Mussolini thinks otherwise. As soon as his experts told him that if Italy "stood-in" with the Geneva plan it would not get as many wave-lengths as it needed he decided to "stand-out," and to take the wave-lengths he needed. The scheme seems to be going forward smoothly. Simultaneously there are alarming rumours of insufficient wave-lengths for Britain under the Geneva scheme. It is being stated that a whole area of England is to be sacrificed for Northern Ireland. If this is the case, and if Italy is "getting away with" independent action, then why in the name of common sense don't we jump in and grab while the grabbing is good. Listeners pay their ten shillings in order to get as many as possible of as good programmes as possible; they don't pay money to protect the interests of remote Continental listeners. It is really a moot point whether any good is gained from the attempt at international control tried by the Geneva Union. So far as Britain is concerned it is, as usual, all "give" and no "take." Perhaps it is too late to go back on Geneva. If this is so, then at least we might expect our delegates to hold out more firmly for indisputable British rights. Then again, what is Arthur Burrows doing at the seat of power? Surely the B.B.C. put him there and supports him there for a definite purpose? This subject of British interests in international wave-length distribution has reached such a state that there should be a full and exacting Parliamentary enquiry. The record of the Post Office is much worse than that of the B.B.C. in this matter.

The
Blue Spot
MULTIDYNE COIL



What it is—

The Multidyne all-wave coil is a plug-in coil combining a number of coils suitable for listening in on all wave-lengths from 160 to 4,300 metres. An adjustment lever of insulating material operates the multiple switch gear, which switches off at both poles every winding not in use. The windings are the "frameless" twisted basket type. High self induction, low self capacity, no oscillation.

What it does—

The Multidyne coil entirely dispenses with an expensive collection of coils, and the trouble of changing them. The lever projecting beyond the container avoids hand capacity effects and affords immediate changing from one station to another with beautifully sharp resonance at the multiple couple. The method of marking on the dial the divisions of stage and wave-length make this operation as simple as it is effective. It is marvellously efficient as a reaction coil because accurate ratio with all wave-lengths is instantly obtained by moving the lever. Price complete 13/6. The Multidyne Coil maintains our reputation for the production of components that are efficient—

So we labelled it



F. A. HUGHES & Co., Ltd., 201-206, Gt. Portland St. W.1.

Telephone: Museum 8630 (3 lines). Telegrams: Distancing, Weso, London.

Manchester Office: 6, Booth St. East, C on M. Manchester.

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An architectural miracle. The design, the inspiration of genius; its execution incredibly perfect to the smallest detail. So perfect indeed that to this day it is not possible to insert a fine blade where marble rests upon marble. Correct choice of material enters largely into the success of every construction, so it is that more and more wireless constructors and electrical engineers are learning the qualities of Trolite, its adaptability, lifelong service and permanent beauty.

INSULATION

- (1) Trolite is ideal for panels and dials and its unique insulating properties commend it for use in every branch of electrical construction.
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- (6) The price of Trolite is within the reach of all constructors. After all, the panel and dials are the most conspicuous part of your set. Remember, you do not sacrifice efficiency for effect by using Trolite—you have both in the Panel de Luxe.



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LIFELONG SERVICE

THE "TRAPPER"

—continued from page 397

and grid bias will, of course, be dictated by the particular make you choose. For the second valve you should use the highest H.T. available up to about 120 volts, but for the first you should try adjusting the voltage. Probably from 60 to 80 will suit in most cases.

The adjustment of the set is simplicity itself. First of all, connect the aerial to A₁, the earth to E, and the batteries to the terminals marked. Connect your telephones to the plug and plug in to the jack. Set the reaction condenser at zero, and the potentiometer slider to about the "half-way" position. The tuning condenser (left-hand) should now be varied until you pick up your nearest station; then slowly turn the reaction condenser until you come to the oscillation-point and immediately turn back again, as the set must not be left oscillating.

Adjusting the Trap

A few experiments will show you that it is very simple to obtain sensitivity and quite a reasonable amount of selectivity without the trap. To get the very best adjustment of reaction you will have to try for the best position on the potentiometer. Once found this will probably remain constant for all future work, although a variation one side or the other of the best point will give you a very fine adjustment for the reaction control.

