

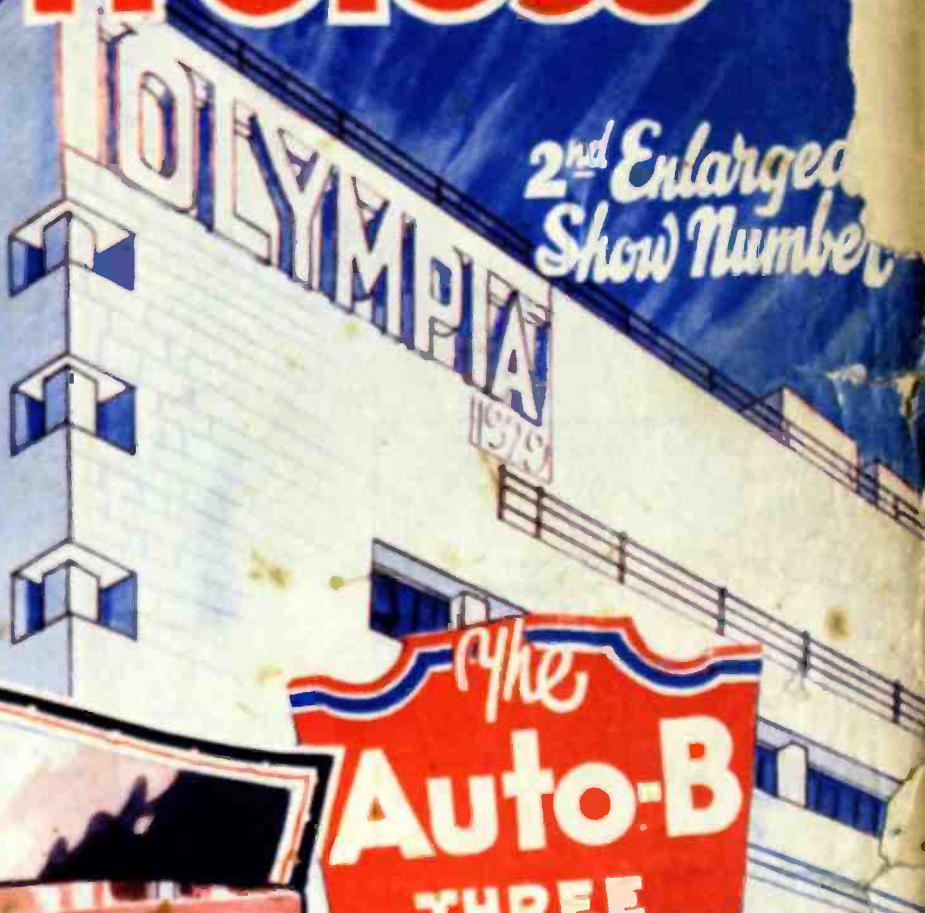
Practical Wireless

3^d P

Published every Wednesday by
GEORGE NEWNES LTD.
Vol. 2. AUGUST 26th, 1932. No. 43.
Approved by the G.P.O. as a Newspaper

2nd Enlarged Show Number

Home Constructor
Sets for
Every need &
Every Pocket



The 1934
Superset.

The
Auto-B
THREE

The
ALL-WAVE
TWO



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AGAINST LIGHTNING
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Varley again! Leaders in the new tuning technique as in the old . . . Varley NICORE Coils mark the biggest advance in radio tuning since the introduction of "Square Peak."

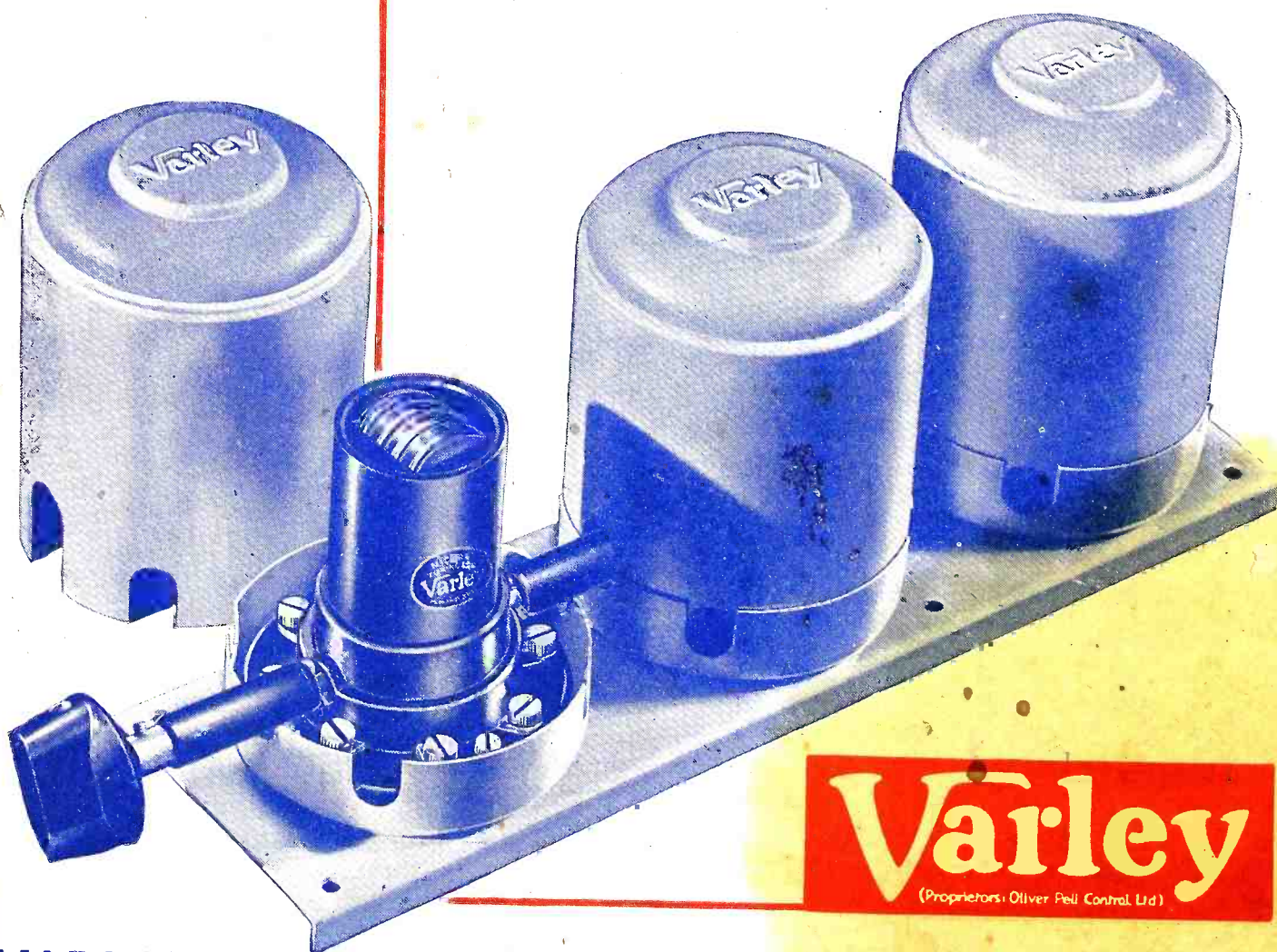
Consistency has been the great aim, and the characteristics of NICORE Coils will not alter in use. These New Coils combine maximum efficiency with maximum selectivity and are suitable for all circuits.

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STAND



No. 85
Main Hall



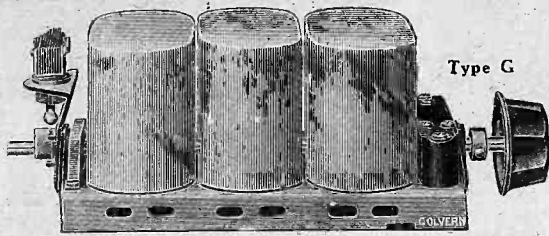
Varley

(Proprietors: Oliver Pell Control Ltd.)

VARLEY— FOREMOST AS PIONEERS

Advertisement of Oliver Pell Control Ltd., Kingsway House, 103, Kingsway, London, W.C.2. Telephone: Holborn 5303

COLVERN FERROCART COILS



SPECIAL G Type GANGED COILS
Complete with gramophone and wave change switch

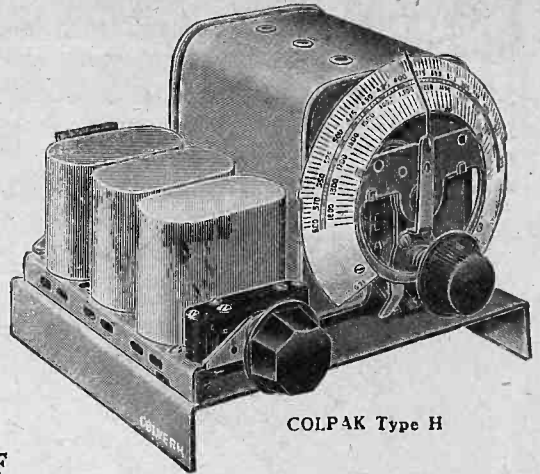
- Two Gang .. 25/-
- Three Gang .. 37/6
- Four Gang .. 50/-

On and off Switch if required 1/6 extra. State if required for battery or mains receivers.

COLPAK Type H
Comprising Ferrocart G type Coils, Tuning Condenser, Gramophone and on and off Switch (state if required for battery or mains receivers).

Coils can be supplied for 1 SGHF stage receivers with Band Pass filter or Band Pass filter and Oscillator Coil for Superheterodyne receivers.

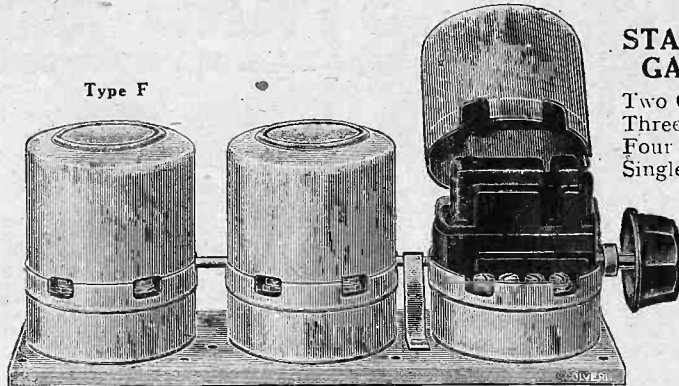
Price 57/6



COLPAK Type H

COLVERDYNE FERROCART INTERMEDIATES

Type FC 110 } 12/6 each
Type FC 150 }
With universal mounting bracket, limited capacity adjustment and band pass coupling controlled externally.



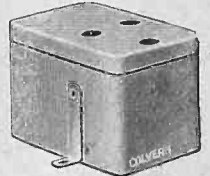
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"It took me only a very short time to discover that—thanks to the 'All-in-One' Radiometer. With this invaluable instrument to help me I'll guarantee to track down any trouble in a few minutes."



The "All-in-One" Radiometer is essential to every radio user. It tests everything, locates faults instantly and helps to keep any set in 100% condition. Ask your radio dealer about it, or write direct to:

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PIFCO
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Standard Model "All-in-One" Radiometer, for Battery Sets only, as shown here. Price **12'6**

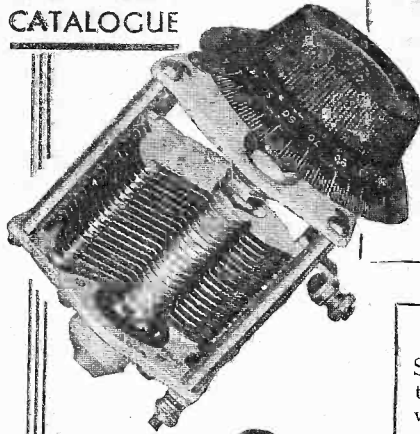
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POLAR CONDENSERS in ANY CIRCUIT mean

SEND FOR NEW POLAR CATALOGUE

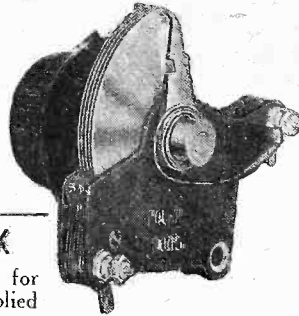
EFFICIENCY



POLAR No. 2.S.M.

The Polar fast- and slow-motion condenser. Made in aluminium. Ball bearings. Robust construction and rigid framework as illustration.

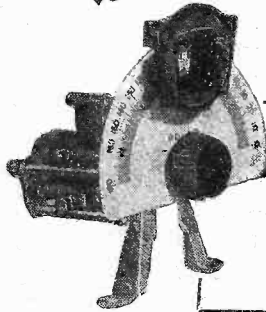
.0005 } **6/6**
.0003 }



POLAR COMPAX

Solid dielectric. Suitable for tuning or reaction. Supplied with knob.

.0005, .0003, .00015, } **2/6**
.0001, .00005 }



POLAR APERTURE

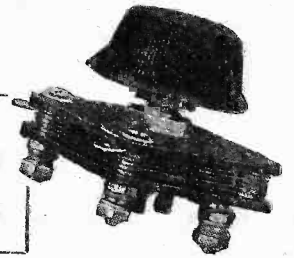
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POLAR DIFFERENTIAL

Insulated spindle. Improved design. Supplied with knob.

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POLAR WORKS, OLD SWAN, LIVERPOOL. Grams: Compounded, Estrand. 8351

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120 volt 'class B' H.T. BATTERY



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 THE SCIENTIFIC VALVE
 HIGH VACUUM 113-117, Farringdon VALVE Co., Ltd., Road, E.C.1.

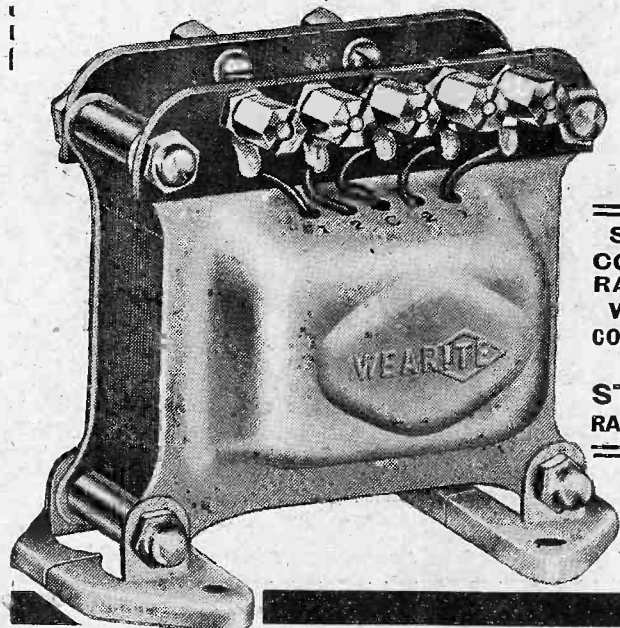
CHARACTERISTICS

Primary resistance 400 ohms
 Half of Secondary (full) 150 ohms
 Half of Secondary (tapped) 100 ohms
 Inductance, using average 2 m.a. driver valve on average signals, 35 henries.
 Ratios: Outer terminals, 1 to 1; half, 2 to 1; Tap, 1.5 to 1; Half Tap, 3 to 1.

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Excellent characteristics and a workman-like looking job are what the designer considered when selecting this Transformer for his "1934 Super."

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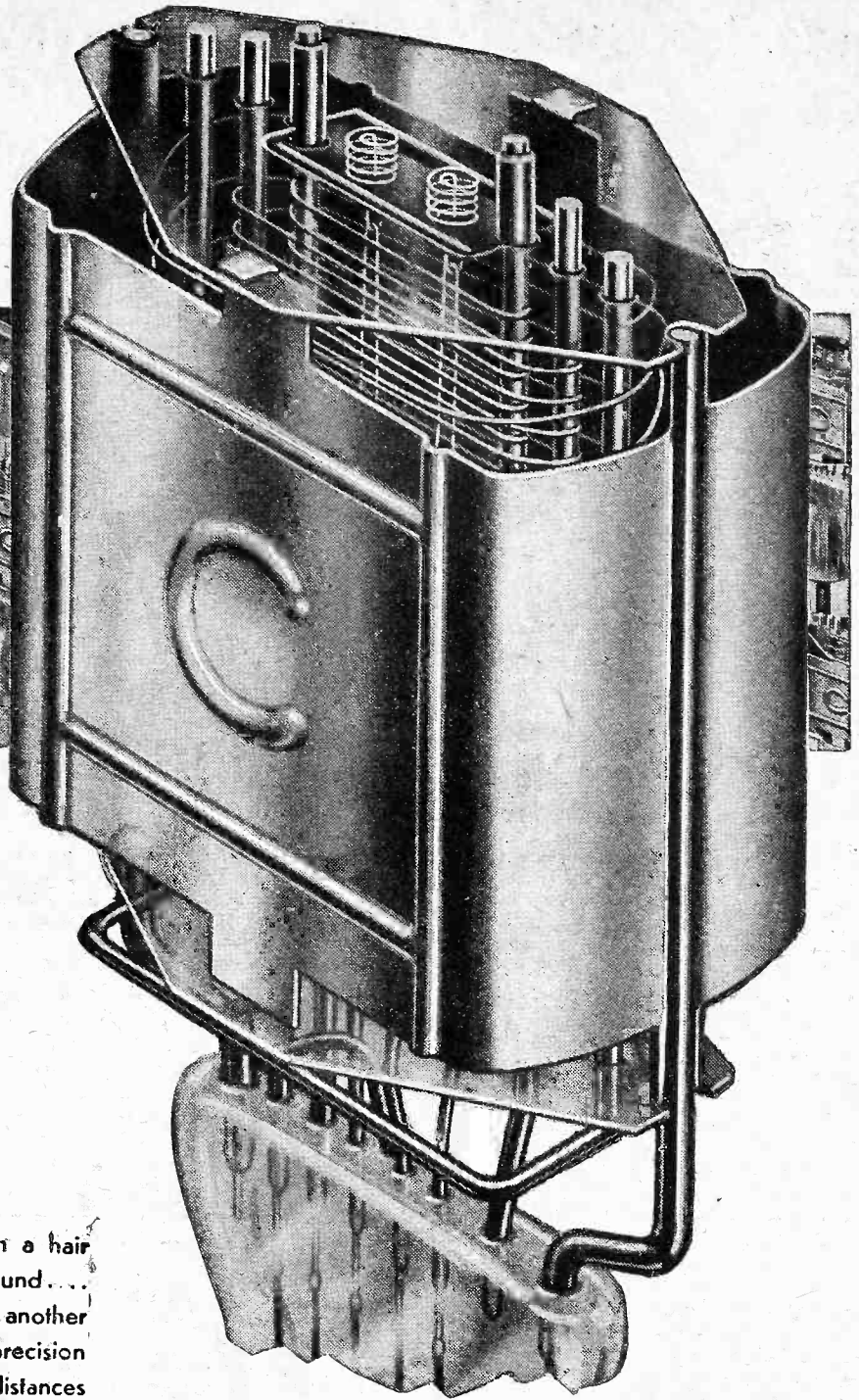
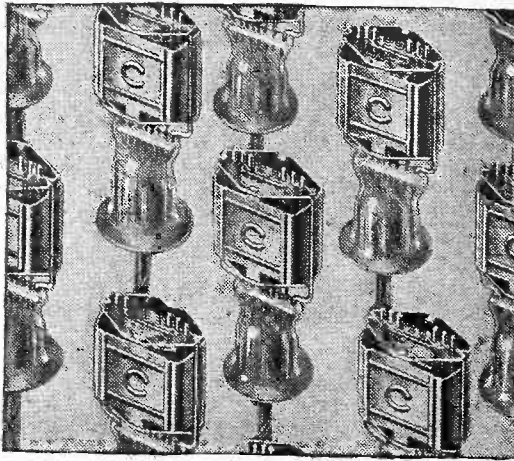


COUPON To Messrs. WRIGHT & WEAIRE, Ltd., 740, High Road, Tottenham, London, N.17.

Please send me a copy of your new booklet, No. G.N.2, giving full details of your components and how to use them, together with technical data. I enclose 3d. in stamps to cover cost and postage.

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ADDRESS



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MACHINES whirr . . . filaments finer than a hair . . . nimble fingers work . . . grids are wound . . . anodes pressed . . . a hundred operations . . . another Cossor Valve is made . . . made with the precision of a watch . . . accurate . . . microscopic distances exactly spaced . . . meticulous accuracy . . . accuracy that ensures that your Cossor Valve . . . wherever you buy it . . . whatever its type . . . is the exact counterpart of the original laboratory-developed design.

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Send for a free copy of the 40-page Cossor Valve and Wireless Book which contains a wealth of interesting and useful information including Radio Definitions—Useful Circuits—List of Stations, etc., etc. Please use the Coupon.

A. C. Cossor Ltd., Highbury Grove, London, N.5. Depots at Birmingham, Bristol, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Sheffield, Belfast and Dublin.

3313

THE LEADING HOME CONSTRUCTORS' WEEKLY!



EDITOR :
 Vol. II. No. 49 || **F. J. GAMM** || August 26th, 1933
Technical Staff :
 H. J. Barton Chapple, Wh.Sch., B.Sc. (Hons.), A.M.I.E.E.
 W. J. Delaney, Frank Preston, F.R.A., W. B. Richardson

ROUND *the* WORLD of WIRELESS

Our First Show Issue

MANY thanks to the hundreds of readers who have taken the trouble to write to us congratulatory letters on our last week's first enlarged Show Issue. That issue, together with this week's issue, should be carefully preserved as a complete guide to current programmes, prices, and tendencies. As readers can easily imagine, the editorial offices have been for many weeks past the scene of strenuous activities and long hours of work in preparing (Real Reader Service again!) the special Printer's Pies necessitated by Radiolympia. Our thanks also to those many readers who called at our Stand on the opening day of the Exhibition to express their appreciation of the paper itself, its policy, its outlook, and its real, reliable, and unrivalled reader service—a service which is without parallel in radio journalism.

Radio and the Norwegian Fishermen

THE nationalization of the Norwegian broadcasting network is to be followed by Government assistance to the fishing industry. In future all trawlers, smacks and other coastal and seagoing craft will be equipped with wireless receivers. Special broadcasts destined in particular to these ships are to be made by a number of stations, such as Stavanger, Bergen, etc., and at fixed hours during the day information collected by Government seaplanes will be given in respect of the best fishing grounds, state of weather and other items of interest to the industry. News bulletins, market quotations in Norway and other countries and especially gale warnings will be transmitted at more frequent intervals than has hitherto been the case.

Allo ! Ici Tunis Kasbah

THE French military station at La Kasbah (Tunisia) which for some time had suspended its broadcasts, with the assistance of local wireless associations has now resumed its daily transmissions. The wavelength used is slightly higher than the channel previously adopted, namely 1,275 metres; the power of the transmitter has

been increased to roughly 1½ kilowatt. The main evening transmission, starting at B.S.T. 20.30, opens with the announcer counting numbers in a similar way to the principal adopted by other French stations. There are no broadcasts on Sundays. The programmes consist of news bulletins, weather forecasts, time signals and musical items contributed by local talent. An effort is to be made to relay broadcasts from Paris studios. All announcements are made in the French language and the station

Radio and the Chilean Army

WITH a view to popularizing "listening" as a pastime throughout all classes of the community and also, incidentally, to curtail imports of foreign wireless apparatus, the Chilean War Ministry has made arrangements to open special technical classes for members of its army. Tuition in all radio matters and especially in the construction of wireless sets is to be given by qualified engineers. The Government has in view the establishment of military works for the manufacture of both receivers and transmitters. By this means it is hoped to supply apparatus at a low cost to the general public and thus encourage in Chile the development of the industry.

Proposed Zionist Broadcasting Station

IF a report from Prague is to be credited, at the Zionist congress to be held in that city in August, a proposal is to be put forward to install an all-Jewish broadcasting station somewhere in central Europe. Although no mention has been made of any particular country it has been suggested that a suitable site could be found in either Czechoslovakia or Romania. The report states that sufficient capital for the installation of a high-power transmitter would be promptly subscribed providing the need for such a station is satisfactorily demonstrated.

SATISFACTORY SERVICE

PRACTICAL WIRELESS answers every reader's question Free of Charge.

PRACTICAL WIRELESS guarantees its receivers (when built from our recommended components) to perform in the manner claimed, under a Free Advice Guarantee.

Every worth-while development is first brought to the notice of the home constructor through the columns of **PRACTICAL WIRELESS**. Only components which readers can purchase are dealt with.

PRACTICAL WIRELESS could not do justice to the vast number of "firsts" to its credit in the small space here available. Several columns would be required. There is hence complete justification for our slogan: "Real, Reliable, and Unrivalled Reader Service."

PRACTICAL WIRELESS is the **LEADING HOME CONSTRUCTORS' WEEKLY**.

closes down with the conventional "Bon Soir," followed by the playing of "La Marseillaise."

Kalundborg on the Air

THE new 75 kilowatt Kalundborg (Denmark) transmitter relaying the Copenhagen programmes has now been heard nightly since July 18th and it is expected that the station will be officially opened at an early date. The main reason for the erection of this heftier plant was the desire of the Danish Government to enable broadcasts to be well heard in Iceland and Greenland. In future all announcements in the programmes will be given out in German and English as well as in the Danish language.

Novelties and Composer-Conductors

SEVERAL first performances are to be heard at Queen's Hall during the forthcoming season of Promenade Concerts, though perhaps on the whole the year has not proved very fruitful in new orchestral music of outstanding interest. The most eagerly expected novelty in the programmes is unquestionably Frederick Delius's new "Idyll" for soprano, baritone and orchestra, which is to be given on October 3, with Miss Olga Haley and Mr. Roy Henderson, two well-known Delius specialists, in the solo parts. The invalid composer is, unhappily, no longer able to write, but the musical world has much cause to be thankful that he remains in full possession of his faculties.

ROUND *the* WORLD of WIRELESS (Continued)

Swiss Common Wave

THE Berne station has reverted to its original wavelength of 245.9 m. as the experiments tried in transmitting these programmes on a channel common to Basle proved unsuccessful.

Radio Toulouse Concerts

AN early-morning transmission may now be heard from Radio Toulouse as the station is already on the air at 8 a.m. B.S.T. Moreover, the midday broadcast has also been extended until 2 p.m. In regard to programmes apart from these minor alterations, the schedule remains the same as for the old transmitter, and concerts are broadcast throughout the day until past midnight.

Hier Hilversum de A.V.R.O.

THE A.V.R.O., undoubtedly the largest association of radio listeners, recently celebrated its tenth anniversary. By the end of the year it is anticipated that its membership will reach the 200,000 mark. Although a private organization, which receives no subsidy from the Dutch Government, it gives work to a staff numbering over two hundred persons, possesses large headquarters at Amsterdam, and has built several modern studios at Hilversum. At present the broadcasts are carried out through the Kootwijk (PTT) transmitter on 1,875 metres.

Hear the Vienna Programmes

THE new Vienna - Bisamberg station now broadcasts from 11.30 a.m. B.S.T. daily, and will continue to carry out these duties until the new reflector aerial tower is ready to be erected. During its installation the programmes will be transmitted by the old Rosenhügel station until 5 p.m. daily. UOR 2, the short-wave transmitter, has been closed down for a complete overhaul; its power is to be increased.

Vienna's New Call

WITH the opening of the Bisamberg high-power station, which, with its greater range, covers considerably more than the Austrian capital, the call from Vienna is likely to be altered. Viennese listeners suggest that the announcer should not introduce the station to the unseen audience abroad as *Radio Wien*, but that as the voice of the Republic it should be known as *Radio Oesterreich* (Austria). However, if you do not recognise the transmitter under that name, listen for the metronome interval signal of which the rapid "tick-tock" is so familiar to us.

U.S.S.R. and German Broadcasts

MOST of us are familiar with the international broadcasts in various languages put out almost nightly by the Moscow and Leningrad transmitters, but programmes in German from Kiev on 1,034.5 metres will come as a surprise to some listeners. These are given on Sundays Thursdays and Saturdays between B.S.T. 22.00 and 23.00, and are usually accom-

INTERESTING and TOPICAL PARAGRAPHS.

panied by an orchestral and vocal concert. As is customary at most Russian studios the announcer is a woman.

Some Spark!

TWO well-known French physicists, d'Arsonval and Georges Claude, recently risked their lives in a laboratory experiment involving an electrical discharge at a pressure of some three millions of volts. The test was made during the night, and as the discharge was accompanied by a hefty thunder-clap, the immediate neighbourhood was rudely awakened. The local authorities have since requested the experimenters to give due warning of any other similar electrical "stunts" they may wish to indulge in at a future date!

German Station for Czechoslovakia

IN view of the large German-speaking population in certain parts of the country—formerly the Austrian province of Bohemia—it is proposed to erect a special transmitter from which an all-German programme could be broadcast daily. The plan is receiving favourable consideration from the authorities inasmuch as it is thought preferable to the alternative of listening to transmissions from Germany direct.

French Census of Listeners

WITH the bringing into operation of the new licensing tax some idea may now be obtained of the number of wireless sets owned by listeners in France. Up to the present in the Paris region only roughly six hundred thousand have been registered, yet the capital possesses seven broadcasting stations. It is estimated that the total number of listeners in France will not exceed two million.

Going South

UNDER this title Derek McCulloch has strung together a series of local cameos depicting life in the Southern States as seen through the eyes of a Negro Pullman car attendant on a train travelling from New York to New Orleans. You will hear these tone pictures in the National programme on August 30. *Going South* includes a number of plantation songs and Negro spirituals presented in their true atmosphere.

Is Radio a Luxury?

IN Kosice (Czechoslovakia), when this question was brought up in a case of bankruptcy, the judge decided that a wireless receiver was not a luxury article, but a necessity, inasmuch as through this medium people were enabled to complete their education. It was just as much a necessary article of the household as an ordinary sewing-machine.

Radio Paris P.T.T.

ACCORDING to a French journal, Radio Paris will be nationalized and included in the French State radio network on January 1st, 1934. From that date it is possible that sponsored programmes and microphone publicity may be discontinued.



PUZZLE, FIND THE B.B.C. CIRCUITS!

Among this mass of cables, 100 in all, containing 70,000 circuits, are the important B.B.C. circuits. They have all to be removed to a different position in Holborn to make room for Tube station improvements. No circuit has to be interfered with. Among this nightmare of wiring are to be found wires along which some of your favourite broadcasts have been carried.

SOLVE THIS!

Problem No. 49.