When you have become used to handling the set on signals without the trap, tune in your local station without reaction, and then change the aerial wire to terminal A. Now take a piece of wood and sharpen it off at one end like a screwdriver. Listen in the telephones for the local station, and then place the blade of your wooden screwdriver in the small cut which you will find in the knob of the adjustable condenser and slowly turn this one way or the other until the local station signals either disappear entirely or come in at the weakest.

This point is very easy to find. Having found the silent or the quietest point for the local station, you can use the receiver in the usual way, and you will find that you can pick up other stations at excellent strength without any interference—or, at least, only the slightest—from the local transmitter.

(Continued on page 451.)

REPAIRS

to HEADPHONES, LOUDSPEAKERS, TRANSFORMERS, COILS.

First-class workmanship only. This is just the vital difference. We are specialists with almost 30 years' experience in every form of intricate and accurate coil winding, and we guarantee that work entrusted to us will be returned to you as good as new, if not better. This is no idle claim, but the unsolicited opinion of scores of satisfied clients.

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(Proprietors: Oliver Pell Control, Ltd.)
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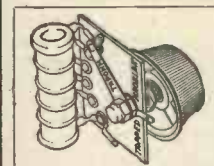
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AMPLIFIERS: 1-VALVE 19/6; 2-VALVE, 30/-
2-Valve All-Station Set, £4. Approval willingly.
Wet H.T. Batteries—Jars, Zincs and Sacs complete,
3/6 per doz. (18 volts). Post 9d. extra. Sample 6d.
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"Tapohm"
Variable Wire-Wound Tapped
Resistance or Potential Divider.



Specially designed for H.T. Eliminator. 30,000 ohms in five equal tappings, for regulating voltage output of H.T. Mains Supply Units. Total capacity 10 watts.

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Write for particulars of transformers & chokes. WIRING DIAGRAMS FREE OF CHARGE.

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Two required for each hole.
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For Your HOME Radiola! Wireless Furniture 3 ft. high—taking your Set, Batteries, etc., complete.
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High Grade Work and finish
GUARANTEED and Sent ON APPROVAL.
Lists of Cabinet Designs No. 21 FREE.
Pickett's Cabinet Works
Bexleyheath.

THE "TRAPPER"

—continued from page 450

If you are able to tune in any station loud enough for the loud speaker at any time (the local station will always be good enough for this, provided it is not more than thirty or forty miles away), connect your loud speaker to the two terminals at the rear and, having tuned in on the 'phones, simply withdraw the plug, whereupon the set will be switched on to the loud speaker automatically.

Results Obtained

A little practice will soon enable you to get the best out of the receiver. Up to the moment some thirty stations have been tuned in with ease while London has been working. Several of them have been loud enough for medium-strength loud-speaker reproduction in a quiet room, and the local station gives full loud-speaker strength on a small aerial at a distance of seven miles.

THE NEW STANDARD SCREENING BOX

—continued from page 426

Fitting inside the box is a wooden baseboard carrying the necessary parts, and in the standard specification these consist of a six-pin coil socket, neutralising condenser, valve holder and filament resistance arranged in the fashion illustrated in a diagram herewith. In each face of the box four small holes are provided through which leads can be brought out, and the exact positions of these again are standardised, so that the position of each wire shall be definitely fixed in any given design.

Easy to Duplicate

This feature, of course, renders it much easier for the constructor to make a good copy of the original wiring when he is working to a published design, and indeed the whole effect of these standard boxes is to make a given design a much more rigid and definite affair, which is more easily copied with perfect fidelity.

With the actual practical applications of the boxes it is not possible to deal here, but designs for sets employing them are already appearing, and the various constructional details will be dealt with as they arise. One

(Continued on page 452.)

World's Record achieved on Peto-Scott 5-Valve Set



The Five Fifty One

Five Valves
50 Stations
One control

244 Stations

identified during trip to Australia. Station W B B M (Chicago) received at distance of 6,840 miles on loud speaker every evening whilst in New Zealand waters.

SOME months ago we conducted a unique test. One of our standard 5-valve receivers was taken from stock and sent to Australia and back on a six-months' trip. Marvellous results were achieved. In mid-Atlantic over 20 stations in Europe and U.S.A. were received on the Loud Speaker during a terrific storm. All these results were logged and verified by independent witnesses. A copy of the log and the actual chart giving a full record of the actual distances covered will be shown at our Stand 163 at the Olympia Exhibition.