Lawrence built a two-valve short-wave receiver and connected it to his aerial ready for a preliminary test. Adjusting the 'phones, he rotated the tuning dial through a complete revolution, but heard no signals. The reaction control seemed to have no effect, and he was just going to remove the 'phones to test the circuit wiring, when he was surprised to hear his neighbour giving a 'phone number. He listened for a moment, and was startled to hear quite clearly the whole of the 'phone conversation, during which he found that the tuning condenser in his receiver made no difference to the strength of this signal. What was wrong with his set? Three books will be awarded for the first three correct solutions opened. Address your envelopes to The Editor, PRACTICAL WIRELESS, Geo. Newnes Ltd., 8-11, Southampton Street, Strand, London, W.C.2. All entries must be received not later than August 25th, and envelopes should be marked Problem No. 49.

SOLUTION TO PROBLEM, No. 48.

The mains transformer had broken down and several turns of the secondary were short-circuited. If Ratcliffe had felt the transformer he would have known of the trouble due to the heat which would have been generated.

The following three readers received books in connection with Problem No. 47:—
Mr. A. Labund, 59, Belgrave Avenue, Watford.
Mr. J. M. Gambles, 14, St. Matthias Terrace, Torquay.
Mr. W. P. Howard, 43, White Horse Street, Stepney, E.1.

ANOTHER OUTSTANDING
"PRACTICAL
WIRELESS"
RECEIVER!



The Superset

The Set that Supersedes

Every Worth-while Improvement Incorporated in This New-season's Five-valve Battery Receiver for Home Constructors. Iron-core Coils—Class B Output—Metallized Wooden Chassis—Two Variable-mu Stages—Simple and Few Controls—Special Tone Control—New Cabinet Design.

By F. J. GAMM.

OWING to the tremendous pressure on our space this week I am not able in these notes to give complete details for the setting up and operation of this new and efficient receiver. I must, therefore, restrict this week's notes to a brief discussion of the more salient points, in order that those who have already finished the receiver may obtain some results whilst waiting for complete and detailed instructions. Obviously, the first point of importance is the installation of the receiver, and although not difficult, if once correctly carried out this part of the work may be ignored and full attention paid to the tuning adjustments, etc. At the rear of the receiver are three terminals for aerial and earth connections, and three for the loud-speaker connections. On the special Microlode speaker which I recommend will also be found three terminals. These must be joined to the three terminals marked L.S. and H.T., with the latter terminal joined to the centre one of the three on the loudspeaker. Do not make any mistake with this lead. The aerial, for a start, should be joined to terminal

A2, and the earth lead then connected to terminal E. Push the radiogram switch in, and ignore, for the time being, the pick-up terminals.

Battery Voltages

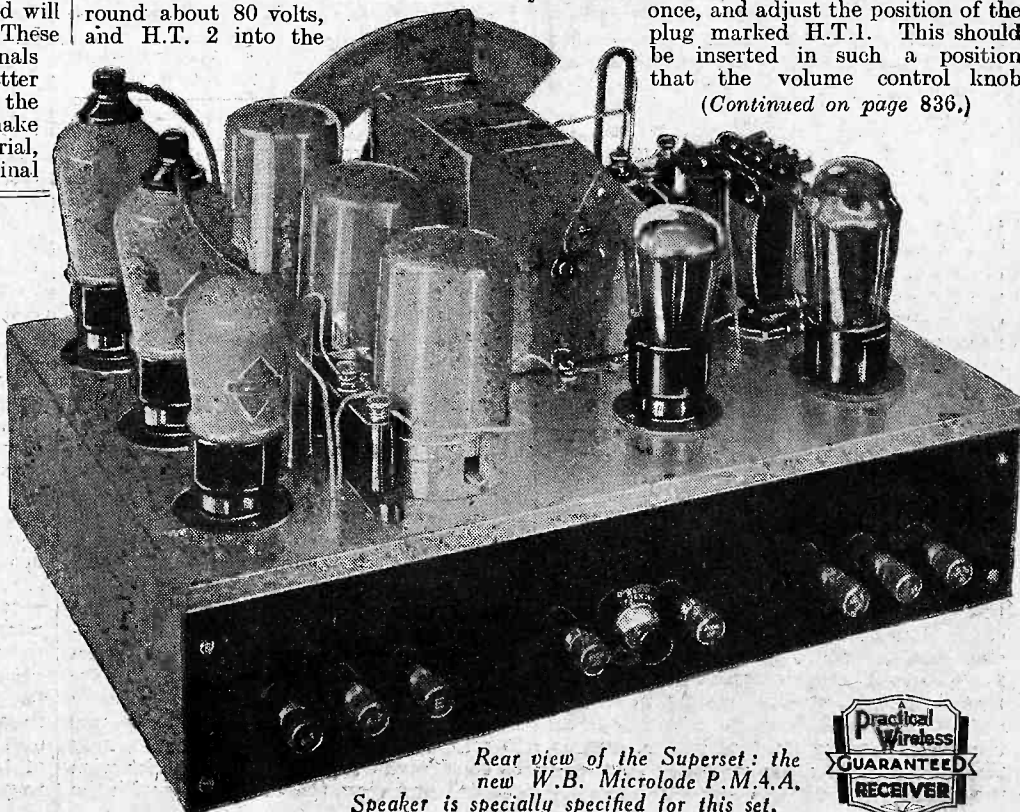
The insertion of the battery lead plugs in the correct positions is essential, and must be carried out as follows. The two leads marked L.T.— and L.T.+ are connected to the accumulator, the positive tag being joined to the red terminal. H.T.— and G.B.+ are each inserted in the respective battery sockets bearing similar marks. The remaining plugs require more careful positioning, and the following sockets should be used temporarily. H.T. 1 should be inserted in a socket on the H.T. battery round about 80 volts, and H.T. 2 into the

120-volt socket. G.B.1 should be inserted into the 1.5 volt tapping on the grid bias battery, whilst G.B.2 should be inserted in the 4.5 volt tapping. The receiver is now ready for a preliminary test. Turn the wave-change switch control to the right (clockwise), and set the lower right-hand control (marked Volume Control on the sketch on page 694 of last week's issue) to a position approximately half-way round. The Controlatone control should also be turned to a position midway between its two end positions. Pull out the On-Off switch, and you should hear a faint rushing sound from the loud-speaker. If, however, a loud whistle greets you, switch off at once, and adjust the position of the plug marked H.T.1. This should be inserted in such a position that the volume control knob

(Continued on page 836.)

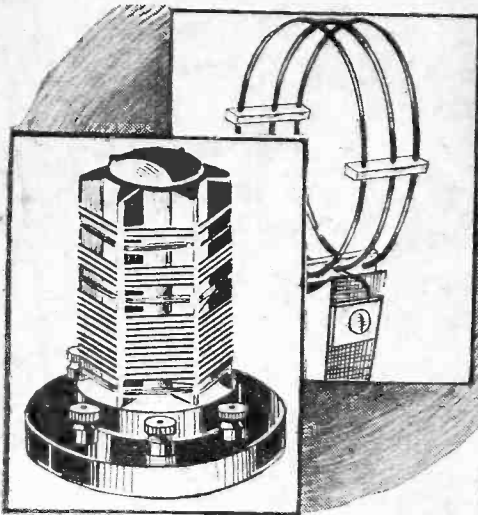
LIST OF COMPONENTS FOR THE 1934 SUPERSET.

- One Three-gang Condenser with full-vision scale (Type 604) (British Radiophone).
- Three Iron Core Coils—one Aerial and two H.F. (Lissen).
- One Class B. Driver Transformer (Wearite).
- Two Superhet H.F. Chokes (Bulgin).
- One Midget H.F. Choke (Bulgin).
- One Type 34 .0001 mfd. Fixed Condenser (T.C.C.).
- One Type 34 .002 mfd. Fixed Condenser (T.C.C.).
- Two Type 50 2 mfd. Fixed Condensers (T.C.C.).
- Five Type 50 1 mfd. Fixed Condensers (T.C.C.).
- Two Type 34 .0002 mfd. Fixed Condensers (T.C.C.).
- One Type 23 Component Bracket (British Radiogram).
- Two Type 21 Component Brackets (British Radiogram).
- One "Nictet" L.F. Transformer (Varley).
- One 25,000 ohm Potentiometer (Wearite).
- One Type B "Controlatone" (Bulgin).
- Four 4-pin Chassis type Valve-holders (Clix).
- One 7-pin Chassis type Valve-holder (Clix).
- Ten "Ohmites"—500, 500, 500, 500, 8,000, 40,000, 35,000, 60,000, 80,000 ohms and 2 megohms (Graham Farish).
- Eight Junior Type Terminals, A1, A2, E, P.U., P.U., L.S.—, H.T., and L.S.— (Belling-Lee).
- One Type 50 S.P.D.T. Switch (British Radiogram).
- One Type 50 3-point Switch (British Radiogram).
- One eight-way Battery Cord (Belling-Lee).
- One "Metaplex" Chassis (Peto-Scott).
- One W.B. Microlode Loud-speaker (Type P.M. 4A).
- Two Type 220 V.S. Valves (Cossor).
- One Type 210 H.F. Valve (Cossor).
- One Type 215 P. Valve (Cossor).
- One Type 220 B. Valve (Cossor).
- One 120-volt H.T. Battery (Ediswan).
- One 9-volt G.B. Battery (Ediswan).
- One 2-volt 40-ampere L.T. Accumulator (Ediswan).
- One "Superset" Cabinet (Osborn).
- One Length Recepter Screened Down Lead (British Radiophone).
- One Filtr Earthing Device (Graham Farish).



Rear view of the Superset: the new W.B. Microlode P.M.4.A. Speaker is specially specified for this set.





Coils for SHORT WAVE RECEIVERS

By K. E. BRIAN JAY

(Concluded from page 670, August 12th issue.)

THE second thing we notice about a short-wave coil is the use of a skeleton former, or sometimes no former at all, the coils being of thick wire held rigid by threading three or four ebonite spacing strips on to it. The reason for this type of construction is this: the adjacent turns of a coil form in effect a small fixed condenser, because each pair of turns can be regarded as two annular metal plates separated by an insulator, which in the case of close-wound coils of covered wire consists of the covering and the material of which the former is made. Now, as is well known, the capacity of a condenser is always increased when anything but air is used for the dielectric and also when the distance between the plates is decreased; consequently the use of covered wires wound close together on an insulating former will make the little condensers, formed by the turns of wire, of higher capacity than would be the case when a bare wire, self-supporting winding is adopted. The net result is that the skeleton type of winding has a lower "self-capacity" than any other type. Furthermore the effect of the former is not confined to increasing the capacity, because dielectrics vary in their efficiency, since they actually absorb a little power in doing their work and some absorb more than others.

The Number of Turns

The third thing about a short-wave coil is that the number of turns is very small. This, of course, cannot be helped; if your circuit is to be used at short wavelengths the inductance must be small, and so the coil can only have a few turns. The necessity for so few turns gives rise to complications, however, that may be more important than the obvious sources of loss, such as the resistance and self-capacity we have discussed above. We have already seen, from the formula $2\pi fL$, that the

R

magnification of the coil is directly proportional to the inductance, that is to say, that the bigger the coil the louder the signals. The importance of this has been brought out very clearly by an American experimenter, who showed that whereas changing the gauge of the wire of a coil from 30 to 20 only increased the efficiency by 9.8 per cent. at 41.67 metres, increasing the inductance of the coil to about $2\frac{1}{2}$ times the original value (and, of course, proportionately reducing the capacity) increased the efficiency by 61 per cent. This clearly demonstrates the desirability of using as

much coil and as little condenser as possible, but here we are up against another difficulty. In order to obtain this desirable gain in efficiency we must use a variable condenser having a small maximum capacity, but, unless we are prepared to use several plug-in coils the lower limit of permissible maximum capacity is restricted by the necessity of covering a reasonably wide band of wavelengths. If we could make a receiver with negligible stray capacities and a coil with negligible self-capacity then, provided our variable condenser had a very small minimum capacity, we should be able to get adequate wavelength coverage with

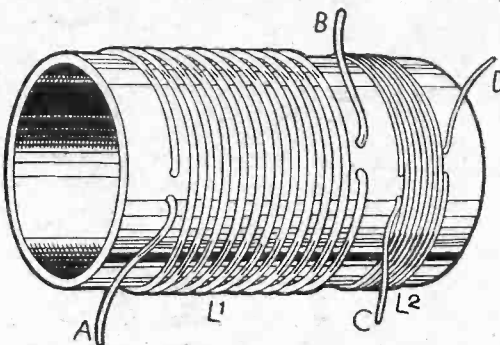


Fig. 2.—How the coil should be wound to ensure that smooth reaction is obtained.

TABLE 1

No. of turns	Wavelength range in metres obtained with condensers of		
	.0001 mfd.	.00015 mfd.	.0002 mfd.
13	31.38 to 71.40	31.38 to 79.40	32.30 to 91.00
11	27.30 to 58.80	27.30 to 85.20	31.25 to 71.40
7	22.90 to 47.60	22.90 to 52.70	23.40 to 58.80
4	16.80 to 34.20	16.80 to 37.50	17.80 to 40.30

quite a small condenser. Since none of these things can be realised in practice, however, we have to compromise.

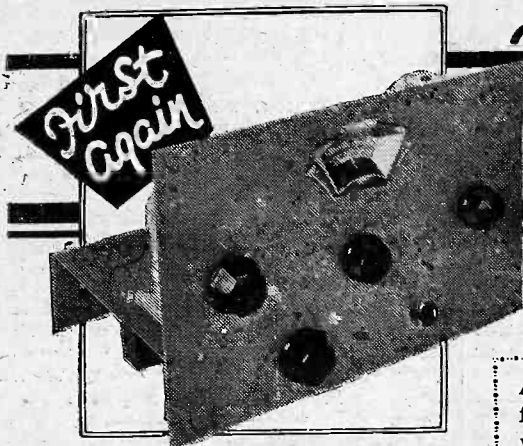
The type of coil which I have taken as an example of current practice is one that is inevitably associated with the idea of short-wave reception, and because it gives an impression of complication it is one of the things that tends to frighten people off short-wave work. If you have contemplated one of these impressive structures and come to the conclusion that it's all too difficult, do try again; wind a few turns of any covered wire you happen to have between say 22 and 28 S.W.G. on a two-inch cardboard tube and find out for yourself that it is really quite easy. I have shown that the skeleton type of winding has been adopted to combat the losses due to self-capacity, which, within limits, may be considered as a resistance in series with the coil and may, therefore, along with the actual resistance of the winding, be very

largely nullified by a proper use of reaction. Add to this the fact that the large field of skeleton type coils is bound to give rise to eddy current losses, instability and hand capacity effects and we have made out quite a good case for using small diameter, thin wire coils. That these will work is borne out by my own experience, for the coils I use on all waves from 60 to 14 metres are wound with 26 D.C.C. or D.S.C. wire on the bakelite bases of burnt-out valves. This type of construction was adopted in order to provide a simple and standard plug-in coil, the need for the plug-in arrangement arising from the very considerable degree of band-spreading required for listening to amateur transmissions and the preference for using a big coil and small condenser. I should, however, hesitate to recommend this particular construction for everyone because one cannot be too sure of the efficiency as a high frequency dielectric of the material of the valve bases.

Sources of Inefficiency

As a basis for design I suggest something like this: that the coil be wound of D.C.C. wire between 22 and 26 S.W.G. on ribbed ebonite or bakelite formers not more than $1\frac{1}{2}$ in. in diameter, the turns being spaced a distance equal to the wire diameter. It is difficult to say how many turns will be needed because of the very wide variations that are certain to occur between individual circuit and valve capacities; in order to provide some data on which to work, the approximate wave ranges of a series of coils were measured and are tabulated in Table 1. The windings were of 22 S.W.G. wire spaced by approximately the wire diameter. Reaction windings should be of thin wire (I used 36 D.S.C.) wound near the earthed end of the grid coils, the turns being close together. The number of turns needed will usually be two or three less than the number in the grid coil, but this is a matter for experiment. Considerable divergences from the figures for minimum wavelengths may be expected and generally they should be rather smaller than those given, because the stray capacities were rather high in the receiver used to make the measurements. In computing the maximum capacity of the condenser across the coil do not forget that, if a band spread arrangement is used the total capacity is equal to the sum of the maximum capacities of C_1 and C_2 , the two variable condensers. A dual range coil to cover the most useful part of the short-wave band was made by winding on 11 turns and tapping at 4 turns from the grid end, shorting the 7 turns between this tap and the earthed end of the coil when the shorter waveband was required. The reaction winding consisted of 4 turns wound between the two sections of the grid winding and another 5 turns wound at the end of the larger (7 turn) section.

STILL LEADING AND SHOWING THE WAY!



The Auto-B Three

Every Home Constructor Should Build This Class B Receiver, which is the First Class B Set to Use Automatic Grid Bias. By W. J. DELANEY

If you carefully carried out the constructional details which were given last week you should have experienced no difficulties of any kind and the receiver should be in a condition ready for the first test. Of course, you may have finished the receiver within a few hours of obtaining all the parts and already have found out its capabilities. However, it will not require a great deal of space to instruct you in the use of this ingenious little receiver, as it is of the very simplest design so far as operating is concerned. As there is only one tuning condenser you have no worries regarding circuit ganging, and although there may appear at first sight to be rather a large array of controls on the panel these are actually very few. For instance, the central knob immediately below the escutcheon is the main tuning control and this is simply rotated in order to select the station to which you wish to listen. The knob immediately to the left of this changes the range over which you can tune, from the medium-wave band to the long-wave band. In the majority of cases, therefore, all that will be necessary will be to turn the wave-change switch to the required band and tune in the station on the central knob. However, this is rather anticipating matters so far as the

Adjusting and Operating Notes for this Ingenious Receiver which Dispenses Entirely with the Grid-bias Battery

beginner is concerned, so perhaps I had better go through the operating instructions rather more explicitly on the assumption that you are a complete newcomer to radio and have chosen this admirable receiver as your first constructional venture.

Connecting Up

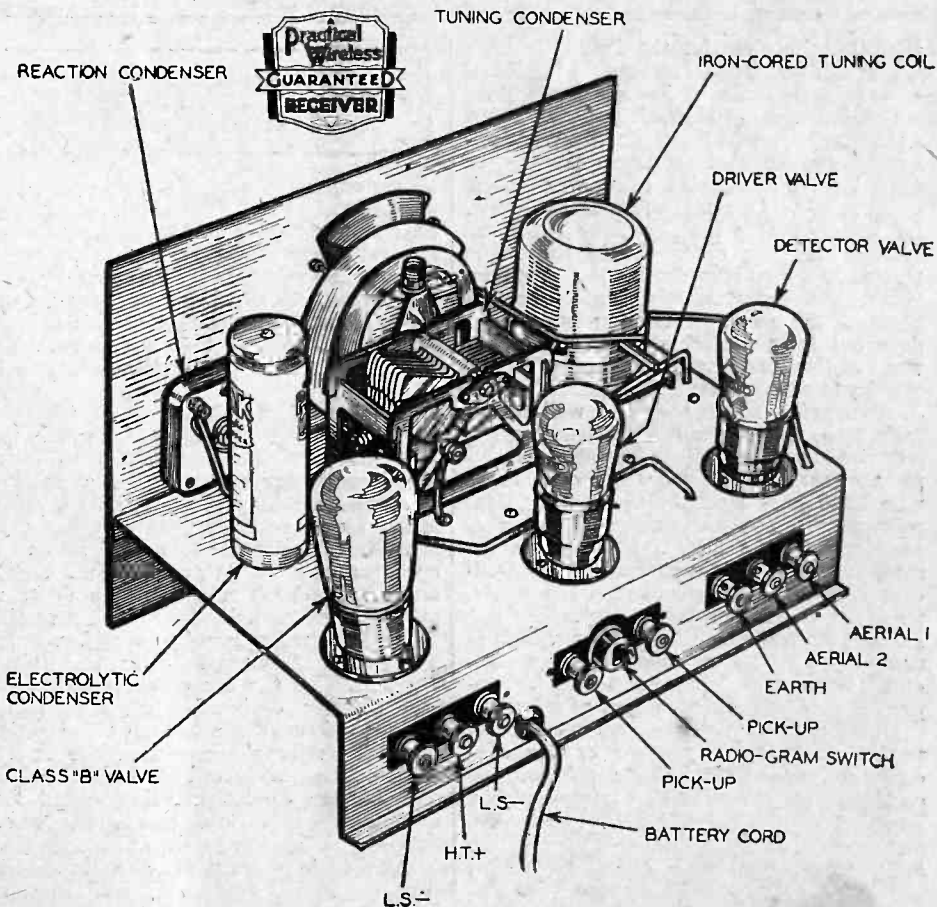
The battery cords each carry at the end a clearly marked plug, and if you wired up the receiver correctly these plugs—as shown on the blueprint or wiring diagram—must be inserted into the correct battery positions. For instance, two of the cords carry a form of spade-end lettered L.T.— and L.T.+. These must be attached to the terminals of the 2-volt accumulator, the black spade (L.T.—) being attached to the black terminal on the accumulator and the red spade fitted to the remaining accumulator terminal. There are only two leads

left and these carry a wander plug marked H.T.— and H.T.+. The former is inserted into the end socket of the H.T. battery marked with a similar negative sign, whilst the positive plug is inserted into the socket marked 120 volts. As was mentioned in the previous article no grid-bias battery is required with this receiver and therefore the battery connections are reduced to the very minimum and should occasion no trouble to even the youngest listener. Now at the rear of the receiver chassis there are three terminals at either end, and two in the centre. In between these latter terminals is the radiogram switch and this must be set to enable the radio to be heard for the preliminary test. If you fitted it exactly as shown in the wiring diagram, the small toggle of the switch should be pushed to the top right for this purpose. Now on the speaker will be seen three terminals, and these have to be joined to the three terminals on the receiver marked L.S., H.T. and L.S. Join the centre terminal of these three to the centre terminal on the speaker and then connect up the remaining two terminals. It will

(Continued overleaf)

LIST OF COMPONENTS FOR THE AUTO-"B" THREE

- One "Magnum" Auto-"B" Metal Chassis (Burne Jones).
- One .0005 mfd. Variable Condenser with Vernier Dial (Telsen).
- One .0003 mfd. Reaction Condenser (Telsen).
- One Type "F.5" "Ferrocart" Coil (Colvern).
- Two 4-pin sub-baseboard Valve-holders (Clix).
- One 7-pin sub-baseboard Valve-holder (Clix).
- One On-Off Switch (Busby).
- One "Toco" 4-1 L.F. Transformer (Multitone).
- One Graded Potentiometer (Multitone).
- One Class B 1-1.5_ratio Driver Transformer (Multitone).
- One 8 mfd. Electrolytic Condenser (Peak).
- Two 1 mfd. Condensers (Peak).
- Three .0001 mfd. Type "M" Condensers (T.C.C.).
- Two .01 mfd. Condensers (Peak).
- One Type "L.M.S." H.F. Choke (Graham Farish).
- One 2 megohm Grid Leak (Dubilier).
- One 250,000 ohm Resistance (Erie).
- One 25,000 ohm Resistance (Erie).
- One 500 ohm Resistance (Erie).
- Eight Treble Duty Terminals, Marked "Aerial," "Aerial 2," "Earth," "Loud-speaker," "Loud-speaker," "H.T.+", Two "Pick-up" (Ecelex).
- One Four-Way Battery Cord (Belling Lee).
- One 210 Det. Valve (Cossor).
- One 215 P. Valve (Cossor).
- One 240 B. Valve (Cossor).
- One Auto-B. Cabinet (Camco).
- One "Sonette" Loud-speaker (Amplion).
- One 120-volt Annodex Class "B" H.T. Battery (Smiths).
- One 2-volt 40-Ampere Hour L.T. Accumulator (Smiths).
- One Coil Glazite.
- One Length Receptu Screened Down Lead (British Radiophone).
- One Filt Earthing Device (Graham Farish).
- One Toggle Switch (Type 460) (Becker).



Our artist's impression of the Auto-"B" Three.

THE AUTO-"B" THREE

(Continued from previous page)

not matter which L.S. terminal is joined to the respective receiver terminal so long as the two sets of three terminals are joined together, with the two centre terminals connected. This is most important as the loud-speaker carries the coupling transformer for the two halves of the Class B valve, and the centre tap must be joined to H.T. positive. This positive return is made in the receiver and must be correctly maintained.

Aerial and Earth

The question of the aerial/earth system is vital, and it is hopeless to build up a good receiver and connect it to an inefficient aerial or earth and then blame the receiver for producing inferior results. It should, of course, be obvious that the wireless signals are conveyed to the receiver through the medium of the aerial and lead-in, and if this is of very small dimensions, or slung up in between some high trees it will obviously be heavily screened and will not pick up sufficient energy to enable the detector valve in the Auto-B to pass on a strong enough signal to derive the utmost from the Class B stage. Remember that this will deliver 2 watts when fully loaded. It will not give you two watts if you try to receive a station 200 miles away on a few feet of wire hung up in a cellar. Therefore give the valves a chance and spend a little time in erecting a really good aerial/earth system. The principal points to aim at are:—

1. Height.
2. Insulation.
3. Efficiency.

The height may be obtained either by fitting a good pole, or by using a tree or

similar support. Fit a good chain of insulators (not less than 3) at the end and use the well-known aerial wire consisting of seven strands of 22-gauge wire (known as 7/22's). At the house end fit a length of strong rope or wire to a chimney stack or in a staple and take the aerial wire to another chain of insulators attached to this. Now attach a length of Receptru to this junction. This material will ensure that any local electrical interference is reduced to minimum. Carry out the makers' instructions regarding the earthing of the screen, etc., and carry the lead-in carefully to the receiver. Do not run the lead-in across a room. Place the receiver on a table or similar stand close to the window where the lead-in enters the room. The earth is obtained by connecting the lead to the terminal on the small copper canister in the Filt carton, and filling the vessel with the chemical in the glass phial. Again, read the maker's instructions carefully and make sure that you get a really high-efficiency earth system. When you have had the receiver working for a time, you can rig up a poor earth and see for yourself what a difference it does make.

You are now ready to try out the receiver, and you must use the small push-pull switch on the panel in order to bring the valves into action. Pull out the switch and slowly rotate the main tuning knob (making certain first of all that the knob to the right of this is turned as far as it will go to the left). It should not take long to hear the local station, and if this is situated not too far away it will come in at really surprising strength. If, however, you run right through the scale and do not hear the station, rotate the wave-change control knob to the correct range, as you may have it set for long waves. When the local is correctly tuned in you will find that

it may be heard over only a degree or so, and to obtain the best quality it must be tuned exactly to the correct spot. Now to vary the tone the lower left-hand knob should be turned, when it will be found that with the knob turned fully round to the right the high notes predominate, whilst when turned to the left the lower notes are strongest. You must therefore adjust this to give you the balance which best suits your ear or the room in which the receiver is used. You will find, for instance, that a large, barely furnished room will require the control set towards the "bass" end, whilst a heavily draped, or crowded room will make the same item of music sound better with the control turned to give a better high note response.

The Reaction Control

The right-hand knob will only require adjusting when a very distant station is required, and it should be used most sparingly, as it introduces distortion, although it may be of only a slight nature. Generally speaking, distant stations do not produce the best so far as quality is concerned, and therefore there is no need to worry about quality, but remember that this control is a servant—to be called upon only when circumstances demand—and do not let it become your master. I think you will find, after a very short time, that this receiver will give you music at sufficient volume to satisfy the most critical, and with a quality which has hitherto been associated only with the high-class mains receiver. If, however, you do come across any difficulty, either in construction or operation, remember that our Query Service is entirely free, and we reply to all queries by return of post under the conditions of our Guaranteed Receiver Service.

Multitone Receiver for the Deaf

A PART from the many thousands of components and receivers which one could see whilst walking through the Exhibition at Olympia, certain items stood out prominently due to their extreme novelty or appeal from the point of view of their great utility. One of the foremost of these, for instance, was the ingenious Multitone receiver for the deaf. Radio has made tremendous progress during the past few years, but unfortunately those who are without the sense of hearing have been debarred from participating in the enjoyment of the broadcast programmes. Now, thanks to the painstaking research of Mr. J. Poliakoff, inventor of the well-known Multitone tone-control L.F. transformer, a device has been perfected, and is included in this new receiver, by which even those who have been deaf mutes all their lives may now enjoy the material which is broadcast by the B.B.C. In addition, the receiver may be used as a means of communication between other members of the family, for instance, and the deaf person. For this latter purpose, the loudspeaker which is normally used for reproducing the broadcast programmes is turned into a microphone by the simple operation of a switch.

In outward appearance, this would seem to be an ordinary receiver of the self-contained type, with the usual controls and loudspeaker fret. The volume controls, however, are divided to fulfil two purposes, one controlling the normal output from the loudspeaker, and the other modifying the volume reproduced by the deaf-aid. The set is battery-operated, and utilizes a Class B output stage. Five valves in

SHOW SURPRISES SUMMARIZED

all are employed, and the speaker is of the moving-coil type. The well-known Multitone tone-control is fitted and the complete apparatus costs twenty guineas. It would, perhaps, be worth while to point out that the Editor, Mr. F. J. Camm, was present at a recent demonstration of this receiver and can fully substantiate the claims which are made for it by the makers.

A Receiver of the Future

ALTHOUGH it cannot be purchased, at least for some time to come, the Marconiphone exhibit of a receiver of the future may prove to be only a vision, and may never emerge from the experimental or scientific novelty stage. It operates entirely without control knobs, and is, in effect, a robot. In order to select any desired transmitting station it was necessary merely to call, vocally, the name of the particular transmitter required. By the use of a most intricate and cleverly designed system of relays the vibrations of the human voice acting upon the microphone caused the instrument automatically to be tuned-in without any further operation being called for. Combined with the wonderful voice-controlled telephony receiver, this apparatus is designed to produce, at one and the same time, a pictorial reproduction of the scene or artist being broadcast. In other words, it is a combined television receiver de luxe.

Televisors

THE complete television and sound receivers, capable of receiving the present transmissions, were very neatly combined. The Grafton receiver on Stand No. 111, for instance, although only a little larger than an ordinary Console Radio receiver, gives a picture just over 9in. by 4in., and provides two separate controls for vision and sound. The Bush receiver, although of somewhat larger dimensions, had the additional feature of a focusing device for the television screen. Both of the above receivers utilized the mirror-drum apparatus which enables the picture to be seen in an ordinary lighted room.

Supersets

THERE were several receivers which might be termed "Supersets" or Receivers de Luxe. Amongst these was the 12-valve radio-gramophone, manufactured by the Radio Gramophone Development Company, Ltd. Practically every modern refinement was incorporated in this receiver. Such features as Automatic Volume Control; Silent Tuning; Visual Tuning; Twin Matched Loudspeakers; Automatic Record Changing, were fitted, and in spite of such refinements the cost was only ninety-five guineas. An instrument on similar lines was also shown by the Gramophone Company, and in this particular case novelty was introduced by the method of mounting the loudspeakers. Instead of these being fitted flat up against the back of the cabinet baffle, they were mounted at an angle, and it is claimed that this results in added brilliancy and better reproduction.

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The advent of Class "B," and the need for anti-microphonic chassis mounting valveholders to counteract the distortion created by powerful loudspeakers working close to valves, are successfully met with.

- CLIX 7-PIN VALVEHOLDER (FLOATING TYPE)
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Regular readers of Radio publications will have noticed how consistently our products are used and specified by the designers of sets for home construction. This in itself is an assurance that in the important question of contact, you are faithfully served by Clix.

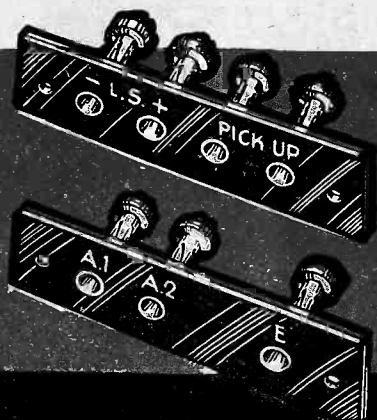
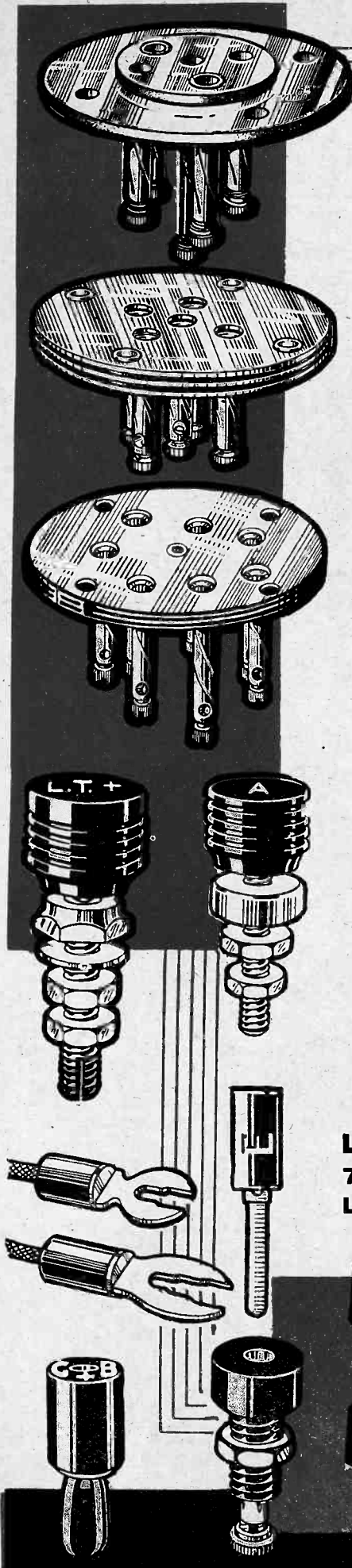
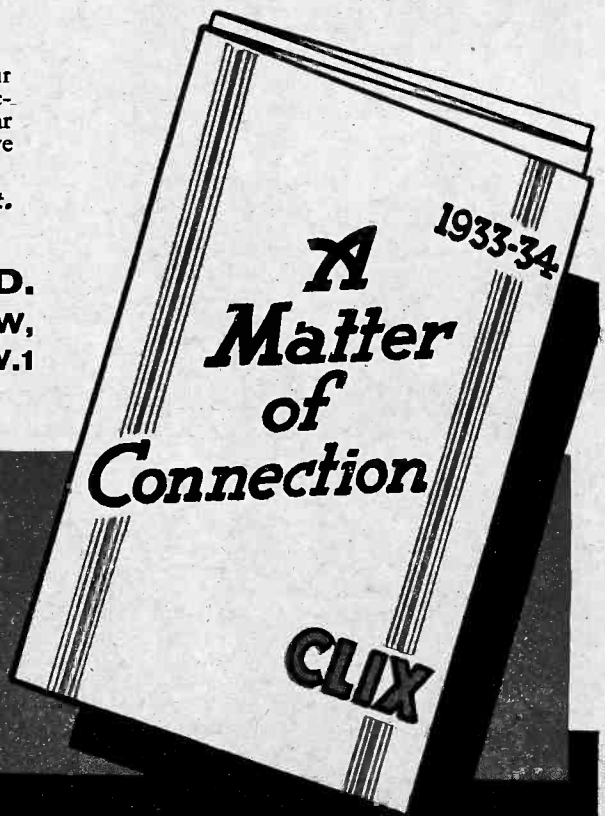
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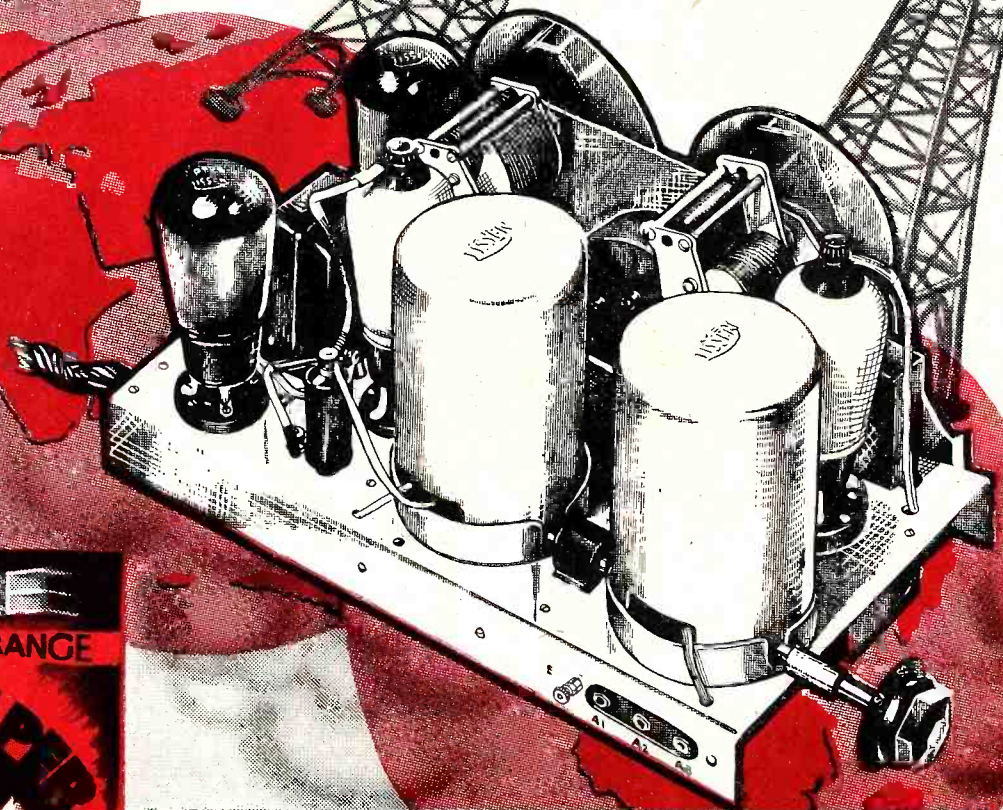
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ALL-WAVE

at last!



AMERICA & AUSTRALIA ON MOVING COIL LOUDSPEAKER FOR THE FIRST TIME..

The Lissen All-Wave All-World "Skyscraper" 4 marks a milestone in radio progress—a milestone so important that it can only be compared to the change from crystal sets to valves. As the first valve sets made practical a range of hundreds of miles, so the new principles involved in this Lissen All-Wave All-World "Skyscraper" make practical the thousands-of-miles ranges of Australia and America. But more than this, it brings two whole new wave-length bands within reach of the ordinary listener—stations and programmes which it was before a scientific impossibility for him to receive—and leaves open for future development a field which may well be used to solve all the problems of ether-congestion at present perplexing the authorities.

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Lissen have published a splendid Chart of the All-Wave All-World "Skyscraper." It tells you exactly what to do with every single nut and screw, so that success is certain. Post coupon on left for your FREE copy.

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ULTRA-SHORT - SHORT - MEDIUM - LONG WAVELENGTHS IN A KIT SET FOR THE FIRST TIME

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STUPENDOUS
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FIRST BENEFITS
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ULTRA-SHORT • SHORT MEDIUM & LONG WAVES for the first time on a Constructor's Set

At last the day of All-World Radio has arrived and all the thrill of conquest has returned to radio reception with the introduction of a new Home Constructor's Kit Set by Lissen, which incorporates for the first time four wavelength ranges instead of two—which tunes from 12 to 2,100 metres—which brings America and Australia within range of British listeners who hitherto have only known the home stations and the chief Continental programmes.

And you can build the Lissen All-Wave All-World "Skyscraper" for yourself. Lissen have made it a Home Constructor's Kit Set because it adds to your enjoyment to use your own hands, it saves you pounds in first cost, it makes you an enthusiast to feel and to hear what a wonderful thing you have created! And when you see the Great Free Chart of the All-Wave All-World "Skyscraper," which tells you how to build it and how to work it and why it gives such marvellous results, you will agree at once that it would be wise of you to build for yourself rather than buy a factory assembled receiver when Lissen have so simplified home construction. **YOU CAN'T GO WRONG!** There are pictures of every part, with every wire numbered, every hole lettered, every terminal identified. Even the exact length of every connection is given to you! But get the Chart and see for yourself—then build the Lissen All-Wave All-World "Skyscraper" 4 and become a pioneer of the World Range Radio of 1934.

High Frequency Amplification for the first time on all wavelengths.

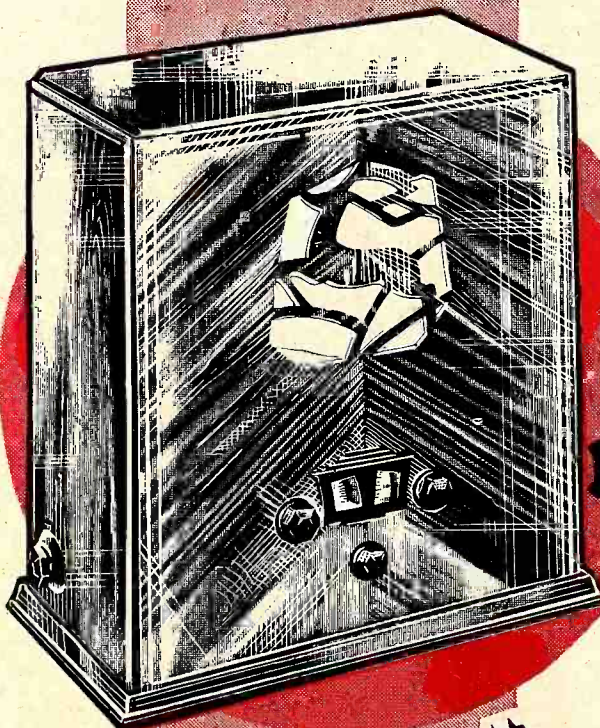
12 to 2,100 metres tuning at the turn of a switch.

Double balanced-Pentode Quiescent Output Stage.

Moving Coil Loudspeaker

Battery operated—and a real battery—economiser!
Less than 10 m/a H.T. consumption!

Now receive stations the World Over!



"SKYSCRAPER" 4

PERFECT MATCHING

for ANY receiver



PM4A 42/- Complete

- Seventeen ratios for power and pentode
- Four ratios each for Class B or Q P P without alteration
- Accurate adjustment instantly to the correct optimum load for any output under any working conditions.

for F. J. CAMM'S 1933 SUPERSET this W.B. speaker is solely specified—incorporating the new and sensational

"MICROLODE" feature

Whiteley Electrical Radio Co. Ltd., Mansfield, Notts.

E.W.G

Still Leading and Showing the Way!

The ALL-WAVE TWO

Here You Are Given Full Constructional Details of the Most Fascinating Two-Valve Set That Has Ever Been Offered to the Home Constructor.

By FRANK PRESTON, F.R.A.



THE "All-Wave Two" will be welcomed by all those who require a really efficient, modern and simple receiver. In particular, the set will appeal strongly to readers who have not previously experienced the enjoyment to be gained by making their own set, since the design lends itself to extreme simplicity of construction.

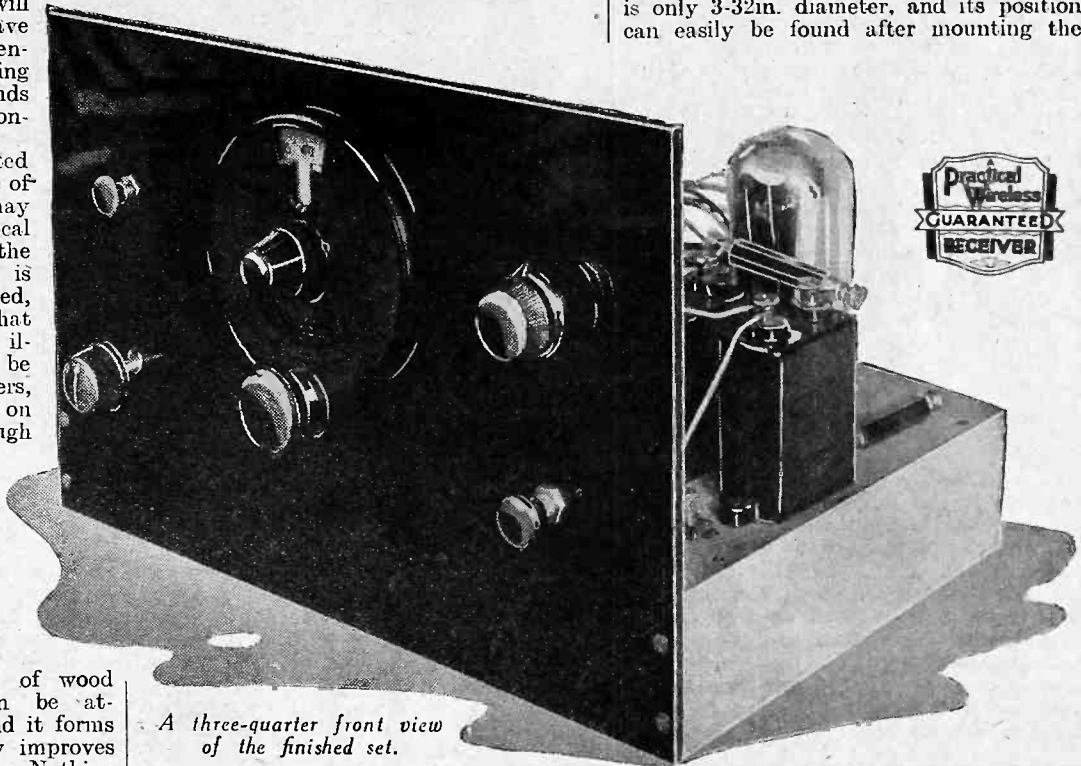
All the parts required are listed elsewhere, and most of them are of perfectly standard type which may be obtained from any good local dealer. The only exception is the special metallized chassis, which is supplied ready cut and drilled, exactly in accordance with that used in the original receiver illustrated. The chassis can be ordered direct from the makers, whose address will be found on the advertisement pages, or through the usual retailer. Ample stocks are available, so there is no reason why any inferior substitute should be resorted to. It might be mentioned in passing that the special chassis specified is actually made of 5-ply wood, and is sprayed with metal by a new and patented process. As a result it has all the combined advantages of wood and metal; components can be attached to it without drilling, and it forms a perfect screen which greatly improves the stability of the receiver. Nothing need be said of the remaining components, since they are all of well-known patterns. Just one word of warning, though—please

do not attempt to use alternatives, because if you do, trouble is almost sure to be experienced sooner or later.

Drilling the Panel

Having obtained all the necessities, then, a start can be made on the constructional work by drilling the ebonite panel

bush is 7-16in. in diameter; the four for the switches and reaction condenser are all 5-16in. and the four for the wood screws (for attaching the panel to the chassis) are $\frac{1}{4}$ in. The tenth hole is not shown on the drawing, and is to take a small stop which is supplied with the "Indigraph" slow-motion dial. The hole is only 3-32in. diameter, and its position can easily be found after mounting the



A three-quarter front view of the finished set.

in accordance with the lay-out shown last week. Ten holes are required altogether, and of these, that for the tuning condenser

panel components Z, by following the directions supplied with the dial.

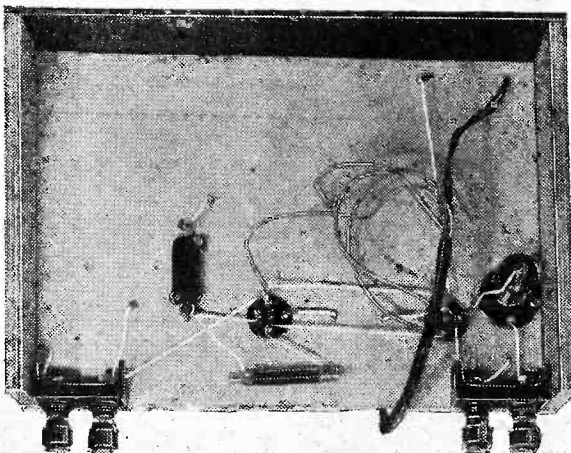
(Continued overleaf)

LIST OF COMPONENTS FOR THE "ALL-WAVE TWO":

- | | | |
|--|--|---|
| One Peto-Scott "Metaplex" Chassis, 12in. by 7 $\frac{1}{2}$ in. by 2 $\frac{1}{2}$ in. | One W.B. Chassis Mounting 4-pin Valve-holder. | Four Belling Lee Terminals, Type "B"; marked "AZ," "E," "L.S.+", "L.S.-" |
| One "Becol" Ebonite Panel, 12in. by 8in. | One W.B. Chassis Mounting 5-pin Valve-holder. | One Belling Lee 6-way Battery Cord with Terminals marked "H.T.+", "H.T.-", "L.T.+", "L.T.-" |
| One Igranic "Igranitor" Coil, Type "A." | One Bulgin "Senator" L.F. Transformer. | One "Microfu" Type 100 mA. |
| One Igranic "Igranitor" Coil, Type "S.W." | One Bulgin Crocodile Clip. | One Mazda Type L2 Valve (Metallized). |
| One Igranic Insulated Switch Rod Coupler. | One Dubilier .0001 mfd. Fixed Condenser, Type 670. | One Mazda Type Pen. 220 Valve. |
| One Graham Farish .0005 mfd. "Zelos" Condenser. | One Dubilier 1 mfd. Condenser, Type BB. | One Peto-Scott "All-Wave Two" Cabinet. |
| One Igranic "Indigraph" Vernier Knob and Dial. | One Dubilier 2 mfd. Condenser, Type BB. | One R. & A. "Bantam" Loud-speaker Unit. |
| One British Radiogram .0002 mfd. Reaction Condenser. | One Graham Farish "Ohmite" 1 megohm Resistance. | One Graham Farish "Fit" Earthing Device. |
| One British Radiogram 2-point Switch. | One Graham Farish "Ohmite" 20,000 ohm Resistance. | One length British Radiophone "Receptru" Down Lead. |
| One British Radiogram 3-point Switch. | One Graham Farish "Ohmite" 30,000 ohm Resistance. | One "Drydex" 120-volt High Tension Battery, Type H 1006. |
| One British Radiogram Short-Wave H.F. Choke. | One Graham Farish "Ohmite" 100,000 ohm Resistance. | One "Drydex" 9-volt Grid Bias Battery, Type H 1001. |
| One "Goltone" .0001 mfd. Pre-set Condenser. | Two Belling Lee Terminal Mounts. | One Exide 2-volt 20 a.h. Accumulator, Type B.T.G. |
| One "Goltone" Super H.F. Choke. | | |

(Continued from previous page)

When the panel has been drilled it can be fastened to the side members of the chassis by means of four $\frac{1}{2}$ in. by 5's screws, and the components can next be assembled. Start by mounting the condensers and switches on the panel, and then fasten the two tuning-coil spindles together by means of the small ebonite coupling link supplied with them. In doing this take care that the two spindles do not touch each other inside the coupling link, or else the broadcast coil (type "A") will be short circuited. Now lay the two coils down on the baseboard in the position indicated in the wiring plan, taking care that the switch spindle is exactly in line with the hole made for it in the panel. Fasten down the coils with $\frac{1}{2}$ in. by 5's screws, and then mount all the other components in the positions shown on the diagrams published last week. It will be clear, of course, that the resistances and grid leak are not attached directly to the chassis, but are held in place by the wiring; they can, therefore, be ignored until a later stage is reached. Once the components have been properly fixed down the wiring can be proceeded with. So as to obviate the possibility of mistakes it is best to carry out the wiring in some simple sequence. Start by putting in the filament circuits on the underside of the chassis and then work from left to right on the top. All the wiring is done in "Glazite" with the exception of a single lead from the pre-set aerial condenser and the battery cords. The former wire consists of a 6 in. length of flex with a crocodile clip attached to one end. Most of the connections are made by looping the end of the wire and securing this under the heads of terminals, but this system is modified in respect to leads going to the valve-holders. The holders are not provided with terminals, so the wires must be soldered to the tags which are fitted. Actually, this method is somewhat better, especially for a set which is to be used on short waves, and no reader need have any fear of difficulty in making the soldered contacts if the following simple method of procedure is adopted. First cut off the wire to length, bare the end for a distance of $\frac{1}{2}$ in. or so, place the bared end through the small hole in the soldering tag, smear a very small amount of flux over the wire and tag, and then apply the hot soldering iron which has previously been tinned. If you have no experience whatever of soldering it might be advisable to call in the assistance of a



Showing the sub-baseboard wiring and layout of components.

friend, but the whole job should take no more than a few minutes.

Notice especially that a wire is taken from the earth terminal to a small wood screw fastened to the under-side of the baseboard. This connection serves to earth the chassis, so that it may function as an efficient screen. The chassis might have been used for all "earth return" leads, but it was not considered wise to do this in view of the absolutely perfect electrical contact which is essential in a short-wave receiver.

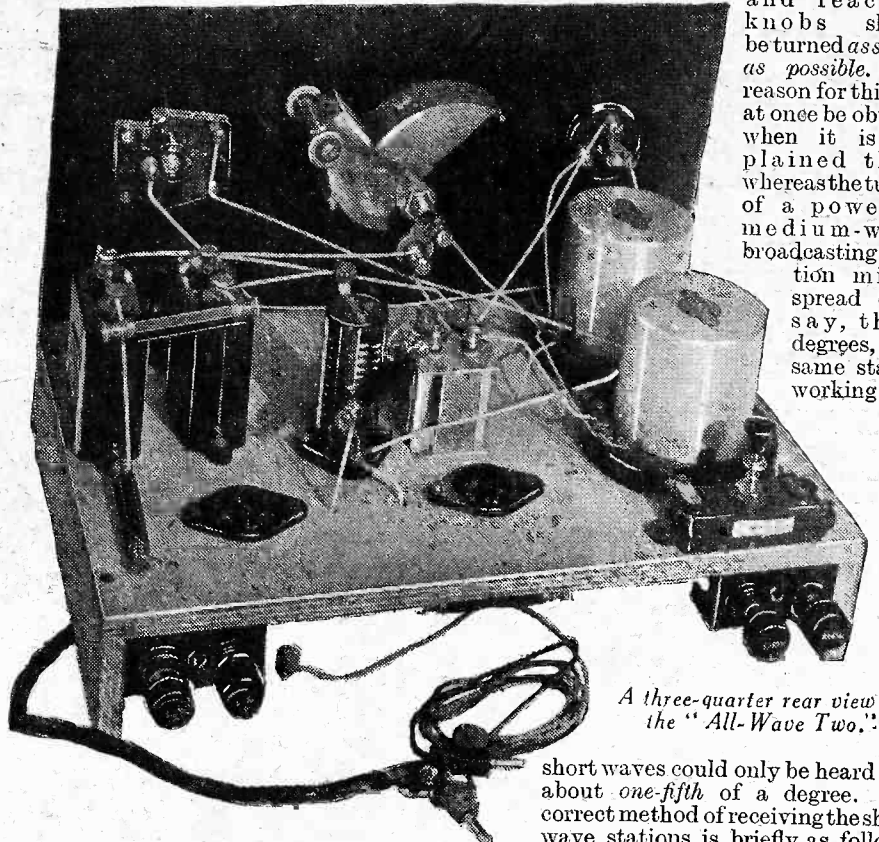
Connecting the Batteries and Testing

After all the constructional work has been finished you can try out the set by

with care there will be no need ever to make the set oscillate and so to cause annoyance to neighbouring listeners, but if by mistake it is allowed to oscillate, the reaction control should at once be slacked off. A very little practice will soon enable the merest novice to feel absolutely at home with this simple set, whilst anyone who has previously handled a set of any type should experience no difficulty at all.

Short-Wave Tuning

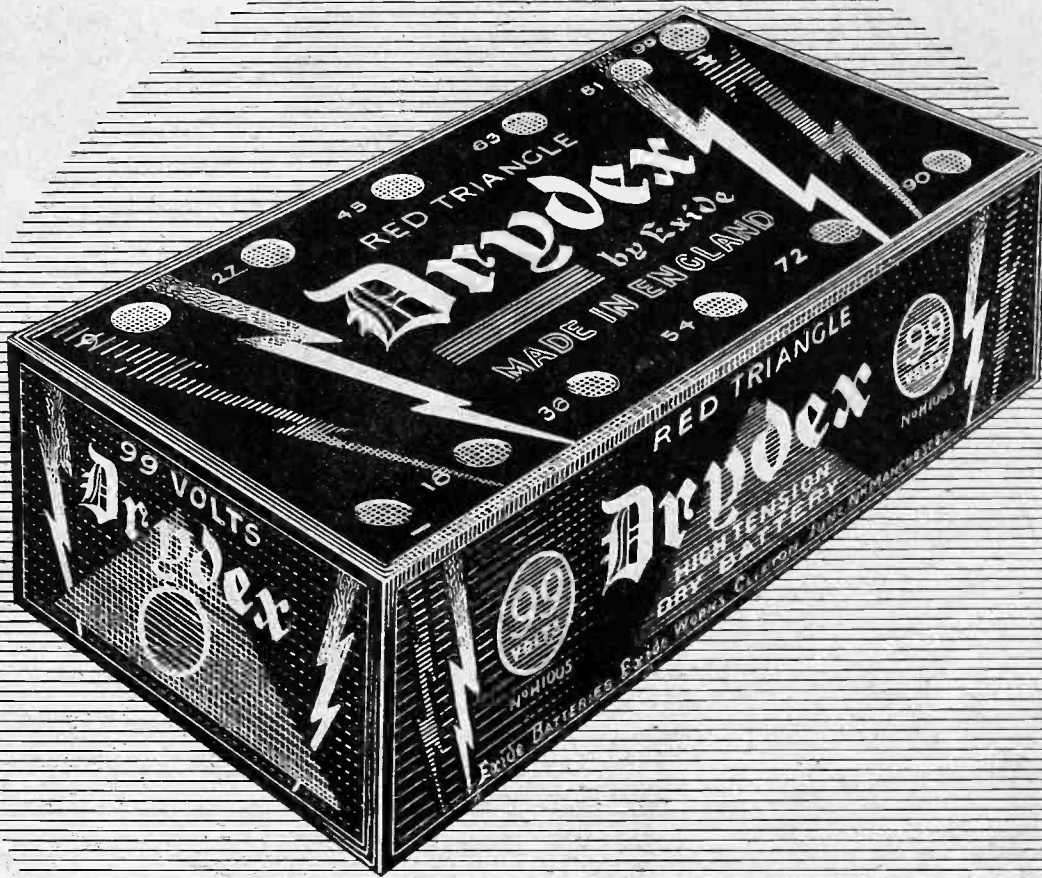
Tuning on the short-wave band is naturally rather more delicate than on the higher wavelengths, but even so it is not by any means difficult if the operator will only remember the simple rule that the tuning



A three-quarter rear view of the "All-Wave Two."

and reaction knobs should be turned *as slowly as possible*. The reason for this will at once be obvious when it is explained that, whereas the tuning of a powerful medium-wave broadcasting station might spread over, say, three degrees, the same station working on short waves could only be heard over about *one-fifth* of a degree. The correct method of receiving the short-wave stations is briefly as follows: First pull out the knob of the three-point switch, transfer the crocodile clip to terminal number "3" on the short-wave coil, and turn the coil switch to the left or right according to whether the 15 to 30 or 28 to 80 metre waveband is required. Set the dial of the tuning condenser to zero, and adjust the reaction condenser until a faint hiss indicates that the set is just on the point of oscillation. Rotate the tuning dial *slowly*, and if necessary slightly alter the reaction setting at the same time, so as to keep the set on the edge of oscillation. When a signal is tuned in a whistle will, of course, be heard, indicating the presence of the carrier wave. This can be "resolved" by *slowly* slacking off reaction and making a slight readjustment of the tuning dial. Incidentally it should be explained that when working on short waves only the first half of the tuning condenser (up to 50 degrees) should be used, as efficiency will fall off rapidly at higher settings. This is not a disadvantage, because at 50 degrees the lower wavelength range goes up to 30 metres, which is higher than the lowest wavelength to be obtained on the second short-wave range. It should be possible to hear the more powerful S.W. Stations on the self-contained loud-speaker.

putting wander plug "H.T.—" into the negative socket of the H.T. battery, taking plug "H.T.+" to the 120-volt socket, putting plug "G.B.+" into the positive grid-bias battery socket, placing plug "G.B.—" into the 4½-volt socket and connecting the two low-tension spade terminals to the appropriate terminals on the accumulator. Connect up aerial, earth, and loud-speaker leads, and then attach the crocodile clip to terminal "2" on the broadcast coil (L.2). Push in the knob of the three-point wave-change switch, and then turn the lower switch knob (working on the coils) to the left or right for medium or long waves respectively. Set the reaction condenser to its minimum (anti-clockwise) position and rotate the tuning knob until the local station is heard. Next increase the reaction setting to a point where the set is just short of oscillation; this will be recognised by the fact that reproduction will show signs of becoming slightly distorted. Now, carefully re-tune and make a final reaction adjustment. If the method just outlined is followed



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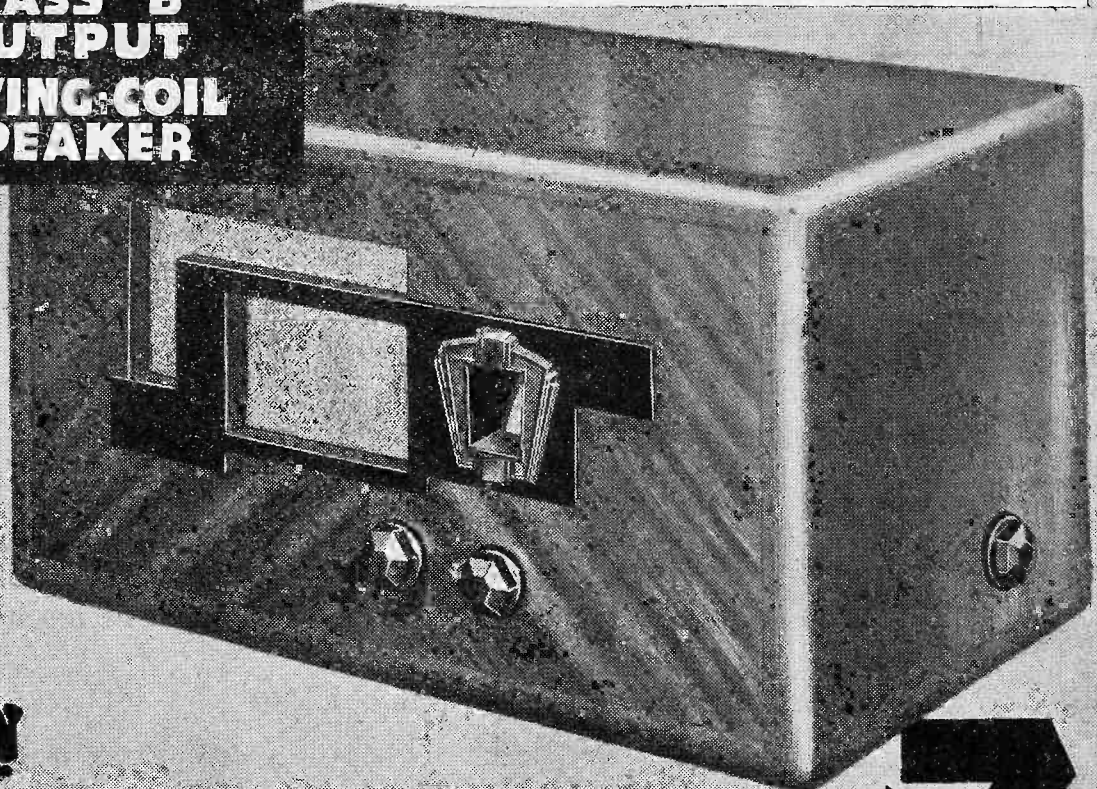
Never before has there been any receiver for Home Constructors on such an ambitious scale as this new Lissen "Skyscraper" Seven Valve Superhet. It embodies every up-to-the-minute advance and refinement of the most luxurious factory-built superhets—it gives the constructor the opportunity to build a £20 receiver for less than half that price.