The set illustrated above is the 1927 prototype of the one used for this remarkable test. It has, however, been improved and simplified. By the slightest movement of the slow-motion

dial, far distant stations come in at full loud-speaker strength and with wonderful clarity. The Five-fifty-one covers all wave-lengths from 250 to 2,000 metres without any coil changing—the movement of one switch only being required. Neutralising is unnecessary—the set is absolutely stable and simple to use.

- Table Model, as above, in Oak or Mahogany £27 10 0
- Console Model, with battery compartment £33 7 6
- Marconi royalties 62/6 extra.

OLYMPIA.
Our Stand is 163
Ground Floor.

—and here is the new

Sociable Three

entirely self-contained—fully equipped—simplicity itself.

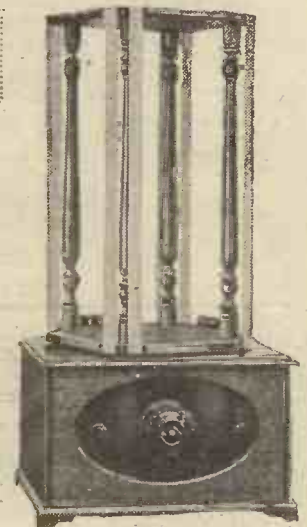
HERE'S the set for the man who wants the finest quality reproduction with the very minimum of trouble or expense. Three valves—single dial tuning—self-contained frame aerial—all batteries within cabinet. Just switch on and enjoy the music. Loud-speaker range 30 miles main stations and 100 miles high-power stations. These distances very considerably increased with outdoor aerial. Principal Continental stations well within its range. Best-quality components, oak or mahogany cabinet, polished aluminium panel with oval vignette. A child can use it. Price £7 10 0. Marconi royalties, 37/6 extra.

NOTE: This set can be supplied complete with valves and the best accessories for less than £15. Write for copy of our new illustrated Art Catalogue.

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POCKET
Illustrated
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RESISTANCE
OHMS.

9/6

MODERN Radio demands more than the sensitiveness of the human ear to regulate the tonal quality of reception. Use Sifam Radio Meters: they have set a new standard of accuracy for controlling plate and filament current, which enormously improves the performance of any set. They trace distortion, avoid waste of expensive batteries and prevent sudden failures.

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M. B. 9.

**THE NEW STANDARD
SCREENING BOX**

—continued from page 451

or two minor points, perhaps, call for a little explanation. First, in regard to the holes provided for leads: there are four of these in each face, and, of course, only a few will ever be actually in use at once.

The large number of sixteen per box was decided upon to provide plenty of alternative positions for the emergence of leads, so as to cover the requirements of all sorts of layouts. Those not in use will normally remain blank, but if their presence was ever found undesirable they could be closed by means of small screws and nuts. (This is not likely to be necessary in any normal receiver.)

It is, of course, intended that each box shall be connected to earth (essential to the functioning of the scheme) and a special terminal is provided for this purpose in one face of the box. Where it is more convenient, however, connection can be made to the box by placing a small screw and nut in one of the standard holes and soldering to this.

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INDEX TO ADVERTISERS

Artercraft Co., The	Page 437	England-Richards Co.	Page 448
Bedford Elec. and Radio Co., Ltd.	446	Falk Stadelmann & Co., Ltd.	424
Belling & Lee, Ltd.	440	Ferranti, Ltd.	415
Benjamin Electric, Ltd.	447	Forno Co., The	437
Bird, Sydney S. & Sons	449	Gambrell Bros., Ltd.	439
Black, Alexander	450	Garnett, Whiteley & Co., Ltd.	Cover iii
Bond, V. C., & Sons	448	Graham Ampton, Ltd.	428
Bowyer-Lowe Co., Ltd.	423	Hanley Brothers, Ltd.	428
Brandes, Limited	403	Heayberd (F. C.) & Co.	452
Brown, S. G., Ltd.	412	Holznan, Louis	445
Burne-Jones & Co., Ltd.	434	Hughes, F. A., & Co., Ltd.	449, 450
Carrington Mfg. Co., Ltd.	431	Igranic Electric Co., Ltd.	431
Clarke, H., & Co. (Mer.), Ltd.	404, 437	International Corres. Schools, Ltd.	437
Cossor, A. C., Ltd.	364	Jackson Bros.	438
D. A. R., Ltd.	436	Jewel Pen Co., Ltd.	452
Darex Radio Co.	448, 450	Junit Manufacturing Co., Ltd.	442
Dubiller Condenser Co. (1925), Ltd.	408	Lissen, Ltd.	309
Economic Electric, Ltd.	437	London & Provincial Radio Co., Ltd.	431
Ede, C., & Co., Ltd.	439	London Electric Wire Co., & Smith's, Ltd.	420
Electradix Radios	450	Makerimport Co.	452
Electron Co., Ltd.	419	Mircomphone Co., Ltd.	361
		Metro-Viek Supplies, Ltd.	362, 263, 411
		Morris, J. R.	446
		Mullard Wireless Service Co., Ltd.	Cover ii, 416
		National Radio Exhibition, The	424
		New Times Radio Co.	448
		Ormond Engineering Co., Ltd.	407