The circuit of the Lissen "Skyscraper" Seven Valve Superhet incorporates a 6-stage bandpass filter giving exact 9-kilocycle channels and therefore providing a standard of selectivity never before achieved by a home constructor's kit set and very rarely found except in laboratory apparatus. Amplified Automatic Volume Control is provided, a special valve for this purpose having been produced by Lissen for use in this receiver. The use of this Amplified Automatic Volume Control constitutes an entirely new experience in listening; no "fading," no "blasting"—you will find yourself enjoying every word of every programme, however near or however distant, without the slightest temptation to interfere with the receiver once you have tuned it. This is radio listening as it should be enjoyed.

a new full-power Lissen Moving-coil loudspeaker—glorious rich tone and majestic volume, actually more faultless in its reproduction than anything you ever heard from even the most powerful mains receiver, yet working economically in this Lissen "Skyscraper" from H.T. batteries.

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Described in this
issue



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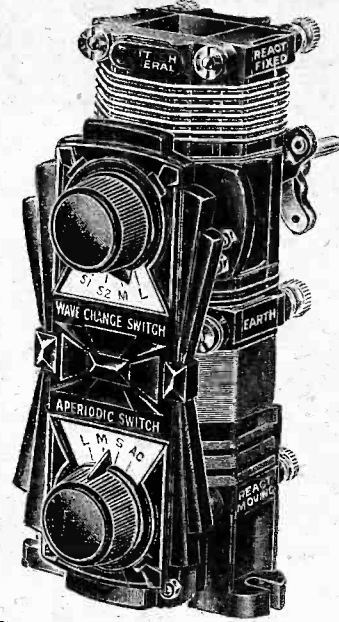
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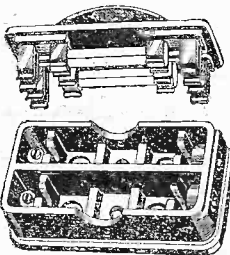
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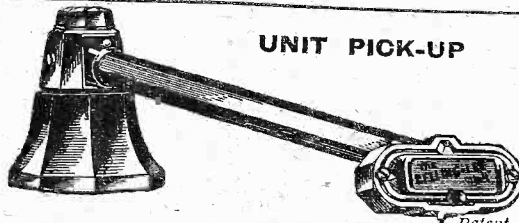
A few of Belling-Lee's latest developments



MAINS INPUT CONNECTOR

Patent

Modification of Safety Twin Fuseholder. On removing cover the fuses are instantly accessible and circuit is dead. Impossible to touch live parts of fuseholder. Flex part carrying mains entirely shrouded. Complete with 1 amp. fuses. Each **3/3**

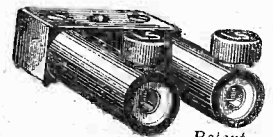


UNIT PICK-UP

Patent

Constructed of metal, this new pick-up follows modern design in appearance and technique. Octagon in form, self-contained Volume Control, Ball Bearing Swivel. The whole arm rotates 180 degrees to facilitate needle changing and simultaneously lifts to swing clear over the record. Complete with template. List No. 1117. **35/-**

TWIN TERMINAL



Patent

The most practical and ingenious terminal yet offered. Even for chassis mounting no terminal mount is required. Will take wire, flex, spade terminal or wanderplug. 8 assorted letterings. In pairs (no mount required). No. 1102. **1/6**



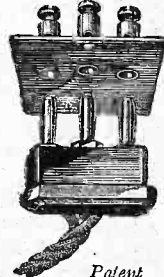
BELLING-LEE PICK-UP

Patent

MODEL A. Adjustable arm allows distance between needle point and centre of base to be varied from 7 1/2 inches to 9 1/2 inches. The arm should be as long as cabinet space permits. Head angle is also adjustable to obtain minimum tracking error for different arm lengths. **27/6**

Special Features—Perfectly natural frequency response . . . minimises needle scratch while retaining high notes and brilliancy of reproduction . . . Minimum record wear . . . Copper screened flex.

3-PIN PLUG

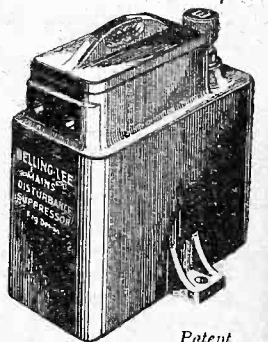


Patent

For connections between receiver chassis and loudspeaker. Centre tap speaker transformers; field coils with connection for earthing speaker chassis, or 3 wire arrangements to carry speech and energising currents to speaker. List No. 1119. **1/3**

DISTURBANCE SUPPRESSOR

Mains leads or aerial carry high-frequency interference which often ruins radio reception. The Belling-Lee Disturbance Suppressor reduces this trouble to a minimum and usually eliminates it entirely. Fuses in both mains leads for A.C. or D.C. supplies up to 250 v. LH18. With complete instructions **9/6**



Patent

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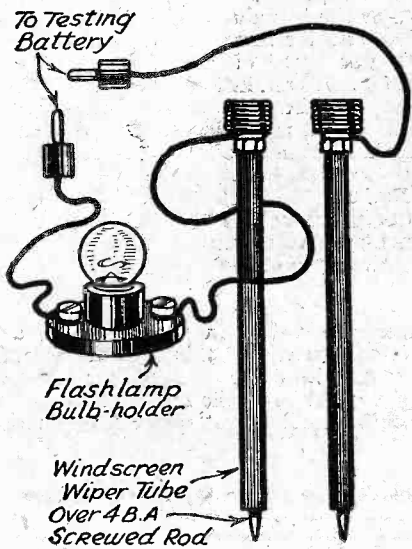
Advt. of Belling & Lee, Ltd., Cambridge Arterial Road, Enfield, Middlesex

READERS' HALF-GUINEA WRINKLES

The Page

A Handy Tester

THIS useful tester is made from two pieces of 4 BA threaded rod, about a foot of motor-car windscreen wiper tube, a bulb holder and two wander-plugs. The accompanying sketch shows how the parts are connected, the finished device



Details of the tester.

being useful for testing circuit wiring. By using the bulb lead only, it may be used for testing filament circuit or any battery circuit wiring.—A. W. LANGE (Herne Hill).

A "Through the Glass" Lead-in

MANY wireless set owners must be seriously handicapped by the modern type of narrow iron-framed window, which does not allow of a lead-in tube being placed through the frame. The writer has solved the difficulty in his own case by bringing the lead through the window-pane itself. The job is carried out as follows:—Obtain a small sewing-cotton reel and cut it into two pieces, as indicated in Fig. 1. The two halves are given a coat of paint, or varnish, to improve their appearance, and clamped together, through a hole in the window-pane, by a nut and washer on each end of a piece of 2 BA screwed brass rod. The end of the aerial is secured to the outer end of the brass rod by another nut (the connection may be made more secure by soldering), and the lead to the set is attached in similar manner to the interior end of the rod. The complete arrangement is shown in Fig. 2.

To bore the hole through the window, a piece of brass or copper tube about 4in. long, of the same outside diameter as the brass rod, or a trifle larger, is taken, and one end filed with a number of serrations, as shown in Fig. 3. It is held in a hand-drill in the usual manner.

In order to locate and guide the drill at the commencement of drilling the

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smooth surface of the glass, a cork bung or a piece of wood 1/4-in. to 1/2-in. thick, is bored through with a hole the size of the drill (the drill itself may be used for this), and stuck on to the window pane with seccotine so that the hole corresponds with the required position of the hole in the glass.

A cutting composition is now made by mixing a little coarse carborundum powder (obtainable from a garage or

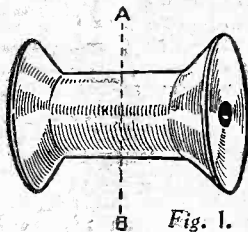
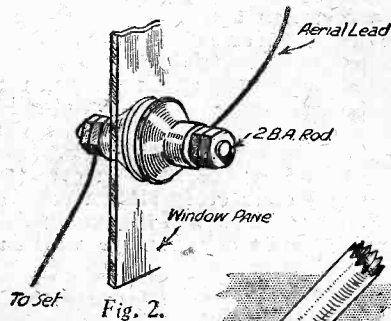


Fig. 1.



Various constructional details of the "through-the-glass" lead-in.



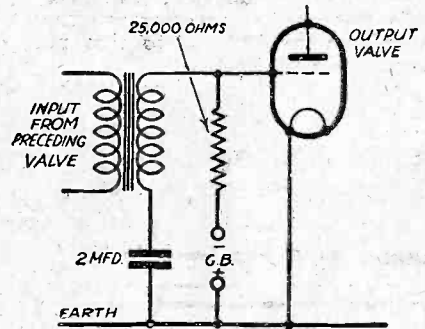
tool dealer) into a thin paste with turpentine. This is smeared in the cutting end of the drill and the latter inserted into the hole in the guide piece. Drilling is then started with a fairly light pressure. The drill should be partly withdrawn from time to time, to feed up fresh carborundum, and, if it ceases to cut with a gritty feel, withdrawn and smeared afresh with the carborundum turpentine mixture. A few minutes only are required as a rule to pierce the glass, and good control should be kept of the pressure on the hand-drill, otherwise the operator may push it

through the window-pane when the bit penetrates.

When the hole is bored, the guide is removed after soaking with warm water, and the pane is ready for mounting. The assembly, when finished, has a very neat appearance, especially when the smallest size of reel is used, and the insulation provided by the glass pane is excellent. Capacity effects are also much reduced.—J. W. CRAWFORD (Ardrossan).

Eliminating Howl

MANY constructors are troubled with L.F. howl, in sets containing two L.F. transformers. The accompanying

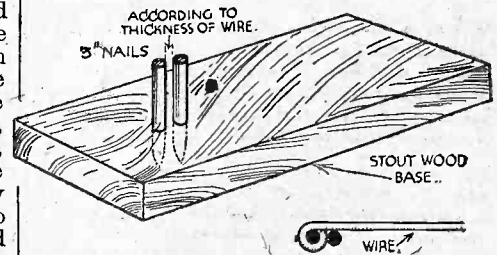


How the grid circuit of the output valve is decoupled.

sketch shows how I cured a troublesome case after all the usual methods had failed. The grid circuit of the output valve was simply decoupled by the addition of a 2 mfd. condenser and 25,000 ohm resistance in the circuit, as shown. This had no detrimental effect on the quality, but effectively eliminated the howl.—H. J. PLUMMER (Islington).

A Loop Forming Gadget

A USEFUL gadget for bending wires on the end of connecting wires can be very easily constructed, as shown in the accompanying diagram. Two 3in. round nails are obtained and the top parts cut off. The nails are then driven into a stout piece of wood, leaving space for the thickness of a wire between them. Nails of varying sizes can be mounted for different sized loops.—A. H. BARKER (West Ham).



A device for forming loops in wire.

The Superhet

Its Evolution & Possibilities

A Practical Article Dealing With Its Development and Modern Improvements.
By H. J. BARTON CHAPPLE, Wh.Sch., B.Sc., A.M.I.E.E.

SUCH a lot has been said lately of the superhet (supersonic-heterodyne receiver) that it will not be out of place here to record how this special form of set was developed. The principle upon which the superhet operates is more or less familiar, even to those listeners who have not operated apparatus of this type. Briefly, it consists in producing, within the receiver itself, an oscillating current of a frequency considerably lower than that of the original signal, yet higher than audio frequency, and of transferring the programme modulation to this new or intermediate frequency.

Amplification takes place at the intermediate frequency, after which the signal is rectified in the ordinary manner, amplified at audio frequency, and finally passed to the loud-speaker.

The superhet set owed its first entry into broadcast receiving practice because of the extreme inefficiency of early forms of high-frequency amplifier. In those days, the early 'twenties, the only type of valve available was the triode; and as has already been explained in some recent articles of mine, the triode, due to its high inter-electrode capacity, permitted a large amount of unwanted reaction, so that in order to ensure reasonably stable operation as a high-frequency amplifier the efficiency of the valve, never very high under the most favourable circumstances, had to be further cut down by various devices.

Frequency Changing

The superhet principle provided a ready means of avoiding this difficulty by changing the frequency of the original signal to a lower value at which amplification could take place more efficiently. The principle was already well-known to radio engineers, for it had been used for a considerable period as a means of rectifying radiotelegraphic transmissions. As first applied to broadcast reception it operated in the following manner. Within the receiver was a valve known as the local oscillator—a triode in which the coils in the anode and grid circuits were closely coupled inductively. Readers will recognize this as a valve operating under conditions of excessive reaction, causing free oscillations to be generated. One of the oscillator coils, or both, were tuned by a variable condenser, and by this means the frequency of the local oscillations was adjusted until it differed from the frequency of the incoming radio signal by a definite amount—usually 100,000 cycles.

By coupling the local oscillating circuit to that of the incoming signal, and passing both to the grid of another valve—the so-called "first detector," the two frequencies were combined to give a new frequency,

equal to the difference of their individual frequencies, namely, 100,000 cycles. What is more, the new frequency was modulated in the same way as the original signal frequency.

Thus the new, or intermediate, frequency appeared in the anode circuit of the first detector valve and acted as carrier frequency to the programme modulation. Next followed two or even three stages of intermediate frequency amplification—ordinary triode valve, the inter-valve couplings being more or less carefully matched, and self-tuned transformers. After the intermediate frequency amplifiers came the second detector, which rectified the signal in the ordinary way, and was followed by the usual low-frequency amplifying stages, terminating with the output valve.

Disadvantages

There is no doubt that these early superhets did provide a very large degree of signal amplification—in other words, they were extremely sensitive and had wonderful range; and for that reason they had a very considerable vogue among those who could afford this rather expensive type of receiver. They had many disadvantages, however. In the first place they were costly to build and to maintain. Seven, eight, or even nine valves were required—and valves then cost something like a sovereign apiece, and took nearly three-quarters of an ampere for low tension.

They were bulky, tricky to construct and to adjust for optimum efficiency—remember that the frequency of the oscillator had to be readjusted for each station, and no ganged condensers were available. Also, one had to face difficulties in operation, for in most cases every station could be tuned in at two settings of the tuning dial.

Another grave disadvantage was that, with the circuit as then used, the superhet was very prone to re-radiation, although this was to some extent mitigated by the use of a frame aerial. But most important of all the disadvantage was the very poor quality of reproduction.

It was no wonder, therefore, that when the neutralized triode method of high-frequency amplification was developed, the superhet's popularity began to wane, and declined almost to zero as soon as the screen-grid valve brought "straight" high-

frequency amplification to a high pitch of efficiency.

After the introduction of the screen-grid valve, and for some years following, very little was heard of the superhet in this country. A certain number were made, of course, and there were still enthusiasts, both amateur and professional, who maintained their interest in this ingenious circuit.

A Revival

Oddly enough, although it was the screen-grid valve which caused the first disappearance of the superhet, it was also the screen-grid valve which permitted its revival. People had played about with screen-grid valves in superhet sets, and had discovered that this type of valve, in common with other types of four electrode valve, could be applied with great success as first detector or "mixer" valve, and also as combined first detector and local oscillator.

More recently, screen-grid valves have come to be used also as intermediate frequency amplifiers as well. A great many different arrangements are possible whereby the screen-grid valve can be employed in superhets and some have been described in recent issues of this journal, and it must suffice to indicate briefly just one or two methods. For example, energy can be taken from the anode circuit of the first screen-grid valve to a tuned oscillator circuit coupled to another coil in the screen circuit, thus "injecting" the local oscillating frequency into the valve circuit where the "mixing" and production of the intermediate frequency takes place. In another arrangement, the oscillating circuit is coupled to the cathode circuit of the screen-grid valve and the heterodyne voltage is introduced at the cathode of the valve.

(To be continued.)

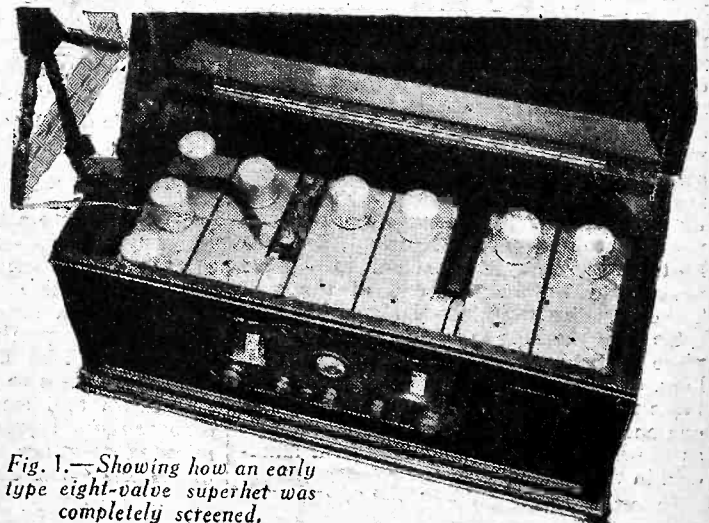
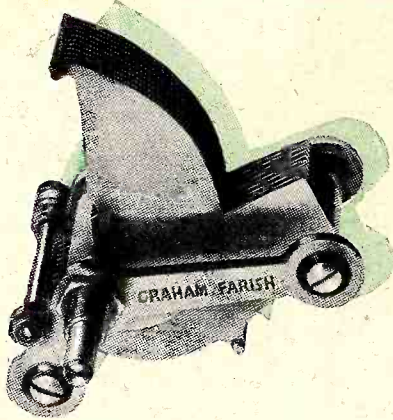


Fig. 1.—Showing how an early type eight-valve superhet was completely screened.

GRAHAM FARISH

COMPONENTS



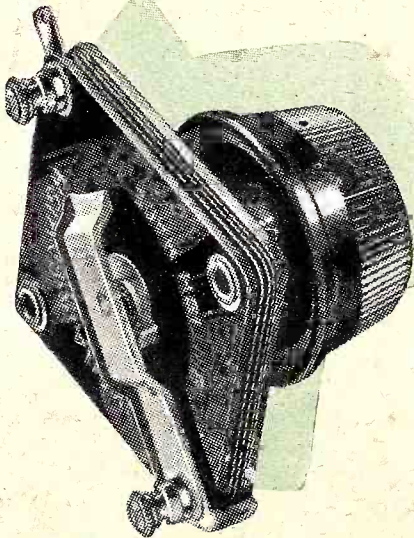
NILOS

VARIABLE CONDENSER

A superb component, possessing extreme rigidity of construction, mechanical perfection of moving parts and high electrical efficiency. Two point fixing of centre spindle, and no spacing washers ensures precision and reliability. Negligible H.F. loss, large accessible terminals, shaft provides easy ganging.

5'-

EACH
Capacity .0005



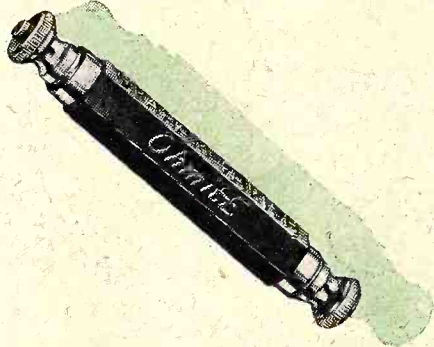
LITLOS

VARIABLE CONDENSER

The LITLOS condenser is a fitting example of high-grade workmanship. It is a very carefully constructed instrument, compact in size and efficient in design, with accurately gauged bakelite dielectrics and solid brass pigtail connection to moving vanes. Made in all capacities up to .0005 mfd. in tuning straight-line capacity and differential types. One hole fixing; supplied complete with terminals.

2'-

EACH
Differential tuning or
reaction types



OHMITE

RESISTANCES

The most popular and efficient type of fixed resistance for all general purposes. Better than wire wound, non-corrosive and non-inductive, they cannot create hum, and do not readily overheat. All values 50 ohms to 5 megohms. 100° F. Temperature rise. Heavy Duty type approximately double the above ratings. Price 2/3.

For those who prefer interchangeability and convenience in mounting, holders are available, vertical and horizontal, 6d. each.

1'6

EACH

Write for the new 1933/4 Catalogue to be published in September.

GRAHAM FARISH LTD., MASONS HILL, BROMLEY, KENT

Export Office: 11/12, FENCHURCH STREET, LONDON, E.C.3.

THE GENIE OF ALADDIN'S LAMP COULD DO NO MORE FOR YOU.

A superb range of speakers of beautiful tonal quality. All fitted with Universal Transformers for use with any set. HEAR and SEE them at our **STAND NO. 104.**



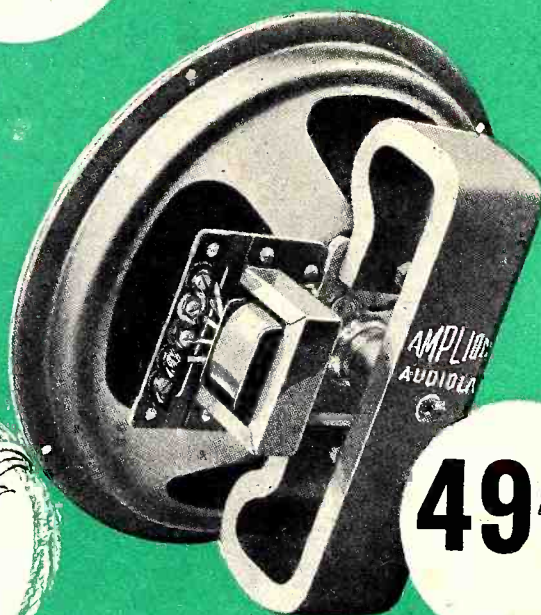
39'6

THE M.C.22.—Embodying all the latest Amplion improvements but selling at the same price as last year's model. WITH UNIVERSAL TRANSFORMER. Price **39'6**



27'6

THE SONETTE.—The baby speaker with the big voice. Weight 2½ lbs. exactly. Price **27'6** Only Amplion could have done it.



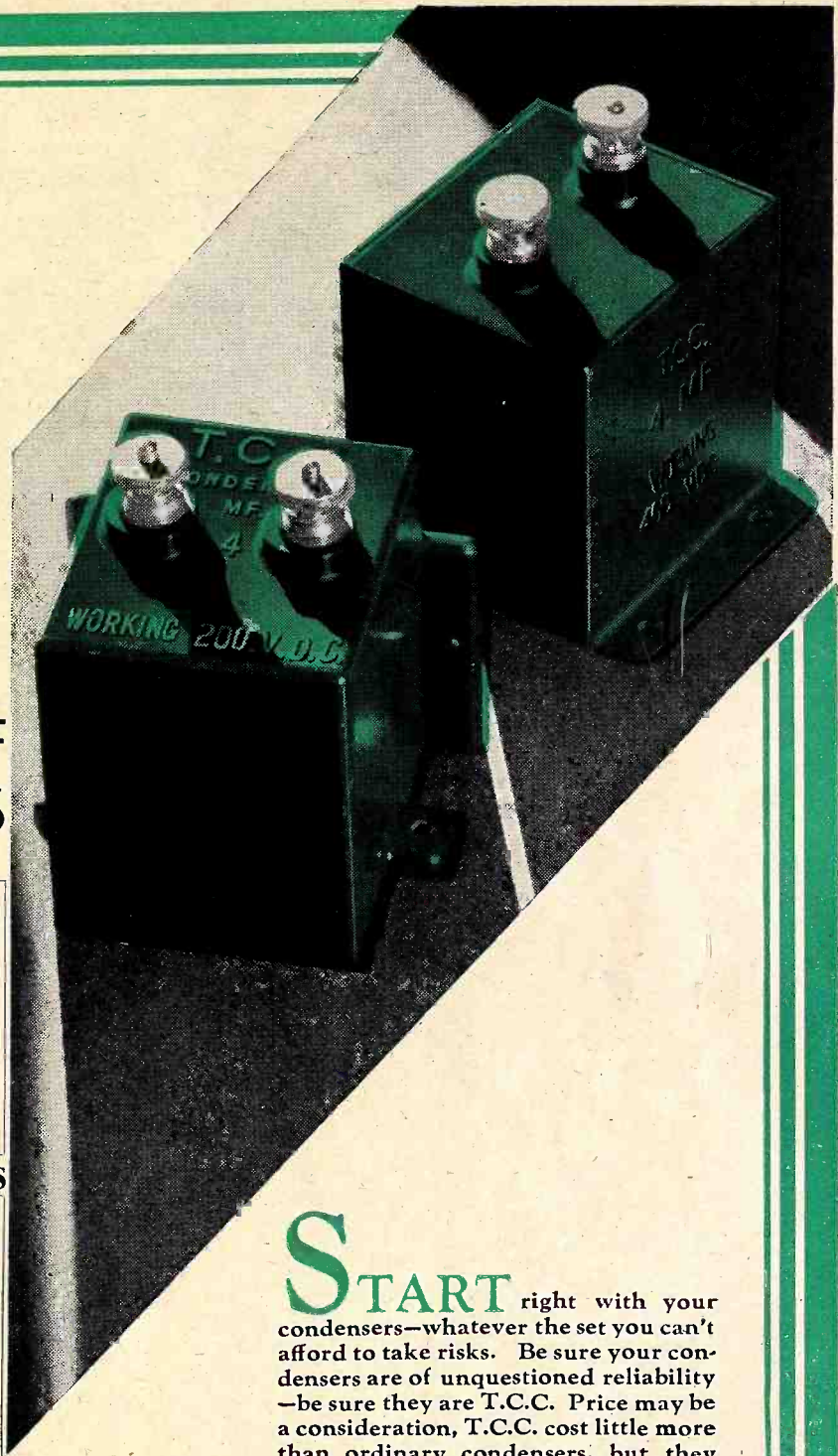
49'6

THE AUDIOLA.—A luxury speaker at a price within the reach of all. 7in. cone and universal transformer. Price **49'6**



AMPLION (1932) LTD.,
82/84, ROSOMAN STREET, LONDON, E.C.1.

SEE THE
COMPLETE
RANGE ON
**STAND
No. 98**
RADIOLYMPIA



CURRENT PRICES OF T.C.C. CONDENSERS

PAPER CONDENSERS. TERMINAL TYPES

Mfd.	Type 50/61	Type 80/81	Type 101	Type 121
	s. d.	s. d.	s. d.	s. d.
0.1	—	2 0	—	—
0.25	—	2 4	—	—
0.5	2 4	2 6	5 0	7 0
1	2 6	3 0	6 0	8 6
2	3 6	4 0	9 0	13 0
3	5 0	6 0	—	—
4	5 6	7 0	17 6	25 0
5	7 3	9 0	22 0	31 0
6	8 6	10 6	25 0	37 6
8	11 0	14 0	—	—
10	14 0	17 6	—	—

PAPER CONDENSERS. SOLDERING TAG TYPES

Mfd.	Type 65	Type 84	Type 87
	s. d.	s. d.	s. d.
0.1	1 8	2 0	2 2
0.25	1 10	2 2	2 4
0.5	1 11	2 4	2 6
1	2 0	2 9	3 0
2	2 8	3 9	4 0
3	—	—	—
4	5 0	6 9	7 3
5	—	—	—
6	7 0	10 0	—
8	9 0	13 0	—
10	11 6	16 0	—

MICA CONDENSERS

Mfd.	Type M	S.P. Type	Type 34
	s. d.	s. d.	s. d.
.00005	0 8	—	1 3
.0001/3	0 8	2 0	1 3
.0004/5	0 9	2 0	1 3
.001/4	1 0	2 6	1 8
.005/6	1 6	3 0	2 0
.01	2 0	—	3 0

ELECTROLYTIC CONDENSERS

Mfd.	Type 802 Aqueous	Type 801 Aqueous	Type 902 Dry
	s. d.	s. d.	s. d.
8	8 0	—	6 6
4	5 0	—	—
7	—	6 0	—

START right with your condensers—whatever the set you can't afford to take risks. Be sure your condensers are of unquestioned reliability—be sure they are T.C.C. Price may be a consideration, T.C.C. cost little more than ordinary condensers, but they are pedigree condensers backed by the oldest firm in the country whose activities are solely condenser making!

The Telegraph Condenser Co., Ltd.,
Wales Farm Rd.,
N. Acton, W.3.

T.C.C.

ALL-BRITISH
CONDENSERS



Now H.T.

Imagine it!
 60 v 5000 ma.h. H.T. 14 $\frac{3}{4}$ " x 4 $\frac{1}{2}$ " 37/6
 30 v " " " 8 $\frac{3}{16}$ " x 4 $\frac{5}{8}$ " 21/-

*accumulators
 half the size!*

NO NEED NOW FOR DRY BATTERY EXPENSE

●A new era opens. Gone are the costly dry batteries. Gone are the bulky H.T. accumulators. To-day comes a new kind of H.T. source—a plate-less accumulator hardly bigger than the old dry battery itself. ●Startlingly low in first cost, it costs you nothing after except for occasional re-charging. The secret is the Block plate-less cell, that does away with the old weight, space and weakness of accumulator plates. ●Non-fragile. Elegant (the case is coloured bakelite). More durable than the plate type; inexpensive. Demand is overwhelming—order at once for early delivery.

**DOUBLE CAPACITY
 L.T.**

What a boon!

Cut away view of Block cell.—First the coloured bakelite that covers the L.T. type; next a lead cylinder (both the 'negative' and the cell's container.) Inside it, active paste. Last is the central 'positive' column and separator.



Price of 80^{a.h.}
 L.T. 2.v. 11/6

**STAND
 22
 MAIN HALL
 OLYMPIA**

BLOCK

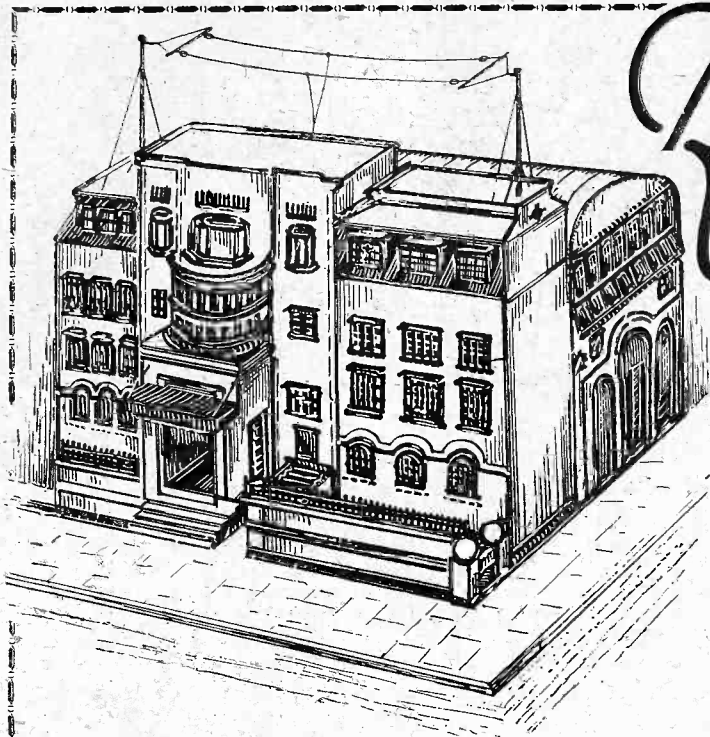
PLATE-LESS ACCUMULATORS

Block Batteries Ltd, Abbey Road, Barking, Essex. Tel: Grangewood 3346/7

TAS/BC.43

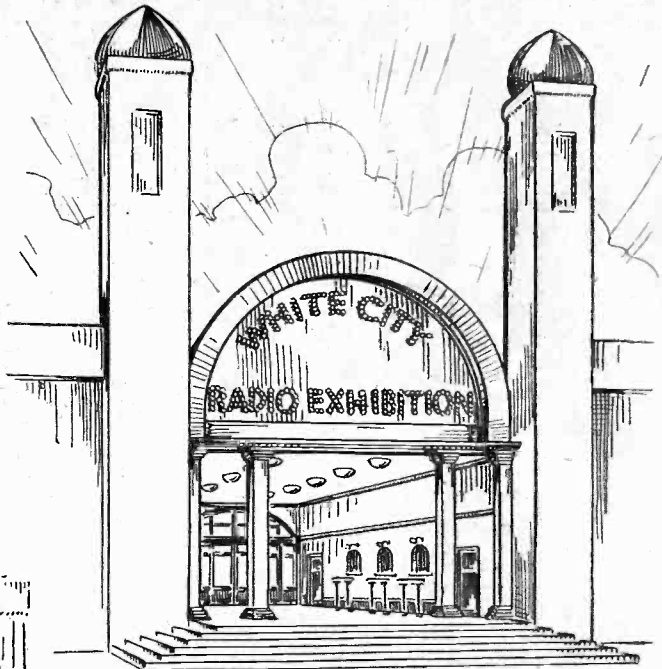
Radio has Moved with the Times

Retrospections and Reflections on the Development of the Radio Industry, as Exemplified by its Exhibitions.



The first All-British Radio Exhibition and Convention was held at the Horticultural Hall. Note the twin aerial.

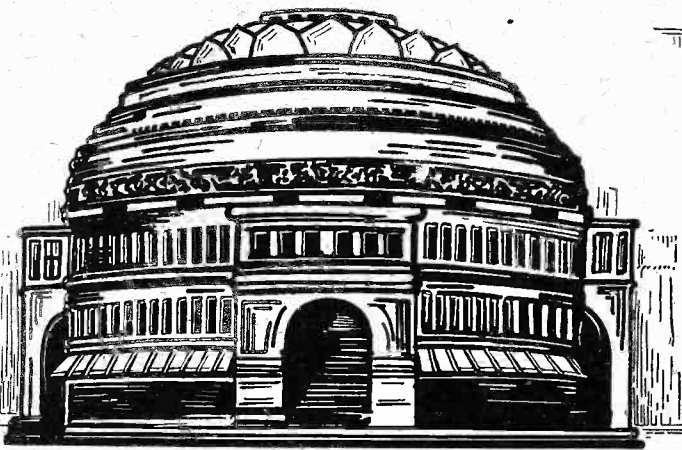
THE greatest exhibition of wireless products in the whole world will be thrown open to the public at 11 a.m. on Tuesday, August 15th, in the Grand Hall at Olympia. This National Radio Exhibition, to give its full name, is being organized by the Radio Manufacturers' Association, and there will be exhibitors of British made receivers, components, and accessories of every conceivable type. The 1933 Show will be the twelfth and greatest of a series which was commenced in 1922. In the latter year the "First All British Wireless Exhibition and Convention" was organized by Messrs. Bertram Day and Co., Ltd., for the benefit of the wireless manufacturers and traders in this country. It was held in the comparatively incommensurate premises of the Horticultural Hall, and despite the fact that there were only about fifty stands it proved



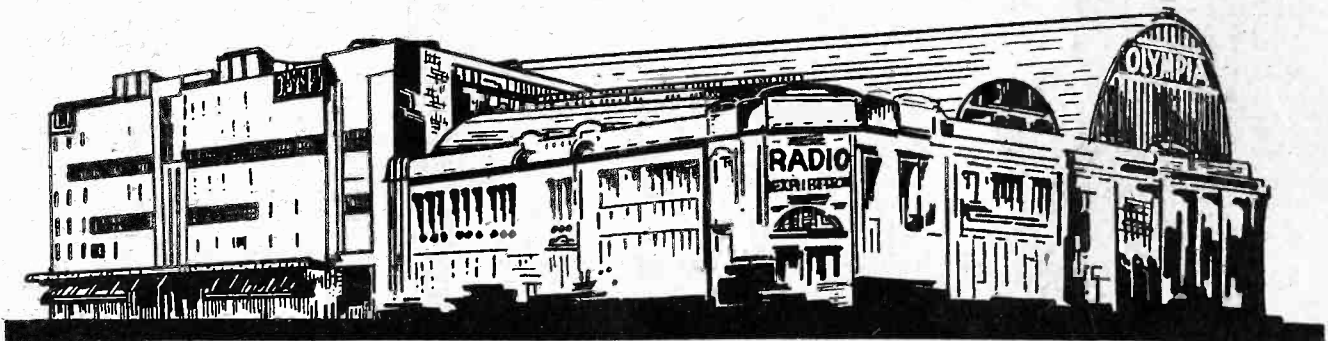
The White City, where the second Exhibition was held.

so successful that plans were immediately put in hand to run a second exhibition the following year.

In passing it will be of interest to quote a few sentences from the catalogue issued in connection with the 1922 Exhibition, viz., "This All-British Wireless Exhibition and Convention is the first of its kind ever held in this Country, and, apart from other (Continued on page XIV)



The Albert Hall—the third link in the chain of progress.



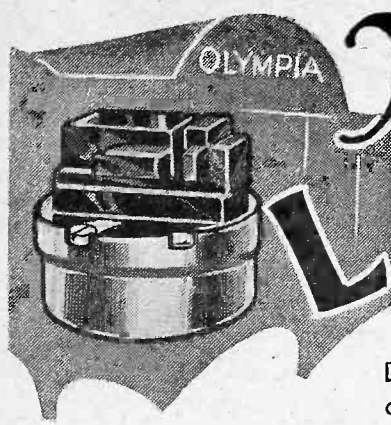
An artist's impression of the present vast building—Olympia—necessitated by the enormous size of the wireless industry.

AN ALPHABETICAL

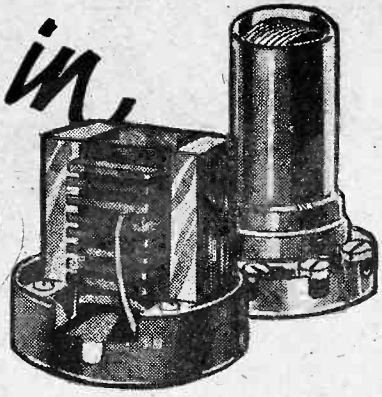


NAME	ADDRESS	STAND No.	NAME	ADDRESS	STAND No.	NAME	ADDRESS	STAND No.
Apollo Gramophone Co., 4, Bunhill Row, E.C.1.		T23	Dyson & Co., Ltd., Works, J., 5, Godwin St., Bradford		T17	Loewe Radio Co. Ltd., 4, Fountayne Rd., Tottenham, N.		245
Aerialite Ltd., 10, Amber St., Manchester		220	Earl Engineering and Electrical Co., 132A, Much Park St., Coventry		249	London and Provincial Factors Ltd., 140, Theobalds Rd., W.C.1.		T4
Amalgamated Press, Fleetway House, Farringdon Street, E.C.4		11	Eastick & Sons, J. J., 118, Bunhill Row, E.C.1.		T12	Lugton & Co. Ltd., 203, Old St., E.C.1.		T26
Amplion (1932) Ltd., 82-84, Rosoman St., E.C.1.		104	East London Rubber Co., 29-33, Great Eastern St., E.C.2.		T19	Levick & Sons, Ltd., Clarence Steel Works, Sheffield		36
Automatic Coil Winder and Electrical Equipment Ltd., Winder House, Douglas St., S.W.1		46	Econasign Co., Ltd., 137, Victoria St., S.W.1		231	Magnacore Ltd., 85, Alsen Rd., Holloway, N.7.		223
Baird Television Ltd., 133, Long Acre, W.C.2.		117	Edge & Sons, Ltd., Wm., Bolton, Lancs.		121	Manufacturers Accessories Co. (1928) Ltd., 85, Gt. Eastern St., E.C.2.		T10
Bakers Selhurst Radio, 75-77, Sussex Rd., Croydon, Surrey		35	Edison Swan Electric Co., Ltd., 155, Charing Cross Rd., W.C.2.		82	Mains Power Radio Ltd., Broadway Works, Eastern Rd., Romford, Essex		211
Balcombe Ltd., A. J., 52, Tabernacle St., E.C.2.		61	Eldeco Radio, Ltd., 62, Conduit St., W.1.		100	Marconiphone Co. Ltd., 210, Tottenham Court Rd., W.1.		77
Belling & Lee, Ltd., Cambridge Arterial Rd., Enfield, Middx.		45	Electrical Measuring Co., Ltd., 55, Cardington St., Hampstead Rd., N.W.1		222	McMichael Radio, Ltd., Wexham Rd., Slough, Bucks		69
Benjamin Electric Ltd., Brantwood Works, Tariff Rd., N.17		42	Electro Dynamic Construction Co., Ltd., Devonshire Grove, S.E.15		240	Metal Agencies Co. Ltd., Queen Sq., Bristol		T30
Benn Bros., Ltd., Bouverie House, Fleet Street, E.C.4		212	Ensign Ltd., 88, High Holborn, W.C.		T24	Milnes Radio Co. Ltd., Victoria Works, Church St., Bingley, Yorks		242
Bernard Jones Publications, 58, Fetter Lane, E.C.4		10	Epoch Radio Mfg. Co., Ltd., Exmouth House, Exmouth St., E.C.1		2	Montague Radio Inventions and Development Co. Ltd., Beethoven Works, Gt. College St., Camden Town, N.W.1		87
Birmingham Sound Reproducers Ltd., Claremont St., Old Hill, Staffs.		218	Ever Ready Co. (G.B.) Ltd., Hercules Place, Holloway, N.7		57	Mullard Radio Valve Co. Ltd., Mullard House, Charing Cross Rd., W.C.2		71
Block Batteries, Ltd., Abbey Road, Barking, Essex		22	Faudels Ltd., 36-40, Newgate St., E.C.1.		T3	Multitone Electric Co. Ltd., 95, White Lion St., Islington, N.		55
Botolph Radio Ltd., 119, Bishopsgate, E.C.2		244	Ferranti Ltd., Hollinwood, Lancs.		74	National Accumulator Co. Ltd., 50, Grosvenor Gardens, S.W.1		216
Bowyer-Lowe & A. E. D., Ltd., Diamond Works, Coombe Road, Brighton		102	Film Industries Ltd., 60, Paddington St., W.1		246	New London Electron Works Ltd., East Ham, E.6		107
Bridger & Co., R. O., 334, Goswell Rd., E.C.1		221	Flinders Ltd., East Stockwell St., Colchester		T7	Newnes Ltd., George, 8-11, Southampton St., Strand, W.C.2		8
Britannia Batteries Ltd., 233, Shaftesbury Avenue, W.C.2		124	Fox Publications Ltd., 14, Britannia St., W.C.1		111	N.R.S. Ltd., 15-16, Alfred Place, W.C.1		T22a
British Blue Spot Co., Ltd., 94-96, Rosoman St., E.C.1		97	Fuller Accumulator Co. (1926), Woodland Works, Chadwell Heath, Essex		34	Nuvolon Electrics Ltd., Meredith Yard, Park Crescent, Clapham Park Rd., S.W.4		238
British Broadcasting Corp., Broadcasting House, W.1		—	Garrard Engineering & Mfg. Co., Ltd., 17, Grafton St., W.1		119	Odham Press Ltd., Long Acre, W.C.2		T18
British Ebonite Co., Ltd., Nightingale Rd., Hanwell, W.7		207	G.E.C. (Batteries), Magnet House, Kingsway, W.C.2		112	Oldham & Son Ltd., Denton, Manchester		123
British General Mfg. Co., Ltd., Brockley Works, Brockley, S.E.4		33	General Electric Co., Ltd., Magnet House, Kingsway, W.C.2		90	Ormond Engineering Co., Ltd., Ormond House, Rosebery Av., E.C.1		99
British Fix Co., Ltd., 118, Southwark St., S.E.1		204	General Mouldings		59	Orr Radio (Inc. United Radio Manufacturers), 63, Lincoln Inn Fields, W.C.2		40
British Radiophone Ltd., Aldwych House, Aldwych, W.C.2		118	Gilbert & Co., Ltd., C., Arundle St., Sheffield		T20	Osborn, Charles A., Regent Works, Arlington St., N.1		202
British Rola Co., Ltd., Minerva Rd., Park Royal, N.W.10		52	Grafton Radio Co., 79, Lots Rd., Chelsea, S.W.		111	Osram Valves, Magnet House, Kingsway, W.C.2		92
British Thomson Houston Co., Crown House, Aldwych, W.C.2		209	Graham Parish Ltd., 153, Masons Hill, Bromley, Kent		205	Partridge Wilson & Co., Devenset Works, Evington Valley Rd., Leicester		127
Brown Bros. Ltd., Great Eastern St., E.C.2		T15	Gramophone Co. Ltd., 363, Oxford St., W.1		80	Phillips Lamps Ltd., 145, Charing Cross Rd., W.C.2		81
Bulgin & Co., Ltd., Abbey Rd., Barking, Essex		122	Grampian Reproducers Ltd., Station Avenue, Kew Gardens, Surrey		23	Portadyne Radio, Portadyne Works, Gorst Rd., N.W.10		75
Burgoyne Wireless (1930), Ltd., 34A, York Rd., King's Cross, N.1		3	Gripsco, 28, Victoria St., S.W.1		251	Powertone Products, 88a, Cromer St., W.C.1		253
Burton, C. F. & H., Progress Works, Bernard St., Walsall		4	Grosvenor Electric Batteries Ltd., 2-3, White St., Moorgate, E.C.2		126	Pye Radio Ltd., Africa House, Kingsway, W.C.2		73
Bush Radio Ltd., Woodger Rd., Shepherd's Bush, W.12		64	Goodmans, 69, St. John Street, Clerkenwell, E.C.1		109	"Radio for the Million," 63, Lincoln Inn Fields, W.C.2		39
Cadisch & Sons, R., 5-6, Red Lion Sq., W.C.1		T5	Hacker & Sons, H., Perfecta Works, Ray Lea Road, Maidenhead		120	Radio Gramophone Development Co. Ltd., 18-20, Frederick St., Birmingham		79
Carrington Mfg. Co., Ltd., 24, Hatton Gdns., E.C.		83	Halford Radio Ltd., 39, Sackville Street, W.1		49	Radio Instruments Ltd., Purley Way, Croydon, Surrey		41
Celestion Ltd., London Rd., Kingston-on-Thames		125	Harlie Ltd., Balham Road, Lower Edmonton, N.9		54	Radio Society of Gt. Britain, 53, Victoria St., S.W.1		201
Chloride Electrical Storage Co., Ltd., Clifton Junction, nr. Manchester		241	Haynes Radio, 57, Hatton Garden, E.C.1		9	Rawplug Co. Ltd., Rawplug House, Cromwell Rd., S.W.7		262
Churchmans Ltd., Colchester		T1	Heayberd & Co., E. C., 10, Finsbury St., E.C.2		16	R.C. Radio Electric Ltd., 51, Whitcombe Street, W.C.2		243
Cifel Products, Ltd., 134, Pentonville Rd., N.1		239	Hellesens Ltd., Morden Rd., S. Wimbledon, S.W.19		160	Radiolab Mfg. Co., Sendridge Works, St. Albans		206
City Accumulator Co., 7, Angel Court, Strand, W.C.2		94	Henderson Wireless & Electrical Service, 54, Queen's Rd., Brighton		T16	Redfern's Rubber Works Ltd., Hyde, Cheshire		26
Clarke & Co. (M/c) Ltd., H., George St., Patricroft St., Manchester		91	Henley's Telegraph Works Co., Ltd., W. T., 11, Holborn Viaduct, E.C.1		53	Regent Supply Co., 21, Bartlett's Buildings, E.C.4		58 and 60
Climax Radio Electric Ltd., Haverstock Works, Parkhill Road, N.W.3		84	Higgs (Gt. Britain), Ltd., Westbourne Place, Hove, Sussex		12	Reproducers & Amplifiers Ltd., Frederick St., Wolverhampton		44
Cole, Ltd., E. K., Ekco Works, Southend-on-Sea, Essex		70	High Vacuum Valve Co., Ltd., 113, Farringdon Road, E.C.1		108	Rist (1927) Ltd., A., Waveney Works, Freemantle Rd., Lowestoft		208
Columbia Graphophone Co. Ltd., 98, Clerkenwell Rd., E.C.		66	Hillman Bros., 123, Albion St., Leeds		T28	Ronnie Engineering Co., Gewdson Road, S.W.9		27
Colvern Ltd., Mawneys Rd., Romford, Essex		56	Hobday Bros., Ltd., 21-27, Great Eastern St., E.C.2		T11	Seabrook Batteries, 205, Bedford Av., Trading Estate, Slough, Bucks		210
Consolidated Radio Ltd., 75, Kilburn Lane, W.10		115	Hustler Simpson & Webb, Ltd., 317, Hoe St., Walthamstow, E.17		62	Selecta Gramophones Ltd., 81, Southwark St., S.E.1		T2
Cosmocer Ltd., Cambridge Arterial Rd., Enfield, Middlesex		14	Igranic Electric Co., Ltd., 147, Queen Victoria St., E.C.4		86	Shalless & Evans, Tranquil House, Tranquil Vale, Blackheath, S.E.3		254
Cossor Ltd., A. C., Cossor House, Highbury Grove, N.5		89	Iliffe & Sons, Ltd., Dorset House, Stamford St., S.E.1		7	Shawndel Tool Co., 99, Regent St., W.1		203
Cromwell (Southampton), Ltd., 32-33, Brintons Terrace, Southampton		76	Itonia Ltd., 58, City Rd., E.C.1		T27	Siemens Electric Lamps & Supplies Ltd., 39, Upper Thames St., E.C.4		31
Chorimet Radio Elec. Ltd.		215	Jackson Bros. (London) Ltd., 72, St. Thomas St., S.E.1		116	Six-Sixty Radio Co., 17-18, Rathbone Pl., W.1.		95
Dallas & Co. Ltd., John E., 6-10, Batterton St., W.C.2		T22	Johnson Talking Machine Co., 96, Clerkenwell Rd., E.C.1		T9	Simpsons Electric Co., Grange Works, Leyton, E.10		17
Darwins Ltd., Fitzwilliam Works, Sheffield		43	Kolster Brandes Ltd., Cray Works, Sidecup, Kent		63	Sinclair, Stafford, 49-50, Twyford St., N.1.		252
De La Rue & Co., Ltd., Thos., 90, Shernhall St., Walthamstow, E.17		6	Lampareux Electrical Supply Co. Ltd., 3, Dyers Buildings, E.C.1		18			
Dew & Co. Ltd., A. J., 33, Rathbone Place, W.1		T13	Lamplugh Radio Ltd., 177, Foleshill Rd., Coventry		219			
Diggle & Co., Alfred, Jane St., Rochdale, Lancs.		13	Lancashire Dynamo and Crypto Ltd., 94, Petty France, S.W.1		50			
Dubilier Condenser Co. (1925) Ltd., Ducon Works, Victoria Rd., North Acton, W.3		68	Lectro Linx Ltd., 79a, Rochester Row, S.W.1		87			
Duflecto-Polyphon Ltd., 2-3, Newman St., W.1.		T25	L.E.S. Distributors Ltd., 15-16, Alfred Place, W.C.1.		T14			
			Lissen Ltd., Worpole Rd., Isleworth, Middx.		72			

(Continued on page XIV)



The LATEST in COILS

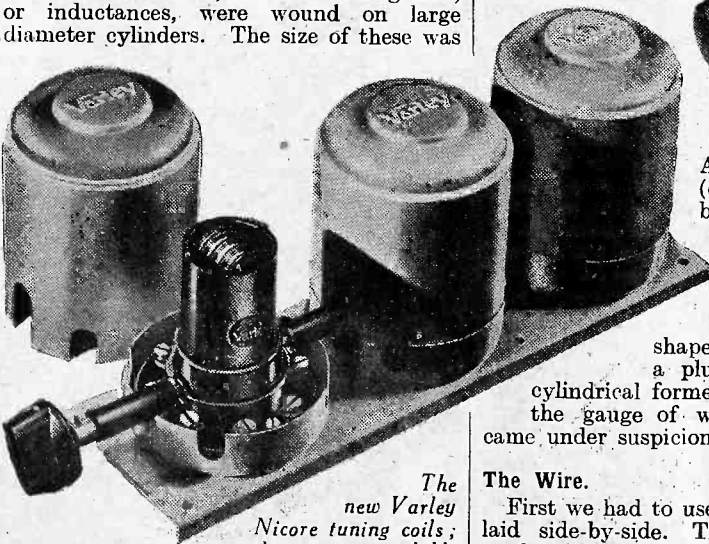


A Short Review of the Development of the Tuning Coil with a Forecast of the Coil of the Future. By W. J. DELANEY

A GLANCE at some photographs of old wireless apparatus will no doubt cause surprise to the amateur who is only just old enough to make his first acquaintance with a wireless receiver. The actual coil which I used on my first receiver in pre-war days took three days to make from sheets of brown paper. It took seven full-size sheets each carefully brushed over with shellac and wrapped round a large earthenware ink bottle. When each sheet had dried another was wrapped over it, and so on until finally I had a cylinder just over six inches in diameter and eighteen inches long. Thirty gauge enamel wire was wound round this, each turn touching until the cylinder was full, and this was a tuning coil! To select the amount of wire required to tune to a station a brass rod was attached to wooden end pieces and a brass slider was run along the wire with a bared portion to make contact (Fig. 1). It certainly worked, but what a contrast to the coil of to-day! Suppose we review the design which has been employed in tuning coils—what do we find? Quite a mixture of ideas, some of which have been introduced and hailed as ideal, only to be dropped and brought up again at a later date. Take, for instance, the actual former, or tube, upon which the coils were once wound.

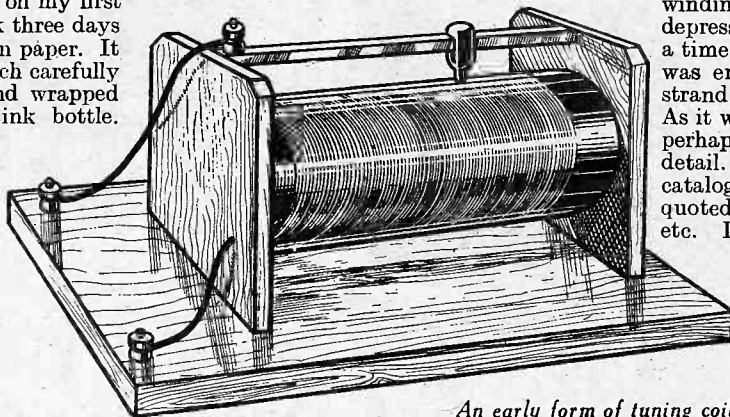
The Former.

As I stated above, the first tuning coils, or inductances, were wound on large diameter cylinders. The size of these was



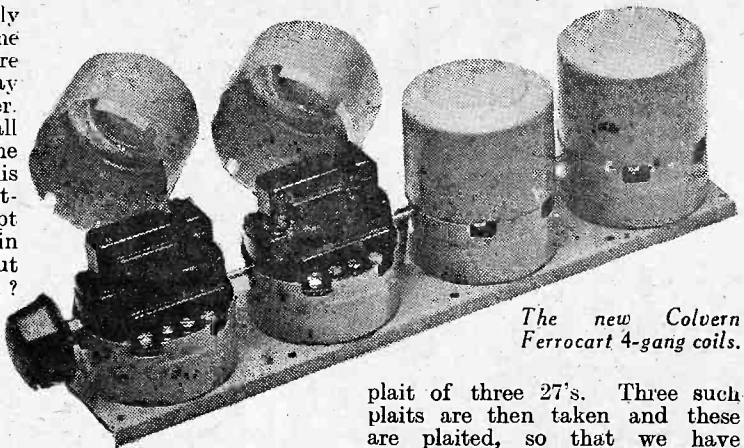
The new Varley Nicore tuning coils; they are available as single, double, and triple-gang units.

gradually reduced as the art "progressed," and there came a time when an "expert" (or it may have been a manufacturer!) stated that there were losses in the coil former, and the wire should be self-support-



An early form of tuning coil, which, compared with a modern coil, illustrates the progress made in ten years.

ing. Consequently from that time numerous ideas were developed to do away with the coil former. We are no doubt all familiar with the plug-in coil, and this was really the outcome of the attempt to avoid losses in a coil former. But what happened?



The new Colvern Ferrocort 4-gang coils.

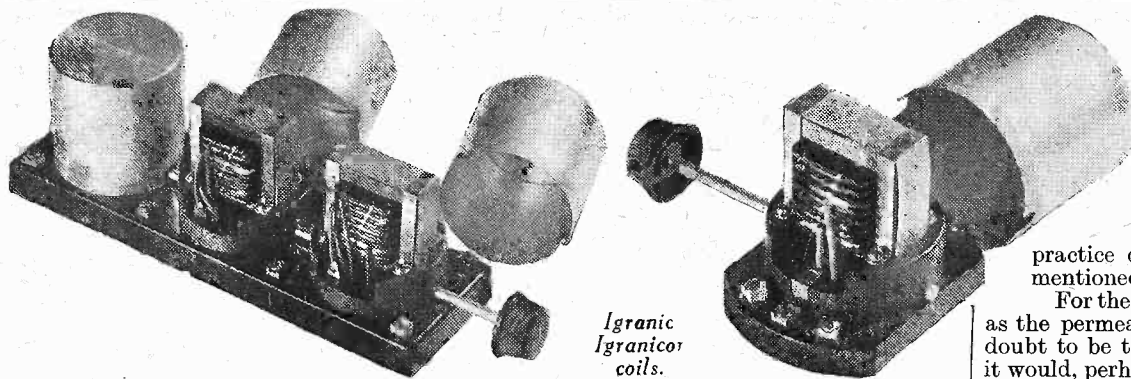
Another "expert" (or, again, it may have been a manufacturer) found that there were even greater losses in the coil when it was compressed into the shape which was utilised for a plug-in coil. Thus the cylindrical former was re-born. Then the gauge of wire which was used came under suspicion.

The Wire.

First we had to use thin wire, each turn laid side-by-side. Then thick wire was used. After a time it was found that better results were obtained when the wire was

"pile wound." Many interesting forms of coil winding were developed, and at least one coil which I made up was wound on a round wooden former, heavily coated with shellac, and when this was tacky the entire winding was transferred into a concave depression in another piece of wood. After a time a special type of wire known as Litz was employed. This consists of a multi-strand cable wound in a particular manner. As it will be referred to again later it would perhaps be as well to describe this wire in detail. If you glance at a wire-maker's catalogue you will see that Litz wire is quoted as being 9/27's; 18/36's; or 9/40's, etc. It will be noticed from these figures that the first part of the number is a multiple of three. This is the most important feature of the Litz wire, and this is how it is made up. We will take 9/27's. A strand of gauge 27 wire covered with a single covering of silk is taken and plaited with two other similar strands. This gives a

plait of three 27's. Three such plaits are then taken and these are plaited, so that we have actually nine separate insulated pieces of 27 gauge wire plaited in sets of three. The whole is then finally wound with silk so that it resembles a single wire except that the slight irregularities due to the plaited cord may just be discerned through the silk. This wire possesses a very low H.F. resistance, and there was a time when a coil of it was used for tuning purposes and the efficiency was certainly of a very high order. So high, in fact, that only one such coil could be used without very complete screening. Screening in this case does not mean the placing of a small can round the coil, but the erection of a large metal box at least four inches away from the coil in all directions. Such boxes were obtainable from some manufacturers at a cost of about 3/-!