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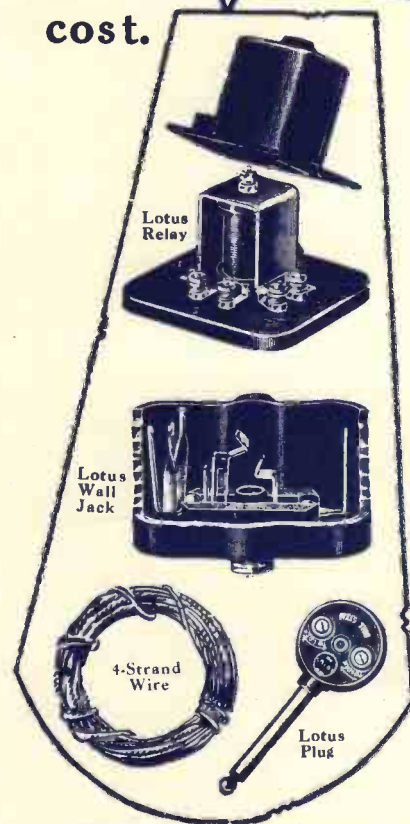
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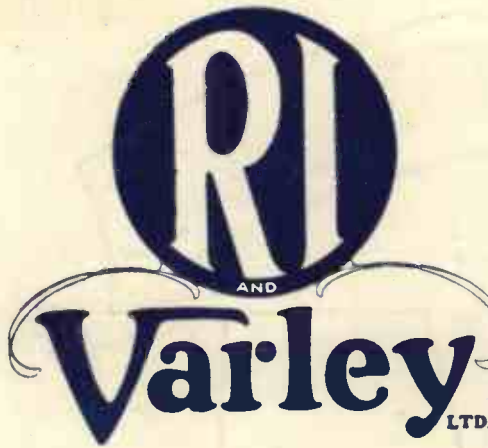
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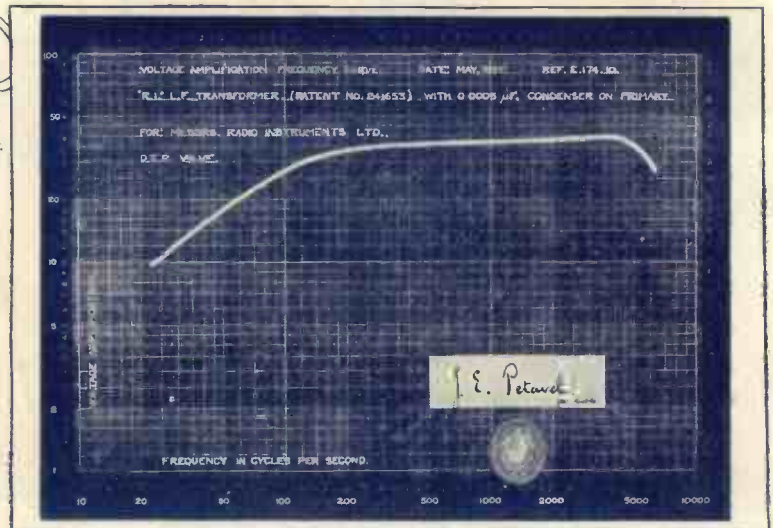
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