Igranite coils.

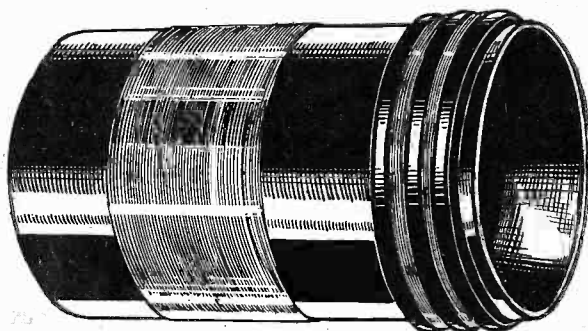
Back to the Former

What happened next? The former was still being used, but an "authority" ruled that ebonite was subject to losses and was not suitable for supporting an inductance coil for tuning purposes. Poor amateur! What was to be done now? A material was

soon produced—known variously, as Paxolin, Ivorlin, etc. This was better, and we began to settle-down. Suddenly, however, manufacturers of coils began to find that customers were returning coils because of crackling and similar noises, and it was found that the fine wire which was being

wound on these coils was being eaten away by some chemical in the former. We are now about the year 1932 and from what has been said the newcomer to wireless will gather that we were in a mess. That is, if we were doing everything we were being told. However, valves, transformers, and other parts of a receiver were also being subjected to alteration and improvement, and the coil became of less importance as it was possible to use an inefficient coil and make up for losses by employing a number of valves which by now were obtainable for 10s. instead of 30s. Thus, a return was made to the ebonite former, but now, owing to the fact that valves were easier to obtain, the coil was made of very small dimensions, put in a can to still further reduce its efficiency, and you had to buy two or three valves, and you got the results previously obtained with one large coil and one valve. Thus we "progress." However, perhaps I am painting a rather black picture. Actually, of course, other conditions were gradually getting worse, and it was essential to employ a number of tuned circuits or you were tuning-in several stations at once, and this could not be permitted. The large Litz-wound coil was not, by itself, selective, and tapping it to provide selectivity naturally reduces its efficiency. We are thus driven to employ two or more tuned circuits and consequently, if the valve is sufficiently efficient, there is no necessity to go all out for coil efficiency, so long as we get a reasonable pick-up. We were thus, at the end of 1932, in the position of using coils wound on a former of about 1in. in diameter, enclosed in a screening can, and which give an efficiency factor probably equal to an ordinary plug-in coil of the old days. Not so good as the Litz coil on a large diameter low-loss former, but better than a thin-

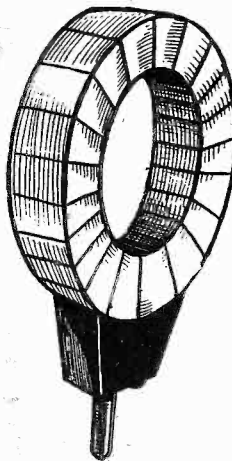
wire, badly wound coil on a cardboard tube. And, of course, we must remember that where two or more coils are being used they must be inductively separated, and this is easily carried out when they are in the cans, but difficult to carry out when not screened.



An early commercial cylindrical coil.

The Iron-core Coil

By the end of 1932 experiments had proved that a coil with an iron core was a pronounced possibility, and accordingly in the early months of this year we had the iron-core coil thrust upon us. The formers upon which these coils are wound is under an inch in diameter in most cases, and the wire is of the Litz type. The efficiency of these is undoubtedly of a high order, and many things are now possible. I have already dealt in these pages with this type of coil, and it now remains to try and visualise the further developments which the coils can make. Cannot the wire be removed altogether? This may seem absurd, but a careful study of the developments which have been made show that it certainly is possible. What of the tuning condensers? So far this has been a necessity, but with the advent of the iron-core this will be dispensed with next year. This is not a prophecy, but a definite fact, and the coil itself will be tuned by varying the position of the iron core. This has already been touched upon in these pages, and the system is known as permeability tuning. At the moment, however, the device is rather on the large side, but there is, no doubt, a method of making a smaller, and thus the receiving set will also be able to be reduced in size. But is there not another method of tuning whereby both the coil and the condenser



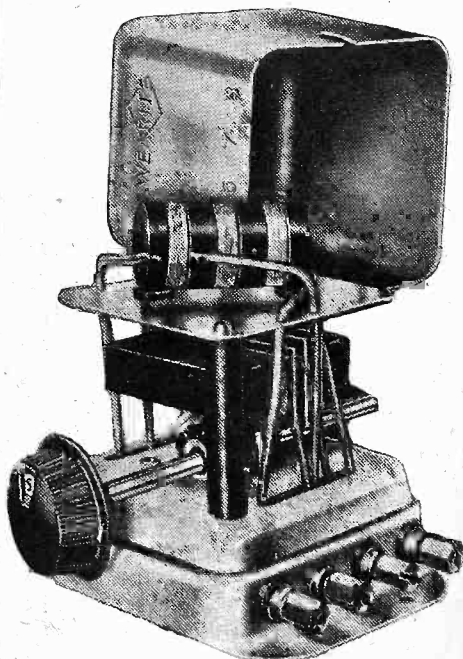
An efficient, but early type of plug-in coil.

may be dispensed with? As we are only half-way through 1933, it is useless to attempt to suggest that there is no other method, and it is just as likely that the tuning methods of 1934 may differ from those of this year by as wide a margin as does this year's practice differ from the methods first mentioned in this article.

For the benefit of the new reader, and as the permeability method of tuning is no doubt to be the next development in radio, it would, perhaps, be as well to give a rough indication of the arrangement as it is at present being developed in the majority of the manufacturers' laboratories. First of all, from what has already been said, it is obvious that the inductance of the coil is increased when it is wound round a powdered-iron core. Obviously, therefore, the withdrawal of the core will decrease the inductance. This naturally leads us to assume that it should be possible to tune

from say 200 to 600 metres by varying the position of the core in relation to the coil. Unfortunately, however, there are one or two difficulties which occur, and it is not simply

a question of taking a small core and a small coil and simply pushing the core into the coil. In order to obtain a straight line variation it is probably necessary to make the coil (or the core) of a certain definite shape and the mechanical side of the operation may then be simplified. Furthermore, once this particular shape has been decided upon it will be obvious to all that every coil will possess absolutely the same "law," and that such variations as now exist between, say, an aerial coil and a tuned-grid coil will no longer exist. This leads us further to the assumption that the ganging of three or more circuits will become absolutely simple and accurate, which will in turn lead to greater overall efficiency.



The new Wearite Nucleon iron-core tuning coil.

Where is DESIGN

A Critical Review of Some of the Improvements Which Have Been Introduced During the Past Year.

Leading?

THE present, on the eve of the Radio Exhibition, is to the wireless amateur rather like the end of March to the business man. The Show marks the beginning of a new radio year, and at the end of the old one we may find it interesting to review the events of the past twelve months, noting, among the numerous developments, those which have proved an immediate success, those which have quickly been superseded, and those which have opened out new fields for future exploration.

There is no doubt whatever that the radio year which is nearing its end has been a most remarkable one in every way and one that will stand out in wireless history as the most important in several respects. A greater number of really important inventions have been made than ever before in the same space of time. More difficulties have been successfully overcome and we are a good deal nearer to perfection. Despite this, our achievements have shown us that there is much more to be learnt and many new paths still to be pioneered. They indicate in which direction those paths lie, but only by further endeavours can we trace them and mark them out on the radio map.

“Straight” or Superhet?

But enough of similes; let us see just what our new knowledge means to us and how we can apply it to future progress. Dealing first with the types of receivers which have been most popular during the last year one cannot help noticing the growth in numbers of superheterodynes. Of all the various types of sets the superheterodyne has increased in numbers by the greatest proportion. Why? Chiefly, I think, because the question of selectivity has gradually become so much more acute. Simple sets with band-pass tuners, although perfectly good in their way, have been found far too unselective to cope with the more congested ether conditions, and the superhet is at the moment the only kind of set that can be said to tune sufficiently sharply to separate stations working on frequencies less than 9 kilocycles apart. During the past year it has often been said that the superhet is the only kind of receiver for the future. I am tempted to ask

“Is it?” And I also venture to reply “I doubt it.” As reason for this reply I would say that the new systems of tuning which are just coming into prominence will probably give us—for the next year at any rate—a sufficient degree of selectivity for our needs when used in “straight” sets. The latest iron core coils give amazingly sharp tuning, and with the perfection of permeability tuning (in which the variable condenser is dispensed with, and tuning accomplished by varying the position of the iron core), it is very probable that the ordinary “straight” three or four valver will be given a new lease of life.

To Buy or to Make

A question that has arisen very frequently during the past year is: “Is it worth while to build one’s own set when a really good ready-made one can be bought so cheaply.” Most readers of PRACTICAL WIRELESS will have no hesitation in replying in the affirmative, but there might be some who have their doubts. The person who builds his own set (assuming that it costs as much as the ready-made article) is much better off, though, because as the many novelties and improvements become known he can add them to his set at very little cost, whilst the owner of a commercial receiver is obliged to wait until the new season’s sets are available before he can enjoy the latest features. And features that are new

when the set is first bought may be rendered obsolete in a few weeks, or even in a matter of days. My meaning will be made more clear if I mention that thousands of home-constructors have already tried and adopted such things as Class B amplification, automatic volume control, iron-core tuning coils, high frequency pentode valves and numerous other innovations that have come into being during recent months. The user of a commercial set must wait until after the Show, however, before he can take advantage of them.

Class B and Q.P.-P.

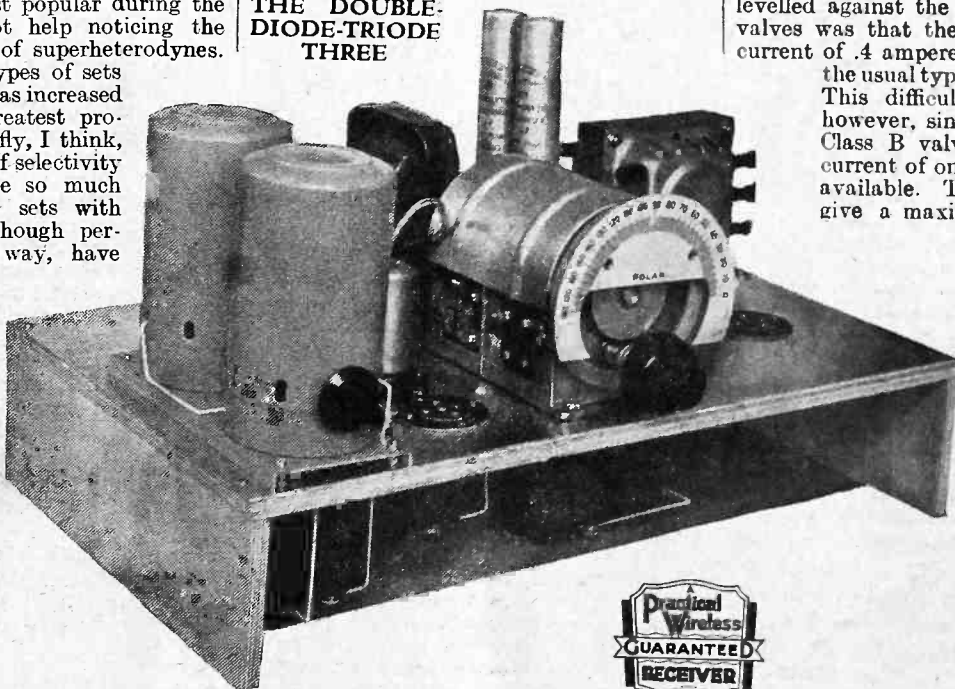
And now let us analyse the more important of the year’s developments and consider how they are likely to contribute to the future of radio. I do not know what you would consider the most important recent contribution to radio, but I should be inclined to vote for Class B amplification, which has brought the so-called humble battery receiver on to the same plane as the more luxurious mains set from the point of view of undistorted loud-speaker output. The average Class B valve when suitably operated will give an output of two watts, or twice as much as the smaller mains driven set can deliver. Class B has been in use for only a very short time, but has proved itself to be all that was expected of it, and entirely free from “snags” such as one often finds with new inventions. Perhaps the only objection that could be levelled against the first types of Class B valves was that they required a filament current of 4 ampere, or twice as much as the usual type of small power valve. This difficulty no longer exists, however, since a number of smaller Class B valves, taking a filament current of only .2 ampere, are now available. These smaller valves give a maximum signal output of

about 1 watt, and although this may seem rather low, it is quite as much as the average listener ever requires and is enormous when compared with the previously considered ample output of a few hundred milli-watts.

Whilst on the subject of Class B one might make reference to quiescent push-pull, the system of amplification which was introduced immediately prior to Class B. Q.P.-P.

(Continued overleaf)

THE DOUBLE-DIODE-TRIODE THREE



(Continued from previous page)

has, of course, the same primary objects as the system which followed it and might have become extremely popular had it not been found that Class B gave even better results in a simpler and less expensive manner. Although it marked a great forward step, Q.P.-P. had the shortest life of any radio development I can recall—not because it suffered from any serious fault but merely because contemporary progress was too rapid for it.

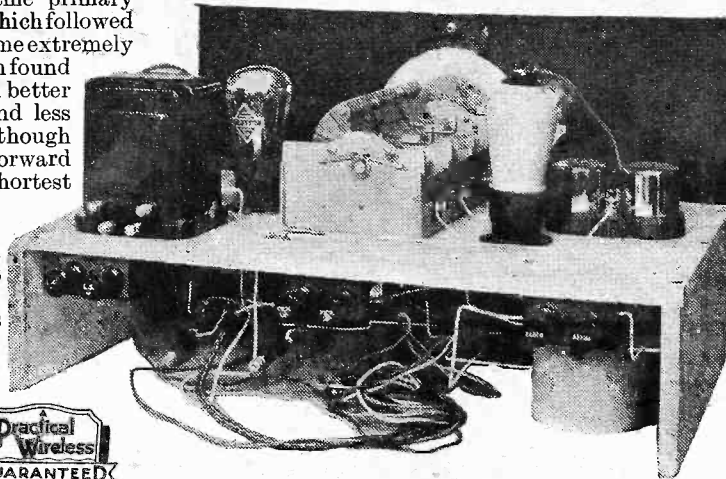
Automatic Volume Control

Automatic volume control has come very much into the limelight during the last year and has, in my opinion, though some may doubt it, a brilliant future. By maintaining the volume of sound reproduced by the loudspeaker at a constant level despite the fluctuating signal voltages picked up by the aerial system, it minimizes the greatest objection to long distance reception—fading, and prevents distortion caused by valves being overloaded by a nearby or powerful station. A.V.C. is particularly useful and important in a receiver designed for use in a moving motor-car; in fact, "car radio," as it is being called, is almost impossible without it, due to the fact that the signal strength picked up by the aerial varies enormously as the car passes under bridges, near to metal structures, through streets or over the open country. It is because of the increasing use of automatic volume control that several new valves have been designed during the past year. Double-diodes, double-diode-triodes, double-diode-pentodes and short-base variable- μ valves all owe their introduction to the development of A.V.C. and will no doubt be widely used in the future. The first three named serve the dual purposes of detector and automatic volume control, whilst the second and third do still more by functioning also as low frequency amplifiers. The fourth valve is useful in so far as its degree of amplification can be varied from zero to maximum by the application of a grid bias voltage of only slight variation. Because of this, the automatic volume control action is much more complete than when ordinary V.-M. valves are employed.

The "Cold Valve"

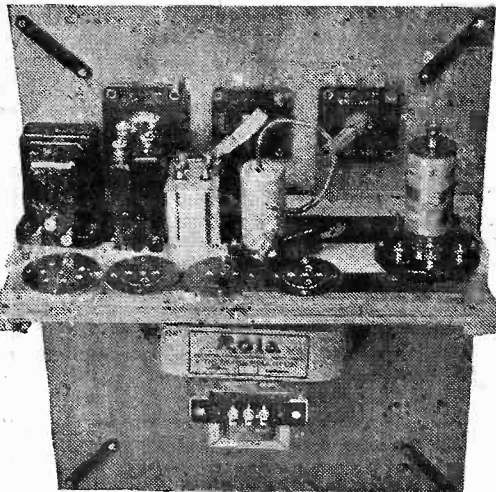
Another new device which at one time was considered to have a future is the "cold valve," or more correctly, the dry high-frequency rectifier. This is similar in construction to the well-known metal rectifiers used in A.C. eliminators, but is, of course, much smaller, and is intended for use with high or radio frequency currents. Having no filament to heat, and taking no high-tension current, the new H.F. rectifier is certainly economical, but for some reason or other has not become popular. The "cold valve" can be used very successfully in

THE FERROCART Q.P.-P. THREE



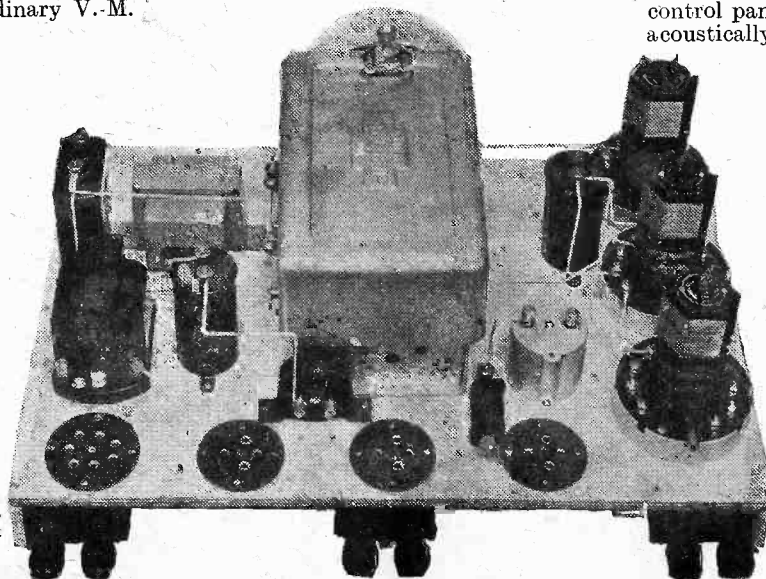
Rear view of a guaranteed "Practical Wireless" receiver, employing Ferrocart coils.

THE FEATHERWEIGHT PORTABLE FOUR



A.V.C. circuits, and one might think that this fact alone would be sufficient to ensure popularity. But it can only be used as a detector—it has no amplifying properties—and thus does not in reality effect any saving because valves are available which

THE BETA UNIVERSAL FOUR



will rectify and at the same time give a very large amount of amplification. Another defect of the dry high-frequency rectifier is that it has a comparatively low resistance and thus exerts considerable "damping" on any tuned circuit in which it is included. This can only satisfactorily be overcome by feeding the component through a specially designed step-down transformer or by connecting it to a "low" tapping on the preceding tuning coil. The dry H.F. rectifier is most efficient at the lower radio frequencies (longer wavelengths) and may thus be used most successfully as the second detector of a superheterodyne. At the present stage of developments, however, it is very doubtful if the "cold valve" will ever be used extensively; had it been possible to introduce it at an earlier stage it would undoubtedly have become a standard fitting.

All-Wave Receivers

Short-wave reception has become increasingly popular during the last year, chiefly due to the opening of the Empire Transmitters at Daventry, but also because of the extended use of short waves by stations in every part of the world. I think it is quite safe to predict that in future practically all broadcasting which is intended to be picked up over great distances will be carried out on short waves. This must inevitably lead to the perfection of receivers so designed that they will receive on all wavelengths from about 10 metres up to 2,000 metres. A few sets of this kind have already made their appearance and some of them have proved to be extremely efficient, but there is still room for considerable advancement in this direction.

Structural Alterations

Dealing with the general external design and appearance of receivers, only few changes seem to have been made during recent months, and sets of 1933 are not vastly different to those of 1932. The reason might be that designers have been too busy dealing with the "internals" to consider the less important aesthetic details, or that the appearance of present day sets meets with general approval. One change that has been made by a few firms, and which is likely to prove a popular one, concerns the position of the loud speaker in console type receivers. For some reason it became standard practice to have the speaker fret directly above the control panel, and though the system was acoustically satisfactory it had the disadvantage—in battery sets at any rate—of wasting a good deal of useful space. Some manufacturers are now using a cabinet which is long rather than high, so that the speaker can be arranged beside the set instead of above it. It is probable that this style will eventually be used by practically all makers of battery receivers, if not also by manufacturers of mains sets. Many improvements have been made to tuning condenser drives with the object of making them easier to read, and most of the 1934 sets will be fitted with "full vision" tuning scales. With these the whole scale is visible whilst a pointer moves

(Continued on page xii)



Items of Special Interest

IN order to assist those who wish to investigate developments in special directions, the following notes are classified under various headings, and it should be possible to read here brief details of certain developments or new components, and then proceed to the appropriate stand in order to examine the actual component.

LOUD-SPEAKERS

THE principal link in the chain of wireless reproduction is undoubtedly the loud-speaker, and in many receivers it is possible to fit a new loud-speaker without in any way altering the receiver circuit. A new speaker will, in quite a number of cases, give an old receiver a new lease of life, although it must be remembered that a good loud-speaker will show up faults in a receiver which are now not audible owing to the failure of the speaker to give a sufficiently straight-line response. For the smaller type of receiver—or for receivers intended for use in cars—the new Midgets will undoubtedly prove of great utility. The Grampian speakers in this class, for instance, have an overall size of 6½ in., with a depth of only 2½ in. They will handle 2.5 watts. In addition to this model there is the Sonochorde, the Amplion "Sonette," and several others. In all of these the quality of reproduction has definitely not been sacrificed in order to get a small type of speaker. Careful choice of the cone material, the centralizing device and the transformer ensure that the response curve is sensibly level over the normal range and there is nothing "squeaky" about them. However, a visit to the respective stands should soon convince you regarding the response and the volume which is obtainable.

The other type of speaker which will attract equal attention is the combined Class B Unit and Speaker mounted on the same chassis. The Ferranti is a very good example of this, being almost a complete receiver. The Rola is built up on similar lines, and other firms which are introducing this type of speaker include Epoch, Bakers Selhurst, Amplion, and Sonochorde. In most cases all that is necessary is to connect the present output terminals to the two input terminals on the speaker unit, and in this way your present set receives the addition of a Class B stage and a really good moving-coil loud-speaker. When it is remembered that the output of this combination is of the order of 2 watts, the improvement which is effected to an existing simple receiver is astounding.

Before finishing this section mention must be made of the new Grampian Dual Midget speakers. The Dual speakers are already well known and may be seen on the Celstion, Rola, Magnavox, and other stands, and they consist of two speakers mounted on one chassis, but they have different response curves. Thus it is possible to obtain a much greater musical range than is normally obtainable from one single speaker. For the convenience of the listener with limited accommodation, and for special cases, the Grampian Midget Dual has been introduced, and this measures only 13½ ins. long by 3 in. deep. It handles 5 watts and costs only 55s.

CONDENSERS

THE new types of variable condenser will appeal to many, and the principal developments in this direction may be seen on the stands of British Radiophone, Polar and Jackson Bros. The Radiophone condensers are very much smaller than have hitherto been obtainable, and represent a great improvement in condenser design. In the ganged type the trimmers are now situated on the top, and they are totally enclosed, making them thoroughly dust-proof with no dust-cover to get mislaid or lost. For short-wave work a special type of condenser is obtainable from this firm in either a single or a two-gang type. These are substantial components mounted on a thick steatite base. The new Polar condensers are more substantial than former models, and will also be found full of good points. A glance round the stands will reveal several other firms who have introduced or improved condensers of both the fixed and variable types, and the Peak fixed condensers on the Wilburn stand are worth close attention. These are made in several types, and will be found very cheap, especially in the tubular type. The Peak range of electrolytic condensers will also attract attention.

L.F. TRANSFORMERS

NATURALLY all the manufacturers of transformers will be found to have introduced special components for the recently introduced Class B method of working. In this connection we must draw particular attention to the Benjamin, Sound Sales, Multitone, Wearite, R.I., and Varley stands. On all of these will be found various types of input and output transformer. In some different types of Driver transformer are manufactured for use with the different types of valve, whilst in others the transformer is provided with tapings so that it may be used with any type of Class B valve. The prices vary according to the types. The Multitone components are, of course, especially designed for tone control, and this firm supplies a special potentiometer for connection to appropriately marked terminals on the transformer. When connected in circuit, this potentiometer gives a perfect gradation of tone from "all bass" to "all top," or, in other words, it is possible to accentuate just what part of the musical scale you wish. It is a most interesting device. A number of very small transformers may be seen, in which the core is of special material. The Igranico Parvo will probably be the smallest L.F. transformer on view, although the Bulgian Senator runs it very close. The R.I. new component, consisting of an auto-transformer and bearing the name Auto-parafede Transformer is also of the midget type and is also unconventional in design. In most of this year's transformers the quality will be found to have advanced over those of last year.

1933 MILESTONES!

- Quiescent push-pull amplification introduced to this country.
- Class B amplification introduced.
- Iron-core coils for tuning, and complete sets of ganged coils employing such cores, made available to the home constructor.
- Full-vision tuning scales.
- Shadow-tuning scales.
- Silent tuning.
- Automatic volume-control made possible by the introduction of new types of valves.
- Delayed automatic volume-control introduced.
- Quiet automatic volume-control introduced.
- Midget loud-speakers available for the home constructor.
- Permeability tuning reaching a practical stage, but not, at the time of going to press, in a state suitable for release to the public.
- All-metal receiving valves introduced.

COILS

THERE should be no need to remind the keen amateur that coils have undergone the most drastic changes during the past season. Now the majority of coils will be of the iron-core type, in which the iron core is made up from powdered iron held in suspension in some manner or other, according to the particular patented method adopted by the individual manufacturer. The Ferrocart coil was the original wireless coil to employ this system and will be seen on the Colvern stand in practically every type necessary in modern wireless practice. On the Varley stand may be seen some similar coils, but built up in a different manner. The Lissen coils, together with those manufactured by Messrs. Telsen, are probably the smallest yet seen for broadcast purposes. In the latter case especially the complete coil with screen is only 2 in. high. The former upon which the Lissen coil is wound is about half an inch in diameter. Messrs. Wearite and Igranico will also be showing this special type of coil, and literature obtainable on the stands will enable you to appreciate the improvements which may be effected in a receiver when these coils are employed.

In addition to the simpler types of iron-core coil there will no doubt appear at least one ready-made commercial type of permeability tuning circuit. This is a development of the iron-core coil above-mentioned, with the addition that the iron core itself is removable. The coil is wound to a certain value, and the core is arranged on some form of control so that the adjustment for wavelength is carried out by withdrawing the core, or inserting it into the coil. Thus the variable condenser is dispensed with; tuning may be made much sharper; circuits may be more accurately matched; the amplification of the circuit can be much higher, and, in fact, there are many great advantages for this form of tuning. Several attempts have already been made to design an efficient permeability tuner, but various little difficulties have crept in, and at the moment, at least, there is no efficient device of this nature available. By the time the Exhibition is upon us, however, progress will no doubt have been made and we shall see some form of permeability tuning on one of the stands. Whether or not this form of tuning will become so popular as to render the variable condenser obsolete, we do not know, neither do we attempt to prophesy.

VALVES

IF you have been following the progress of wireless during the past few months you will have seen that many new types of valve have been introduced. Undoubtedly to the majority the most interesting is the Class B valve. This, for the benefit of newcomers, is a double valve in which the well-known push-pull arrangement is employed in a novel way. As a result, no grid bias is required, and the single battery valve, for an average anode current of only 6 to 7 milliamps, delivers an output of approximately 2 watts. This is, of course, equivalent to the output of many mains pentodes taking 200 volts H.T. and consuming 30 milliamps or more. The other principal valve development is the Catkin valve, produced by the Marconi and Osram people. This is an all-metal valve absolutely unbreakable, and is obtainable in all the principal mains types. Another interesting new valve is the variable- μ H.F. pentode, and specimens of this may be seen on the Mullard, the Ferranti and other stands. On the Cossor stand may be seen a new valve bearing the name Double Diode Pentode. This is a special valve which performs the combined functions of diode detector, automatic volume control, and is itself a controlled L.F. pentode. A most marvellous piece of work. On the Ferranti stand may be seen a special type of valve known as the Heptode, which is a seven electrode valve performing the combined functions of H.F. valve, detector, oscillator, etc. It works wonders in a superheterodyne circuit.

TELEVISION

There is certainly a great interest in the subject of Television at the moment, and unfortunately we have not yet received any details concerning the Baird Company's exhibits. There will, however, be a most interesting exhibit by the Bush Company (Stand No. 64) consisting of a combined sound and vision receiver built on novel lines. Utilizing the mirror-drum apparatus, this receiver has the appearance of a grandfather clock, a method of construction which lends itself admirably to the fitting of a viewing screen at a suitable level for comfortable use. The loudspeaker is situated immediately below the viewing screen, and so lends the final touch to the illusion of reality. There will also be on view a constructor's kit by Messrs. Ferranti, for a receiver on totally new lines. Hitherto the scanning disc or the mirror-drum has been the most efficient method of receiving the television transmission, and in fact of transmitting it also. The cathode-ray tube has also been adapted for use in the reception of television, although it has not been greatly successful. The new system is at present rather obscure, but from what we have heard it introduces a completely new method and is anticipated to give results greatly superior to any method which has yet been employed. The fact that Messrs. Ferranti are marketing the receiver tends to show that there is likely to be some novelty and good promise in the receiver, but as at the moment no full details are available, we must wait until the Show.

SUNDRIES

THERE are numerous other small items which will well repay inspection, and although it is not possible to deal with every one, it should not be difficult to find any item you particularly require from the Guide to the Show which was published in last week's issue. If, however, you are in any doubt whatsoever, ask one of the staff in attendance on our stand. Remember the number—8.

"LITTLE and good" is an expression which has special significance for the radio listener, and particularly for the listener who has but a modest amount of money to spend upon his equipment. In such circumstances, limits must be set somewhere to the capabilities of the receiver; and it is something of a problem to know just where those limits should be applied.

Ultimately, of course, the decision must rest with the individual listener, but it is only fair that a clear statement of the various alternatives should be placed before him. Briefly stated, the subject for discussion is: Inexpensive radio, its possibilities, and what to choose.

By the term "inexpensive" may be understood inexpensive in the first cost of the equipment, or inexpensive to run, or a combination of both, the last mentioned being, possibly, the ideal. It is possible to purchase or to make a very inexpensive outfit which, however, may be much more costly in operating charges, battery consumption, renewals and repairs, than another, apparently similar set, costing a few shillings or pounds more. Thus, the saving in initial cost may be lost over and over again in the first year or so of use—a very unwise and expensive "economy."

A Guiding Rule

The first guiding rule, therefore, in inexpensive radio, is to use the best possible materials—whether ebonite, or wood, or wire, or components such as transformers, condensers, valves or batteries. Even if this means that you must content yourself with a simpler or less powerful equipment, the sacrifice in this direction is well worth while—let "little and good" be your motto from the start.

This brings us, however, to the crux of the whole question. Low first cost, coupled with due economy in running expenses, provided these can be allied to trouble-free service, are very obvious advantages; but the ultimate test of any radio outfit must be the performance it gives by way of programme reproduction. Now programme reproduction can be gauged in terms of three factors: first, the number of

stations which the set can pick up at reasonable volume; second, the quality of the musical reproduction; and third, the average volume of sound.

It may be taken at once that in an inexpensive set—and in this connection is meant not necessarily a very cheap set, but a set of moderate first cost and reasonably economical to operate, it is not possible to obtain world-wide reception, plus perfect quality of reproduction, plus "public address" volume.

At least one of these features (generally two) must be sacrificed if the interests of economy are to be served. This statement must not be taken to mean that it is utterly impossible to combine range, quality, and volume in one receiver—it can be done, but at a cost which the average listener cannot afford.

Alternatives?

What, then, are the alternatives? Let me state them in what mathematicians would call "descending order of range." For a reasonably low cost you could provide yourself with either: (1) a long-range receiver capable, in favourable circumstances, of receiving anything up to a hundred stations, but giving reproduction which not even the most optimistic could pronounce even fair; (2) a receiver, which, under good conditions, will give you a dozen or more stations at tolerable quality and useful volume; (3) a set primarily designed to receive the local or alternative stations and to give reproduction which leaves little to be desired on the score of either quality or volume.

The above, of course, is only a rough classification, for types of apparatus are innumerable, and the different classes merge imperceptibly into each other. For example, a modification in the output stage of one set, or the substitution of a better type of speaker, may result in that outfit meriting promotion to a higher class. Or, by spending just a little more money, the range quoted



By H. J. BARTON CHA

in the second class just mentioned may be associated with the high-quality characterising the third class.

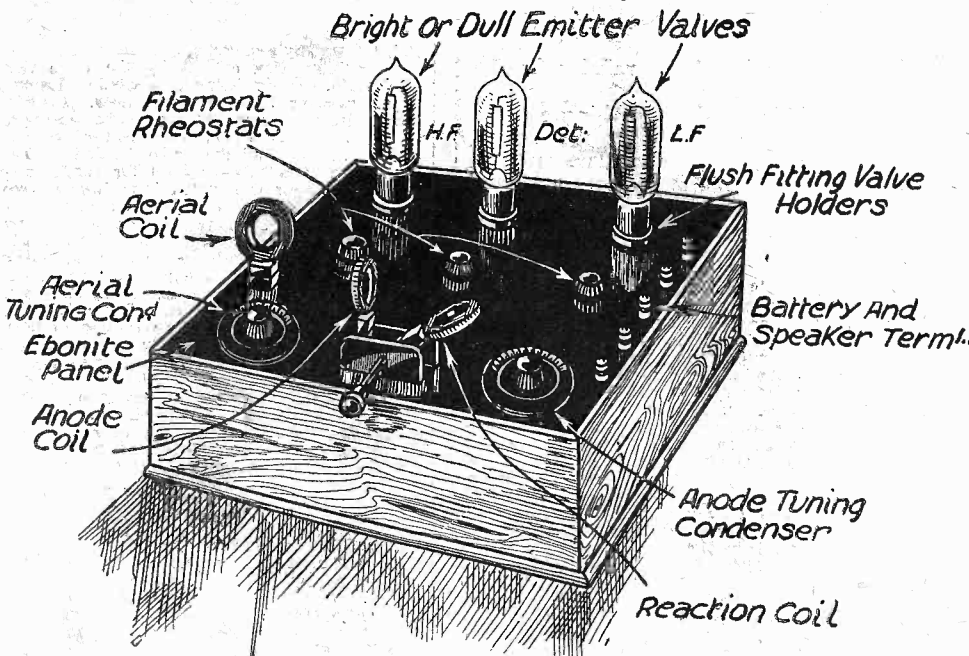
The suggestion I wish to make, however, is that every listener who has to study economy—and who has not?—should apply the axe to range rather than to quality. Good reproduction at any price, but distant reception as a very secondary consideration, is my sincere advice. The reason? Well, in the first place we must not forget that the broadcast service has been designed for the enjoyment of programmes first and foremost, and not as a medium for showing the paces of scientific apparatus which, if not perfect, are highly ingenious. So that if we accept broadcasting for what it sets out to be, and what it is—the finest and cheapest form of entertainment—we might as well enjoy it to the full, and this can only be done by the use of apparatus which reproduces the programmes with the minimum of distortion.

Your Achievement

In this connection, the technically-minded listener is often apt to forget that he is probably the only member of the family who is at all interested in the experimental side of radio, or in long-distance reception. The majority of the family, and certainly all the ladies, want radio for listening to the local programmes. They seldom thank you for installing a complicated set upon which you can bring in programmes from foreign countries, and they do not enjoy the foreign programmes when they hear them. But they will be full of gratitude if your new season's set will always give them the alternative local programmes, and, perhaps, one or two of the best foreigners, with quality better than they have ever heard before.

Again, I fully believe that the thrill experienced by many at a goodly bag of foreign stations is the thrill caused by the achievement. It is not the foreigners, but it is having brought in the foreigners, which counts. Well, then, let your thrill be that of having achieved better reproduction. I judge that, to be able to boast that your reproduction is as near perfect as can be achieved, should give you quite as much satis-

An Early Home-Built Receiver, which gave Quantity—But Not Quality.



FOR Q
YOU
USE A
SPE
AND
VA

QUALITY for QUANTITY

Wh.Sch., B.Sc. A.M.I.E.E.

faction as to be able to boast that you have logged more stations than anyone else in the road.

Finally, if further argument is wanted, let me point out that if you now sacrifice quantity for quality and put in a set which will do ample justice to the excellent fare provided by the local station, you have the nucleus of an equipment which can be extended for long range work at any time, whereas if you expend your limited funds on a cheap set which will bring in half the world and appal your ears at the same time, nothing on earth short of rebuilding entirely will give you really enjoyable quality.

Quality Features

If, after having read so far, you are convinced that the thing to do is to go in for high quality reproduction, you will now be wanting some practical recommendations. What, you may ask, are the features of a "quality" set? The following suggestions cannot pretend to cover the ground more than superficially, and fuller investigation must be left to some future occasion, when it may be possible to show how quality is affected by each component and stage. Also, I am engaged in designing a PRACTICAL WIRELESS quality receiver which will appear in a forthcoming issue.

First of all, let us consider the valve arrangement. While adequate volume can be obtained from the local station, even if situated some fifty miles away, by a set having no high-frequency stage, I very much favour the use of one high-frequency screened-grid valve in the first stage. The reason is that with the greatly increased number and power of broadcasting stations, a very considerable degree of selectivity is required in order to free even the relatively powerful local transmission from interference. The use of a high-frequency stage before the detector introduces at least one extra tuned circuit, thus greatly increasing selectivity. Moreover, such a device as a series aerial condenser is a useful aid to selectivity, but imposes some loss of signal strength which can be made up in the high-frequency stage.

I would strongly advise that the high-frequency valve be of the

variable- μ type, so that, when listening to the local stations, the acceptance of the valve can be increased by increasing the grid bias. This will avoid any risk of distortion in the high-frequency stage, the point at which quite as much distortion is introduced—so far as my own observation is concerned—as in any other two stages put together.

Obviously, the next valve will be the detector, and here good signal handling capacity is of vital necessity if quality

reproduction is the main aim. My personal opinion is that a power grid detector, a diode or a dry rectifier is extremely good. Any reliable make of valve of the H.L. or detector class, carefully operated according to the makers' recommendations for power grid detection, should be free from suspicion. In this connection, the correct values of grid leak and grid condenser are important, and plenty of H.T. volts.

A set having one high-frequency stage and used for the reception of the local station should not require any reaction. If I were building such a set I would not fit any arrangements for boosting the signal in this manner. As, however, most commercial coils incorporate a reaction winding, you may feel inclined to put in the necessary differential reaction condenser. Keep it "all out" however, when listening to the local station, reserving the use of reaction for those occasions when you cannot resist the temptation to search around for a few foreigners.

On the L.F. Side

Now for the low-frequency side. If high-tension supply is plentiful, that is to say, if your set is mains-driven or you are using a battery eliminator with a normal battery set, I would advise a good big super-power triode for the output stage. In all probability your high-frequency and detector combination will give you ample signal voltage to operate such a valve with a good aerial, but if you are doubtful you can interpose a further low-frequency stage.

My reason for this choice is that such a valve has a very large maximum undistorted output. Note, please, that this does not necessarily mean big volume, but you must remember that the signal voltage at the low-frequency grid corresponding to a really loud passage in a normal programme is from three to five times as great as that corresponding to an average passage

of music. Your output valve, therefore, must be capable of handling without distortion, these sudden and infrequent bursts of strong signal—and only a valve having "super power" characteristics can do that. So let it be a super-power triode for preference. Failing this, a large pentode will handle quite a respectable signal, but to be on the safe side, a volume control of the potentiometer type following the detector is advisable, to prevent over-loading.

Should high-tension economy be a very important point—if, that is to say, you must depend upon dry batteries, use Class "B" for your output stage. You will thus obtain all the benefits of signal handling capability possessed by a super-power valve, but at far smaller cost for high-tension.

Tone Control

With Class "B," however, as also with a pentode output valve, the distinctive quality of the output is different from that of a triode. This is because both these classes of valve have a greater response to the high notes than a triode, and in comparison the reproduction seems a trifle shrill and high pitched. The question of tone control must be left to your own individual judgment. In this connection much depends upon your loud-speaker, in fact, the output stage, from the quality point of view, must be considered as a combination of output valve and speaker. Possibly your particular moving-coil loud-speaker, in conjunction with a pentode valve, gives a quality which appeals to you. If not, a tone control in the form of a condenser and resistance in series connected across the output terminals can be used and adjusted until you obtain the quality you desire.

If you are seriously out after good quality, do purchase a high-grade moving-coil loud-speaker. Really excellent permanent magnet instruments, which leave little to be desired, can be bought at a reasonably low price. Give it a fair chance by providing a large and thick baffle, and spend a little time experimenting to find the most satisfactory position in your room for it, if it is not incorporated in the set itself.

The Famous "Fury Four"—Quantity and Quality Combined.



Practical Wireless
GUARANTEED
RECEIVER

A FEW HINTS— WHICH MAY— (OR MAY NOT)— BE HELPFUL TO THOSE VISITING THE EXHIBITION!

WHAT TO WEAR.



OLD SCHOOL COLOURS

VERY SUITABLE ATTIRE. (N.B. SPATS ARE NOT GOOD FORM!)



NEAT AND SERVICEABLE.



HORN RIMS WITH OR WITHOUT GLASS— GIVE ONE THAT TECHNICAL AIR.



FOR THE FAIR SEX! A CHIC ENSEMBLE WITH DINKY POCKETS FOR PAMPHLETS AND CATALOGUES.

GETTING INTO THE SHOW.

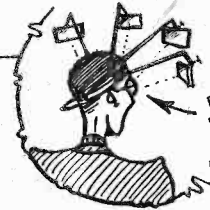
EITHER PAY 1/6



JUMP THROUGH THE ROOF



WALK IN BACKWARDS— (THEY'LL THINK THAT YOU'RE COMING OUT)



FOR AMERICANS— & THOSE IN A HURRY! A NEAT DEVICE WHICH ENABLES ONE TO INSPECT FOUR STANDS AT ONCE.

IT'S DANGEROUS TO WAKE HIM



OR PRETEND THAT YOU'RE SLEEP-WALKING!

AIN'TS ON DEPARTMENT.



* THE BASS RESPONSE IS PUTRID!

TALK TECHNICALLY * THIS REMARK IS ALWAYS PRETTY SAFE!

AN UNCONTROLLED VOLUME OF LIQUID TRANSMISSION AT GREAT FREQUENCY, MISS!



WHEREVER YOU ARE!



DON'T STRIKE MATCHES ON THE STAND ATTENDANTS

WAS THAT QUITE NAICE OF YOU, OLD BOY?



THEY MAY OBJECT!

INSPECTING THE EXHIBITS.



I TOLD YOU THERE WERE SEVEN VALVES, SIR!

I THOUGHT THAT THERE WAS ONLY ROOM FOR SIX!

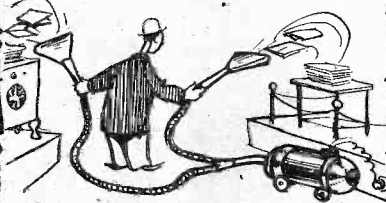
HAVE A LITTLE FAITH!

COLLECTING PAMPHLETS.



PROCURE A TROOP OF SCOUTS

OR ELSE USE A VACUUM CLEANER!



BE PREPARED!

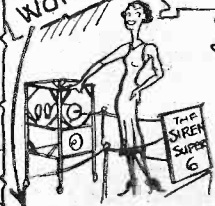
GO!



& LEAVE IT TO THEM!



A FINAL WORD!



WHAT DO YOU THINK OF THE CHASSIS CONSTRUCTION SIR?

MARVELLOUS!

KEEP YOUR MIND ON WIRELESS!

Arthur Ashdeley '33

What Set Shall I Build?

An Article Intended Primarily for the Newcomer to the Ranks of Home Constructors.

By W. B. RICHARDSON.

WITH the extraordinary number of new ideas and inventions which have been introduced into the radio world during the past year or so it is small wonder that those who are contemplating building new sets should have some difficulty in selecting the right type, especially as some radio journals seem to delight in bringing out a new set for each new gadget which is invented.

To the keen amateur the rapid appearance of Q.P.-P., Class B, iron-core tuning coils, Catkin valves, double-diode-triodes, D.D. pentodes and so forth must, to say the least, appear somewhat bewildering. It is only natural that he should ask: "When is it going to stop? When will there be a lull in order that I can look around and decide just what type of set I shall build for the coming season?"

Well, the answer is that the stream of progress will certainly not stop. No doubt it will slow down somewhat after its recent hectic flow, but it is no use waiting with the idea that things will settle down to a condition of little change. They will not. On the other hand it is just as foolish to endeavour frenziedly to keep abreast of the tide by building the very latest receiver as it comes out. *There is no sense in building up the latest set if it is of a type that does not meet your requirements!*

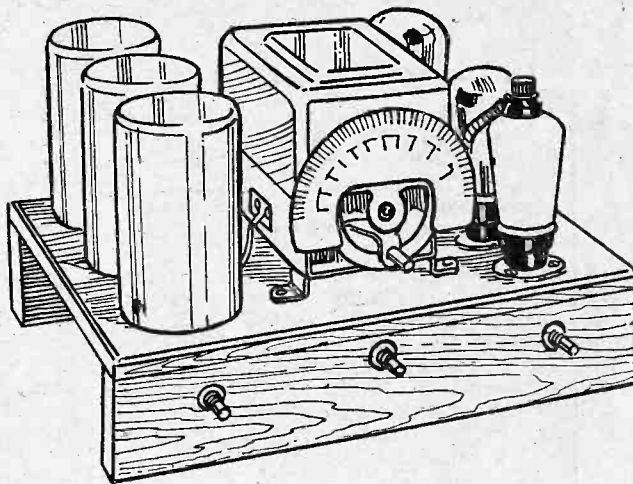
Deciding Your Requirements

The choice of the kind of set will depend on the following considerations. Firstly, what you expect from it, secondly local conditions, and thirdly the price you are prepared to pay. These three factors are, of course, largely interdependent so that each must be considered in relation to the other two. However, let us take the first. By what you expect from your set I mean not only what programmes you will want to receive but at what volume; whether you will want to move the set from room to room or take it away from home; whether you will want to combine a gramophone with it and so on.

Many people make the mistake of over-estimating their requirements. Like the motorist who says he wants a fast sports car and then potters along at 30 m.p.h., so they demand a long-range receiver and then keep it tuned to the local station, or else they ask for volume when all they want is purity of tone. If you are content with, say, a dozen alternative programmes,

and you will probably know from past experience just how much the foreign stations interest you, it is only a waste of money to build a seven-valve superhet. A three-valver would probably be quite adequate. Of course, if you happen to be situated so near the local station that nothing but the most selective receiver is

Q.P.-P. or Class B output if you do not want large volume. If, for instance, the set is going to be installed in a small room where an ordinary pentode or small-power valve would give a sufficient body of sound, then Class B would be quite unnecessary. Many people apparently do not realize that Q.P.-P. or Class B is essentially a system for obtaining comparatively large volume for a modest H.T. consumption. When delivering only a small volume it is no more economical than a single high efficiency pentode, and of course there is the extra initial cost.



The wooden chassis style of home-built receiver, which makes use of the cabinet front as a substitute for the panel.

of any use, then a superhet will not be an extravagance but a necessity. However, under average conditions a three-valve set (S.G., det., pen.) will be well capable of giving you your dozen stations at moderate loud-speaker strength. Under favourable conditions it will give you many more.

Many people are satisfied with the two alternative programmes provided under the regional scheme. In their case, a good two-valver will meet their needs, providing they are prepared to erect a small aerial (preferably out of doors).

Q.P.-P. and Class B

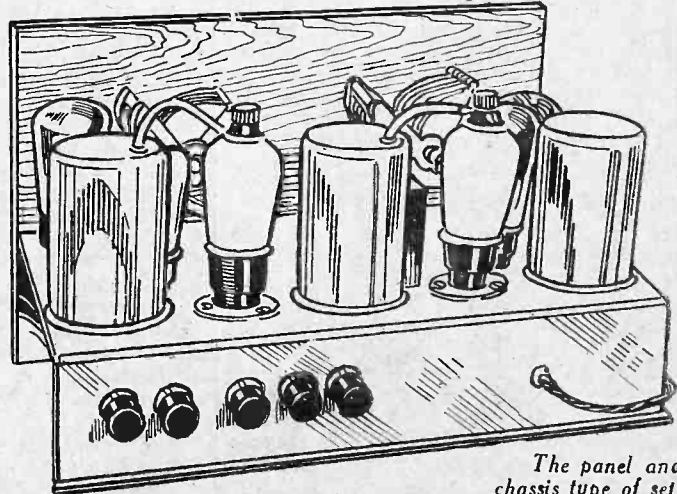
Over-estimating one's needs regarding range is perhaps more common than over-estimating the volume required. However, it may be just as well to remind you that in the case of a battery set there is nothing to be gained by using

Do You Want Quality Reproduction?

Range and volume are not the only matters to decide in determining what you expect of your set. There is the question of quality of tone, portability, ease of control, etc. Unfortunately these things are not always compatible with one another. For instance, the demands of portability are such as to limit the choice of components to the lightest and smallest, and in the case of the speaker and batteries particularly, this is not inductive to the finest reproduction, nor is the fact that the speaker cone is usually placed in close proximity to the valves and other components. If, therefore, you demand portability you must not expect too much in the matter of tone.

If good quality reproduction is the chief qualification of a radio set in your opinion, and personally I think it should be, then the following points will be a guide to the

(Continued overleaf)



The panel and chassis type of set.

(Continued from previous page)

kind of specification to aim at. (1) Mains operation (or super-size batteries where mains are not available). (2) Band-pass tuning, or some form of tone-compensation where knife-edge tuning is employed. (3) Limited reaction. (4) Volume control, if employed, to be of the variable-mu type. (5) A tone control. (6) A good moving-coil speaker.

Let us see the reasons. (1) With mains operation there is no risk of the operating voltages dropping below the optimum values and so causing distortion as often happens with overtaxed or rundown batteries. (2) Band-pass tuning will avoid attenuation of the high notes due to side-band cutting, although at the same time a set employing ordinary loose-coupled, sharply-tuned circuits is quite suitable providing some form of tone compensation, such as a transformer with a rising characteristic, is employed. (3) By "limited reaction" I mean that the reaction control must not be capable of bringing the circuit anything like near oscillation point, or alternatively that it should be used with discretion because the full use of reaction always tends to sharpen the tuning and so cut off the high notes. Of course the variable tone control could be adjusted according to the degree of reaction employed but many would consider this an unnecessary addition to the task of tuning-in. (4) For the average three- or four-valver where a volume control is necessary, variable-mu is the best, as it does not introduce distortion. (5) The provision of a tone control may appear somewhat of a luxury, but here again if you are all-out for quality it is really worth while, quite apart from its use in compensating for high-note loss when reaction is used. (6) I suggest a moving-coil speaker because a good one will give you the best reproduction possible. Incidentally, if it is a question of cost I have usually found that it is better to buy a first-class moving-iron speaker of the inductor or balanced-armature type than a very cheap moving-coil instrument.

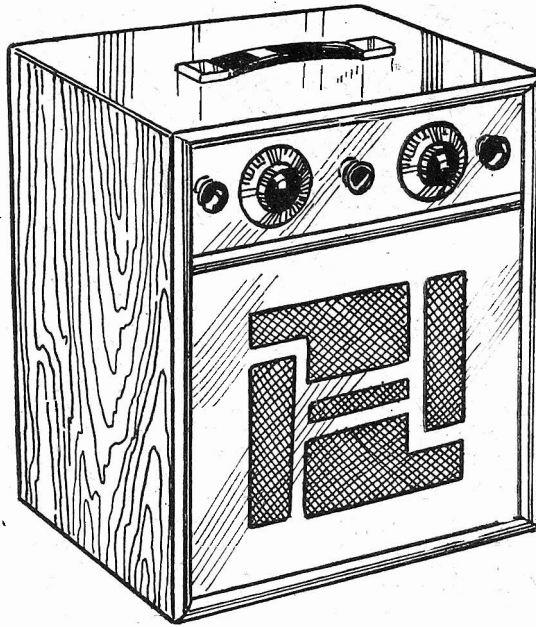
Local Conditions

Having decided on what you expect from your new receiver, you will have to consider your local conditions, for on these will depend the type of set which will be needed to carry out your requirements. The third factor, namely, cost, will, of course, enter into the question, but as this will hardly be overlooked I will not dwell on that point. Obviously, if your ambition is a seven-valve super and your pocket says a two-valver, then you will have to modify your ideas accordingly. Now, about these local conditions. Under this heading I would include the following:—

- (1) Proximity to the local broadcasting station.
- (2) Facilities for an aerial.
- (3) Power facilities.

Let us consider these in order. On the distance you are from the local station depends largely the question of selectivity. Generally speaking, if you are five to fifteen miles from the "local" and you want to get "plenty of foreigners" then you will need a set with a minimum of three tuned circuits. There may be one H.F. stage with band-pass input and a single tuned intervalve coupling, or there may be two H.F. stages with three single tuned circuits. There is not much to choose

between the two arrangements as regards selectivity, although the latter usually gives greater range. The first method can be employed in a three-valver (one H.F. stage, detector, and one L.F. stage),



The all-in transportable style of cabinet.

but the second is usually to be found in a "four" (two H.F., detector, and one L.F. stage). The three circuits will have to be ganged. The decision as to whether to use a three-gang condenser or a two-gang and a single condenser rests with you. The three-gang allows of one-knob tuning, but the other allows of slightly finer adjustment. Examples of recent designs employing the two different methods are to be found in the Radiopax Four and the Fury Four. The former utilized a 3-gang instrument while the latter proved a remarkable station-getter using a 2-gang condenser for the aerial and first intervalve circuit with a separate condenser for the detector grid circuit.

Iron Core Coils ?

If iron core coils are used, the selectivity and range should be of a very high order, but the very fact of the coils being so selective necessitates perfect ganging so that care must be taken to see that the ganged condenser is a first class instrument and that the wiring is properly balanced. Of course, if you follow any of the designs published in these pages you may rest assured these points have been carefully studied. The danger lies rather in deviating from the specification. For instance, it may appear to be economical to use up an old condenser of out-of-date design which you may have by you instead of buying a new one, but it is more than likely to be quite unsuitable since the ganging of some of the earlier models was not carried out with the degree of accuracy demanded by these new type coils.

If you are situated very close to the local broadcasting station or some other form of interference such as a commercial station, then a straight set employing as many as four tuned circuits may be necessary, or alternatively a superhet.

Now let us consider the aerial question. At one time it used to be said that to raise the aerial ten feet was as good as adding another valve to the set. There was certainly some truth in it, but the point is

that the performance of a set is very considerably affected by the type of aerial system used and, therefore, in deciding on the type of set to build due consideration must be given to this point. If you object to an aerial you must allow for the reduced pick up provided by a frame contained in the cabinet. This will mean that to get the equivalent range of, say, a three-valver with outside aerial you will need a "four" or even a "five" with a frame aerial.

Battery or Mains ?

The question "Shall I build a battery or mains set?" is almost synonymous with "Have I electric power available or not?" for nowadays mains equipment is so perfected that there is no more reason why a battery set should be employed in an electrically equipped house than that oil lamps should be used for lighting. Therefore, by all means go ahead and construct an all-mains receiver if you have electric light in the house. The extra initial cost of the set itself will be counter-balanced by the saving in running costs, to say nothing of the convenience and the certainty that there are no batteries to run out at just the wrong moment.

To conclude these remarks on "what type of set to build," let me summarize with the following suggestions. To the man of modest means: Build a straight

two-valver, either battery or mains operated. To those desiring a dozen or so alternative programmes at moderate volume—a straight three (S.G., det., pentode), with the usual two tuned circuits. For greater selectivity a similar set with three tuned circuits, while those desiring a little more "punch" should build up a four-valve set. This in the case of a battery set should have Class B output, which will assure "mains volume" for a reasonable current consumption. The five-valve straight set with, say, four tuned circuits will be reserved for the DX enthusiast or for use where a less powerful set is inadequate owing to unfavourable local conditions. For consistent reception of distant stations a superhet with automatic volume control would be ideal.

If you want a set which will provide music for dancing then considerably greater volume than is normally required will be necessary. This means that for a large room a set with an output of several watts will be needed, or alternatively you could construct a separate amplifier to plug in to your set when required.

WHERE IS DESIGN LEADING ?

(Continued from page VI)

across it; this is just the reverse of the previous arrangement where the scale moved over a pointer and only a few degrees could be seen at the same time. Another important feature will be the marking off of the tuning scale not only in meaningless degrees but also in wavelengths or frequencies.

By way of summing up one might say that 1934 receivers will be very greatly in advance of their immediate predecessors, and will probably set a standard that can be maintained for a few years to come. Further developments are inevitable, but it is most unlikely that 1934 will see so many drastic and important changes as 1933 has done. Whatever happens, the readers of PRACTICAL WIRELESS will be kept well informed, as they have been in the past.

1934 RECEIVERS

An Attempt to Visualize the Type of Receiver which will be Developed During the Forthcoming Year. A Rapid Review by the Technical Editor

It is always rather foolish to attempt to forecast events, and the wireless art is in such a condition that one does not really know to-day just what to-morrow may bring forth. Who, for instance, could have foreseen the developments of the present year? In attempting, therefore, to describe the receivers of 1934 it is quite possible to hazard guesses at some of the things which might appear and yet which may, although unknown to the majority, already be well past the experimental stage in some laboratory. On the other hand, there may be inventions as yet unthought of which will cause as great a change in 1934 receivers as had been caused in the 1933 receivers by the arrival of Class B and iron-core coils.

The Superhet

It is almost certain, and I do not think I shall make a mistake here, that the superheterodyne circuit will be the most used in next year's receivers. The principal reason for this is, of course, the congested state of the ether. With the rumours that certain countries will not follow the advice of the controlling body, and will use just what wavelength and power they please, an even worse state of affairs may come to pass. Even at the present time, with allocated wavelengths and power, there are several points on the medium waveband where two or even three stations may be heard at once, on even the most selective receiver. The superheterodyne circuit is—at present at least—the only arrangement which can be adjusted so that stations working on even an abnormal separation may be separated.

The quality of reproduction suffers, of course, but it is fairly simple to fit tone correctors to make up for this loss. There are already four valve types available which render the construction of a circuit of this nature possible with a maximum of five valves—the complete circuit being then equivalent to a 10 valve super of three years ago. Such valves as the pentagrid, the double-diode pentode and the variable-mu H.F. pentode will need no introduction to our readers, as they have

rectification is provided. The heaters of the special valve used are rated to provide an adequate load with either method of supply. Unfortunately these valves are not available in this country yet, but next season may see their production. In America, the great utility of this type of circuit has led to the development of very small receivers, officially styled "Midgets," but which have received from the American public the nickname of "squeak-boxes." Measuring only about 10 by 8in., with a

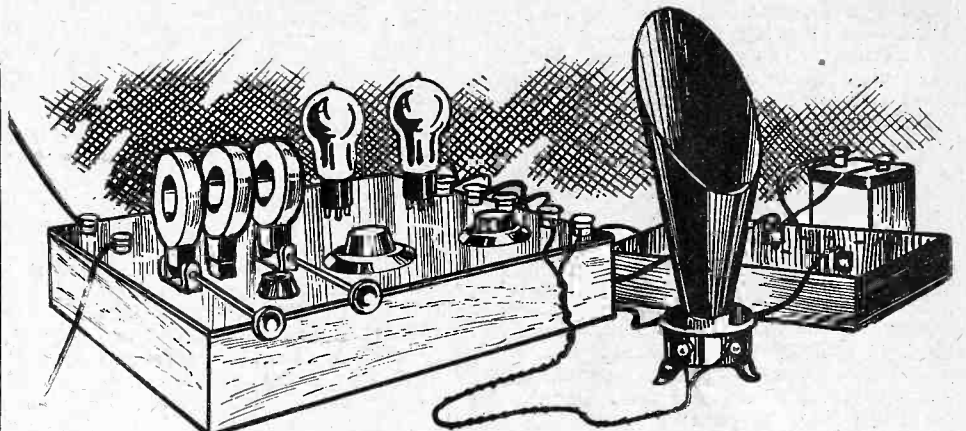


Fig. 1.—One of the earliest complete broadcast receivers.

already been described in these pages. Of course, at the moment such a receiver would be only mains driven. The battery receiver has not yet approached this standard. Before dealing with battery-operated receivers there is one other type of mains receiver which must be anticipated.

Universal Receivers

This type of receiver originated in America, but would be of great use in England. It is so designed that it may be used on D.C. or A.C. mains without any circuit alterations. A special valve, or a metal rectifier, is included in the mains input, and on D.C. this acts simply as a resistance, whilst on A.C. half-wave

depth of about 6in., these contain four and five valve circuits as well as a moving-coil loud-speaker. Naturally, the diameter of the diaphragm is only 3in. or so and the reproduction which this type of speaker gives has led to its nickname. Special midget components may be produced in this country shortly, and if so, we may see this type of receiver. I think, however, that it will be very short-lived, as the British public prefers good quality reproduction to "stunts." However, as I mentioned in the opening paragraph, it is unwise to prophesy.

Battery Receivers

The battery receiver with a simple triode output valve will almost certainly die this season. I cannot imagine a manufacturer producing a 1934 receiver without either a pentode for the cheaper class of receiver or a Class B stage for the better receiver. The output given by either of these arrangements is sufficiently good to warrant a moving-coil loud-speaker, and therefore I should imagine all self-contained receivers will have this type of speaker as standard equipment. The improved use of this speaker will lead to the gradual abolition of the moving-iron type and

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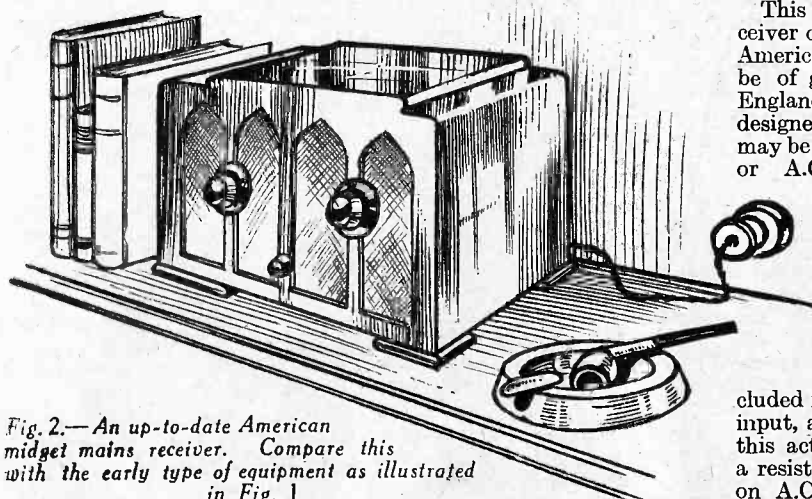
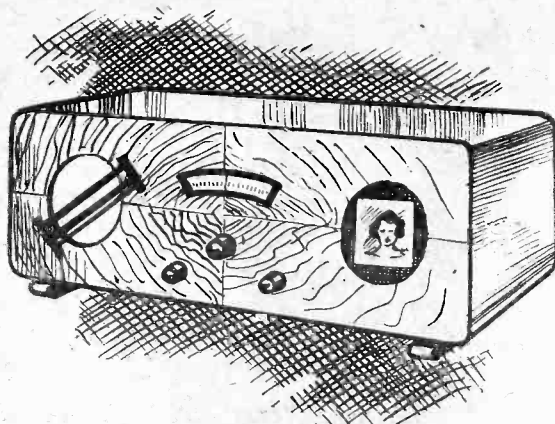


Fig. 2.—An up-to-date American midget mains receiver. Compare this with the early type of equipment as illustrated in Fig. 1

1934 RECEIVERS

(Continued from page XIII.)

consequently the reproduction which will be demanded by the public will gradually reach a very high standard, which will, in turn, lead to the development of "quality" circuits and components. This will inevitably lead to the use of multi-valve sets, and it is quite probable that the simple two and three valve sets will fade out. If, of course, special valves of the mains types are developed for battery users, then only two or three valves will be required to give vast range and volume. The battery radiogram will certainly appear, and in fact advance announcements have already been made by one or two firms concerning such a receiver. The Class B stage enables volume to be obtained which is much better than many small gramophones and the current consumption is not so high that a battery radiogram can be called expensive to run. Fifteen guineas should purchase a really good four-valve radiogram, complete with pick-up, clockwork motor, etc. This is, of course, another step towards the "quality" line.



Will a combined receiver and television be the set of the future?

Television

Will television forge ahead? This problem is a vexed one, and whilst so many alternatives are being tried it is not possible to visualize a complete television (sound and vision) receiver next year. As two separate

and complete receivers are necessary for the complete reception of vision and sound, the dimensions of the receiver become rather large. Added to this is the fact that interaction must be avoided, separate mains equipment may be required, the loud-speaker has to be housed, and the television equipment, either mirror-drum or disc, must also be packed into the same cabinet. This results in a cabinet being required which is at least as large as a good radiogram, and in order to see the picture properly it is necessary for the screen to be sufficiently high. As this means a tall cabinet, and as the modern furnishing tendency is to reduce everything to suit modern houses and flats, I cannot see at the moment just what is going to happen here. I think it is safest to leave this part of the subject alone.

Sufficient has been said to give some indication of what we might expect next year, but who knows, the valve itself may be obsolete by this time next year.

ALTHOUGH it was confidently expected that by the time the 1933 Radio Exhibition opened its doors to the public, permeability tuning would be available to every home constructor, no manufacturer has yet demonstrated to the Technical Staff of PRACTICAL WIRELESS that this hope has been realized. Nevertheless, readers of this paper will be very gratified to learn that the Editor of "Practical Wireless" has for some time past devoted a considerable amount of attention to this absorbing subject and has almost perfected a workable and efficient scheme, of which it is hoped to give full details to our readers at an early date. He has tackled the problem from a somewhat unusual angle and has succeeded in combining a practical mechanical form of construction with very high electrical efficiency. But of that—more later. The whole problem of permeability tuning is far more complicated than the

PERMEABILITY TUNING

An Important Announcement

average wireless amateur realizes, and although there is no difficulty whatever in designing a single tuning circuit which can be made to function by varying the position of the dust-iron core in relation to the tuning coil, the question is vastly different where two or more circuits are involved. It is a particularly difficult—many would even say "impossible"—task to design a set of ganged permeability coils which can be operated by a single control. The primary trouble is to find a core material which is perfectly homogeneous and of which any number of identical samples can be produced. With most of the materials at present available the change in inductance of a coil for any given movement of

the core is an unknown quantity, whilst a particular amount of movement cannot be made to produce the same effect at different parts of the tuning scale. There is little doubt that the difficulties referred to will eventually be removed as the methods of production are perfected, but for the time being it appears that no scheme has been evolved whereby really satisfactory and fool-proof permeability tuning can be offered to the home constructor as a commercial article. Permeability tuning will come, but we think that we shall have to wait a little longer before it proves so successful that we shall all feel justified in scrapping our present tuners and variable condensers. Rumours of permeability tuners to be available at the Exhibition have reached us for months past, but it is significant that none has yet been submitted to us for the exhaustive tests to which we subject all apparatus before recommending such to our readers!

Sektun Products, Winder House, Douglas St., S.W.1	47
Smith & Sons (Motor Accessories) Ltd., Cricklewood Works, N.W.2	51
Sonochorde Reproducers Ltd., 1, Willesden Lane, N.W.6	113
Sound Sales Ltd., Tremlett Grove, Junction Rd., N.19	213
Sovereign Products Ltd., 52, Rosebery Av., E.C.1	101
Standard Telephones & Cables Ltd., Connaught House, Aldwych, W.C.2	96
Stratton & Co. Ltd., Balmoral Works, Bromsgrove St., B'ham	21
Sun Electrical Co. Ltd., 118-120, Charing Cross Rd., W.C.2	T8
Sunbeam Electric Ltd., Sunbeam Rd., N. Acton, N.W.10	65
Tannoy Products, 1-7, Dafton St., W. Norwood, S.E.27	103
Telegraph Condenser Co., Ltd., Wales Farm Rd., N. Acton, W.3	98
Telephone Mfg. Co. Ltd., Hollingsworth Works, W. Dulwich, S.E.21	217

AN ALPHABETICAL GUIDE TO THE EXHIBITS

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Telsen Electric Co. Ltd., Thomas St., Aston, Birmingham	88
The 362 Radio Valve Co., 415, Mare St., Hackney, E.8	214
Thompsons, Diamond & Butcher, 34, Farringdon Rd., E.C.1	T21
Trade Chronicles Ltd., 6, Carmelite St., E.C.4	T6
Telegraph Construction & Maintenance Ltd., East Greenwich, S.E.10	248
Ultra Electric Ltd., Erskine Rd., N.W.3	78
Univolt Electric Ltd., 119, Finsbury Pavement, E.C.2	5
Vandervell Ltd., C. A., 319, Regent St., W.	228

Varley (Oliver Pell Controls Ltd.), 103, Kingsway, W.C.2	85
Vince's Dry Batteries Ltd., Lion Works, Garford St., E.14	105
Vulco Dry Battery Co. Ltd., Vulco Works, N.19	110
Warner Brunswick Ltd., 1-3, Brixton Rd., S.W.9	67
Wates Radio Ltd., 184, Shaftesbury Av., W.C.2	19
Westinghouse Brake & Saxby Signal Co., Ltd., 82, York Rd., Kings Cross, N.1	32
Whiteley Electrical Radio Co., Ltd., Victoria St., Mansfield, Notts	123, 129
Wilkins & Wright Ltd., Holyhead Rd., Birmingham	20
Wingrove & Rogers Ltd., Mill Lane, Old Swan, Liverpool	93
Wireless League, 12, Grosvenor Crescent, S.W.	233
Wireless Retailers Association of Gt. Britain, 1, Mitre Court, Fleet St., E.C.4	250
"Wireless Trader," Dorset House, Stamford St., S.E.1	T31
Wright & Weaire Ltd., 740, High Rd., N.17	1
Zeitlin & Sons, Ltd., 54, Lambs Conduit St., W.C.1	T29

RADIO HAS MOVED WITH THE TIMES

(Continued from page I.)

considerations, marks a very definite step forward in the progress and diffusion of 'Wireless.' For the first time in the annals of its rapid development the wonderful achievements and possibilities of wireless telephony as a means of instruction, recreation and amusement are displayed before the public in the form of an exhibition devoted exclusively to 'Wireless.' The fifty odd Exhibitors include the most prominent British Manufacturers and Suppliers of Wireless Apparatus, comprising altogether the most representative gathering of Wireless trade interests ever held." Those remarks read somewhat strangely to-day, but they give us an insight into the founding of one of the most important trade demonstrations of modern times.

Glancing through the pages of the first Wireless Exhibition catalogue one finds the names of several firms which are still actively

THE WIRELESS CONSTRUCTOR'S ENCYCLOPAEDIA

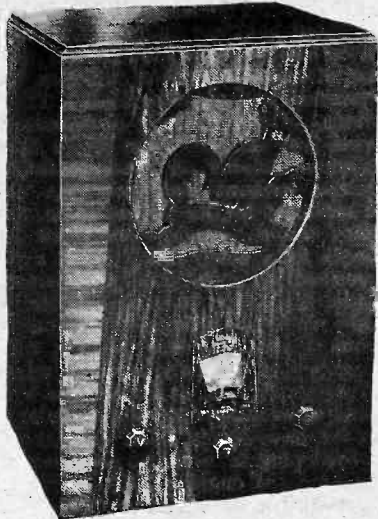
should be on every Reader's Bookshelf.

Purchase a copy from STAND No. 8, GROUND FLOOR.

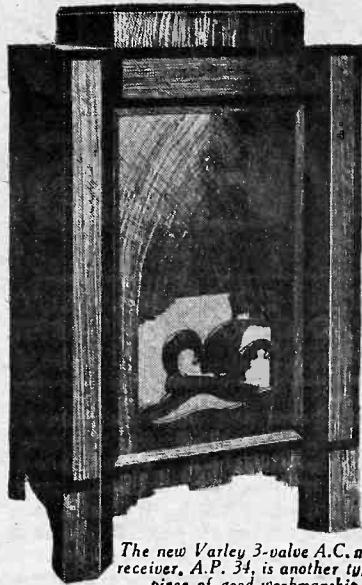
servicing the radio public. Among these mention might be made of Messrs. Cossor, Dubilier, Igranic, Peto-Scott, and Radio Instruments. One also finds the names of others who were at the time well known, but who have since "fallen by the wayside" or transferred their activities from wireless to other branches of trade. Messrs. S. G. Brown, Burndep, Elwell and Fellows are among those firms who will well be remembered by readers whose interest in wireless goes back over the past decade.

Since 1922 the Exhibition has changed its name to the "N.A.R.M.A.T. Wireless Exhibition," "National Radio Exhibition," and "Radiolympia" and has been held at Royal Albert Hall, the New Hall, Olympia, and in the Grand Hall, Olympia. It has rapidly increased in size and prestige with the passage of time, so that this year there is very little space to spare in either the ground floor or gallery of the Grand Hall at Olympia. We have no hesitation in saying that the 1933 National Wireless Exhibition will be the "best ever," and every reader who can possibly do so should make an effort to attend.

NEW SEASON STYLES IN CABINETS



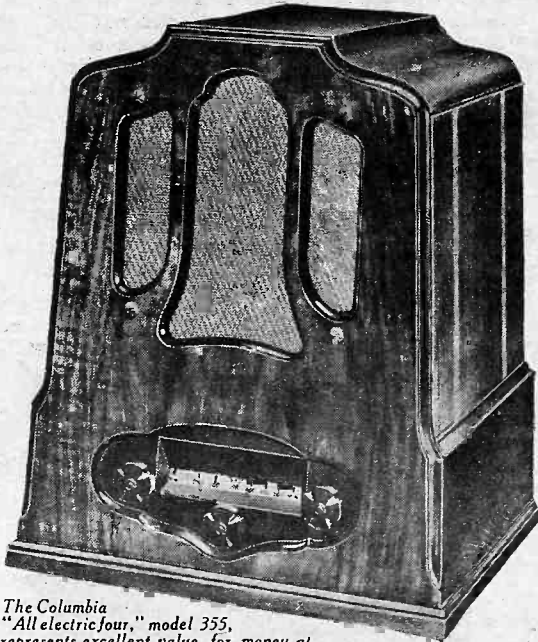
A 5-valve superhet, A.P. 46, made by the world-renowned firm of Messrs. Varley Ltd.



The new Varley 3-valve A.C. mains receiver, A.P. 34, is another typical piece of good workmanship.

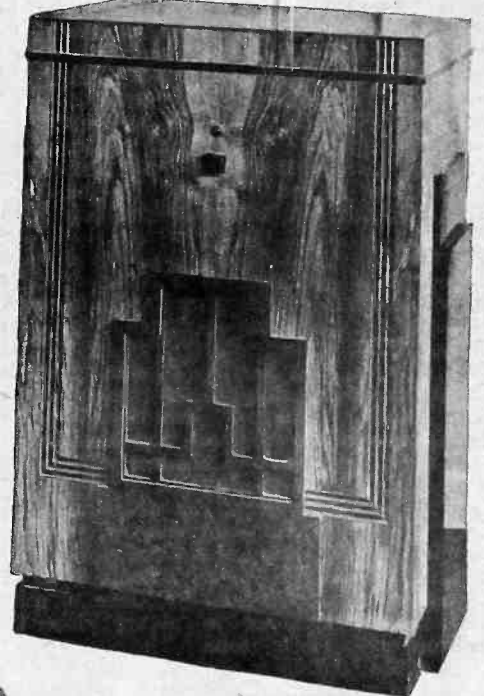


A Ferranti all mains superhet of pleasing design and efficient workmanship.

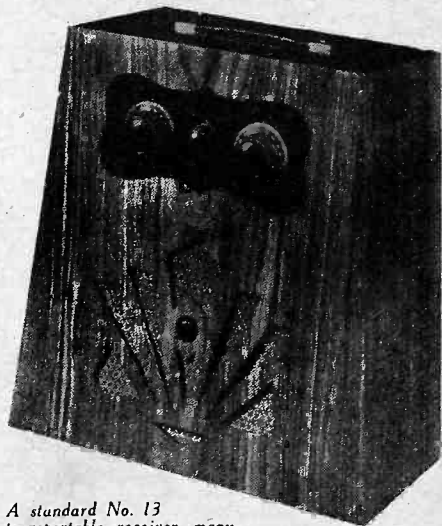


The Columbia "All electric four," model 355, represents excellent value for money at 12 guineas. It incorporates a highly efficient band-pass receiver. Models are available for A.C. or D.C.

The problem of the type which should be adopted for the wireless cabinet is well illustrated on this page, where several leading manufacturers' designs are shown. It will be seen that in some cases the design favoured is extremely simple and plain, whilst in others an elaborate and embellished pattern is utilized. No doubt our readers have their own ideas regarding the lines which should be taken, and these illustrations will give some idea of the extremes which are obtainable when choosing a receiver to harmonize with the furnishings of the home.



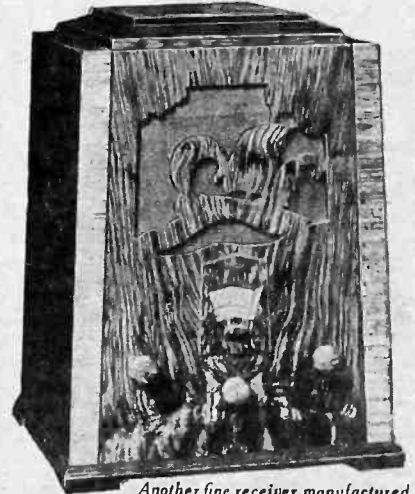
One of the most expensive instruments made by the famous firm of H.M.V. is their "Superhet Autoradiogram Ten de Luxe," which costs 95 guineas. It also incorporates delayed A.V.C.



A standard No. 13 transportable receiver, manufactured by Shalless and Evans, has a neat and compact appearance.



A fine piece of workmanship is the Bush A.C.3 Receiver, which is shown in a standard cabinet.



Another fine receiver manufactured by Messrs. Varley Ltd.

OUR VIEWS ON RECEIVERS

IN this piece of apparatus we have almost the last word in combined radio - gramophones. From the cabinet to the pick-up, every part is the result of long experiment and experience in the radio and gramophone sphere. It is almost impossible to find fault with the cabinet, which is finished in a very simple design which can be housed in practically any room without appearing out of place. The loud-speaker grille is not of the over-worked type, nor does it resemble the front of a Victorian pianoforte. The external controls (volume control and reject button) have been designed in keeping with the general appearance and do not resemble laboratory or workshop controls. The back of the cabinet is enclosed by a framework across which is stretched a piece of fine gauze, thus excluding dust without introducing echoes or box resonance. Thus we pass to the interior of this receiver.

The Circuit

The circuit consists of a seven-valve superheterodyne of the very latest type, the output stage being equipped with an Osram PX.4 valve. This delivers just over 2 watts, and handles a really good signal, so avoiding difficulties in overloading and similar forms of distortion. The arrangement of the oscillator, first detector, etc., is such that second channel whistles are avoided, cross modulation is absent, and the selectivity is of the real square-peak type with sufficient selectivity to permit of the reception of stations working on the allotted *minimum* separation. Tone correction is afforded and functions in a very efficient manner in giving either brilliant or "mellow" tone. The arrangement of the controls is very ingenious and worthy of mention. They are situated on the side of the motor-board, so that it is necessary to raise the lid in order to tune to a station. The scale is calibrated in kilocycles and stations, and a large control knob is provided for wave-range adjustment. A flat-sided roller is fitted to the switching mechanism and as the main control knob is adjusted this roller is rotated so that the actual setting of the instrument is very clearly indicated. Immediately to the left of this "Radio Panel," is the gramophone turntable and the automatic record changing equipment. In addition there is a control which enables the automatic mechanism to be brought into action. In view of the novelty of this mechanism I propose to describe it rather fully.

The Automatic Changing Mechanism

A long spindle is provided and is attached to the normal spindle in the centre of the turntable. This then projects sufficiently high to permit of eight records being rested on two arms arranged at opposite sides of the turntable. When the switch is turned to the position marked "Auto" and the

THE COLUMBIA AUTO-RADIOGRAPH SUPERHET SEVEN Model 631

motor started, two small projections on the side arms are withdrawn and the lower record drops slightly. After a few revolutions of the turntable a further movement of the arms takes place and this allows the lower record to drop to the turntable (a distance of only a few inches), and the next record is put into position ready to be dropped when its turn arrives. The pick-up now rises from its position of rest and slowly moves across to the first groove on the record which is now turning round on the turntable. It is lowered slowly to the groove, and reproduction forthwith takes place. When the record is played right through the arm rises, travels back to a position clear of the record and the next record drops down. The same procedure is then gone through until the eighth record has been played. At the end of this record, the arm travels out to its furthest position, drops on to the rest provided, and the motor is automatically switched off. An additional novel feature is the reject button fitted to the front of the cabinet. If for any reason you do not wish to hear a record after it has commenced to play, you press this button and the pick-up immediately rises from the record, travels to the outside and the next record comes into action. This apparatus works very smoothly indeed, and we were very impressed with it, although we appreciate the maker's instructions on the fly-leaf of the instructional book which states: "Despite the almost human performance of this instrument, remember that it is a machine and must be handled with thought." It would, of course, be quite easy to damage intricate mechanism of this nature if it were treated without due care.

Radio Results

On the radio side the results are very satisfying indeed. When the volume control is set to a suitable position, it is possible to rotate the main tuning control right through the scale and station after station comes in at very good volume. There are no tricky adjustments to be made, and no careful adjustment of reaction and volume control, but simply the one knob to turn from one end of the scale to the other. Naturally the volume control must not be set to its maximum position except when trying to receive a most distant station, as the amplification afforded by the receiver is so great that background

noises, atmospherics, and similar noises are much too loud for enjoyment. We found, with the particular aerial which was used, that the control required adjusting to a position about half-way on, and then upwards of forty stations were tuned in one after the other with ease, and all of sufficient volume to provide real entertainment. The local stations, of course, only necessitated the control just on; and when set so that the maximum volume on these stations was obtained without distortion, the volume was sufficient for the largest room, and no doubt would provide sufficient signal strength for a small hall. When a station is received accompanied by a heterodyne whistle, the tone control on the radio panel may be adjusted to completely remove it, and this was found a valuable feature on the particular evening when the receiver was tested, as heterodyne whistles seemed to be worse on this particular night than we have heard them for some time. A special plug is fitted to the rear of the instrument and engraved MAE. When this is inserted into the aerial socket in place of the normal aerial, the mains wiring is employed for that purpose, and it was found that there were still many stations receivable without any adjustment of the volume control setting. In this connection it should be noted that if hum is experienced when using this device, it is sometimes advisable to reverse the plug in the mains socket.

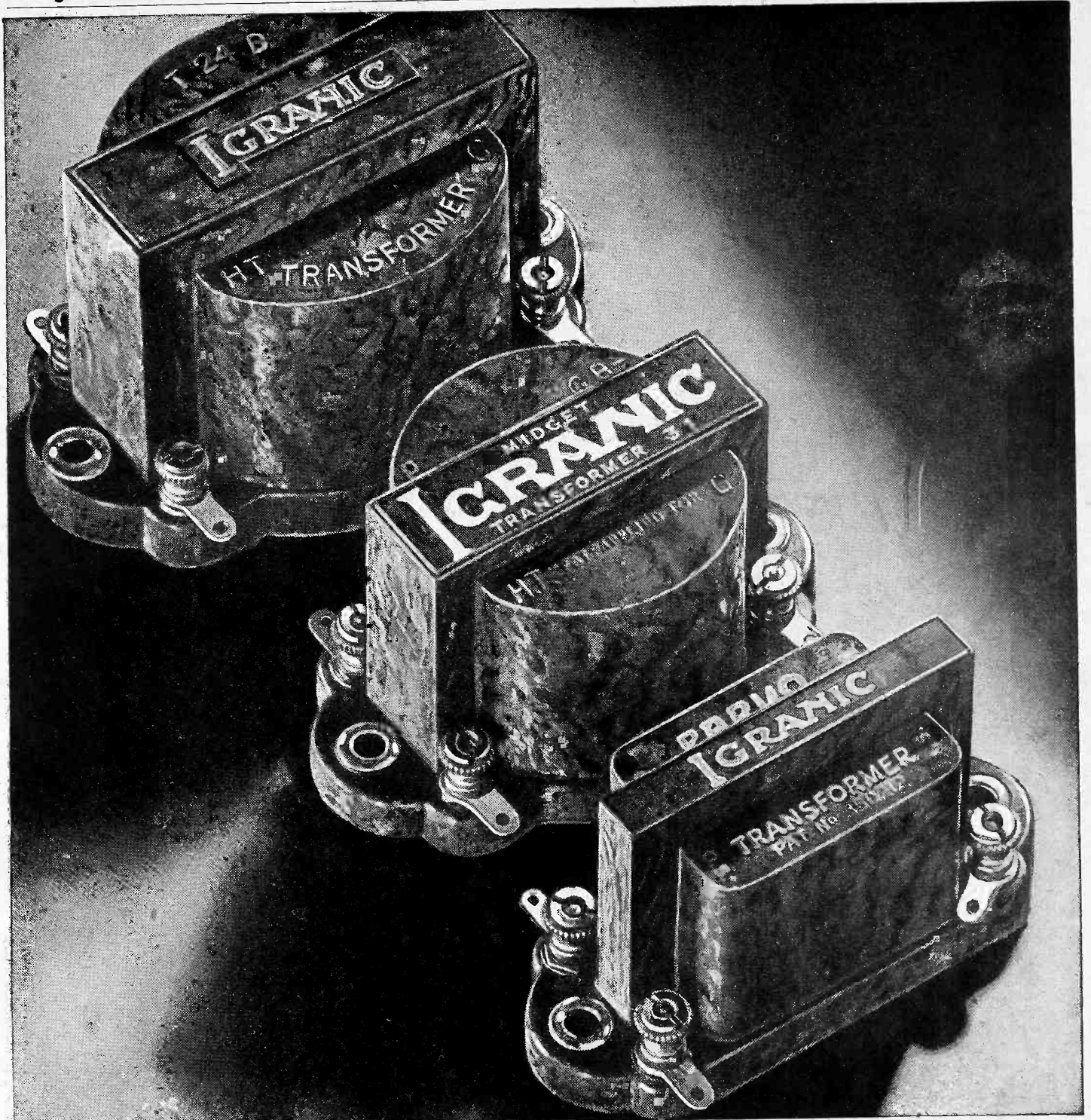
Hum Control

A special hum control device is fitted to the mains equipment of this receiver so that in the event of hum being troublesome this control may be adjusted to give a minimum position for the hum.



COLUMBIA RADIO-GRAMOPHONE WITH AUTOMATIC CHANGER

The Columbia "Autoradiograph Superhet Seven," Model 631, now costs 43 guineas. This handsome instrument in a walnut cabinet has an automatic record-changer and highly efficient seven-valve (including rectifier) radio receiver. Brilliance control, felt-lined lid, illuminated station indicator and electro-magnetic moving coil speaker, are other features of this popular priced radio-gramophone.



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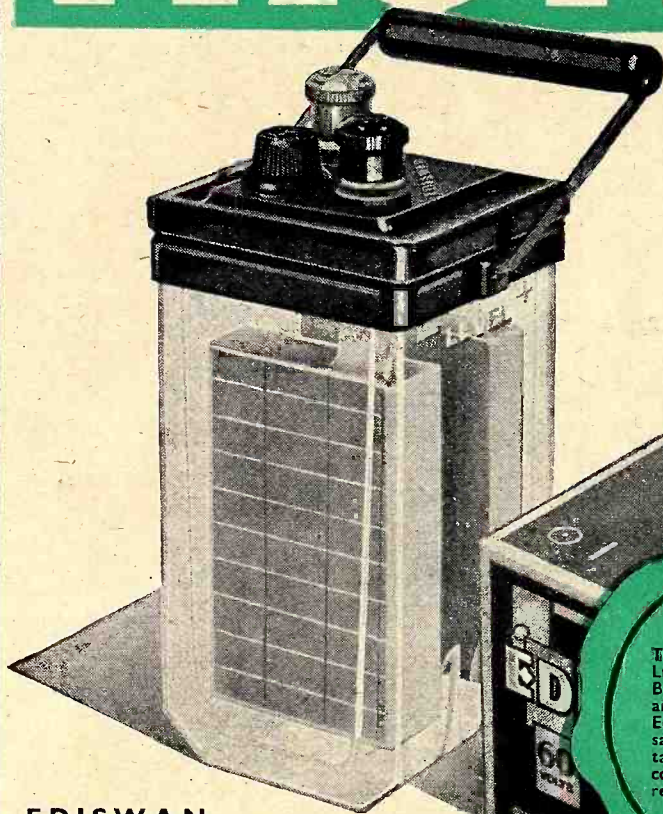
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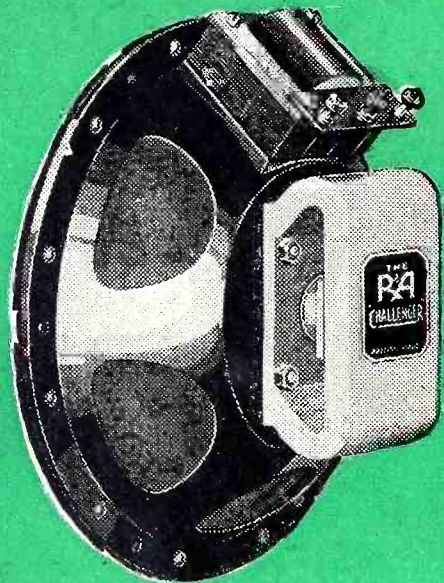
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STAND TO STAND SHOW REPORT

DETAILS OF EXHIBITS OF OUTSTANDING INTEREST ON EACH STAND, BY THE TECHNICAL STAFF

STAND No. 1
WRIGHT & WEAIRE, LTD., 740, High Road, Tottenham, N.17.
UNDOUBTEDLY the principal point of interest on this stand was the new Nucleon coil. This was shown in its many types, and the home-constructor gained some idea of the extent to which this coil has been developed. In addition, the number of smaller components for the home-constructor called for close attention and surprise at the high quality which was shown. The neat battleship grey cellulose finish on some of the transformers attracted many to the details of a component which might otherwise have escaped attention. Messrs. Wright and Weaire are to be congratulated on the arrangement of their stand.

STAND No. 2
EPOCH RADIO MFG. CO. LTD., Exmouth St., E.C.2.
THE "Super-Dwarf" midget loud-speaker was one of the most interesting exhibits on the Epoch stand, and its extremely small dimensions were the subject of appreciative comment. A new large permanent magnet moving-coil speaker at a very low price was also examined with great interest. All the older speakers were shown, and it was interesting to notice that most of them had not only been reduced in price but had been much improved.

STAND No. 3
BURGOYNE WIRELESS (1930), LTD., 34a, York Road, N.1.
AN excellent range of no less than eight different receivers was shown. A self-contained Class B battery set was perhaps the most notable exhibit, and priced at £6 10s., it was a popular attraction. Among the other receivers were the "Popular Three" and the "Olympic Three De Luxe," both of which represent excellent value for money. Altogether

there was a really good display of receivers for all requirements and at diverse prices.

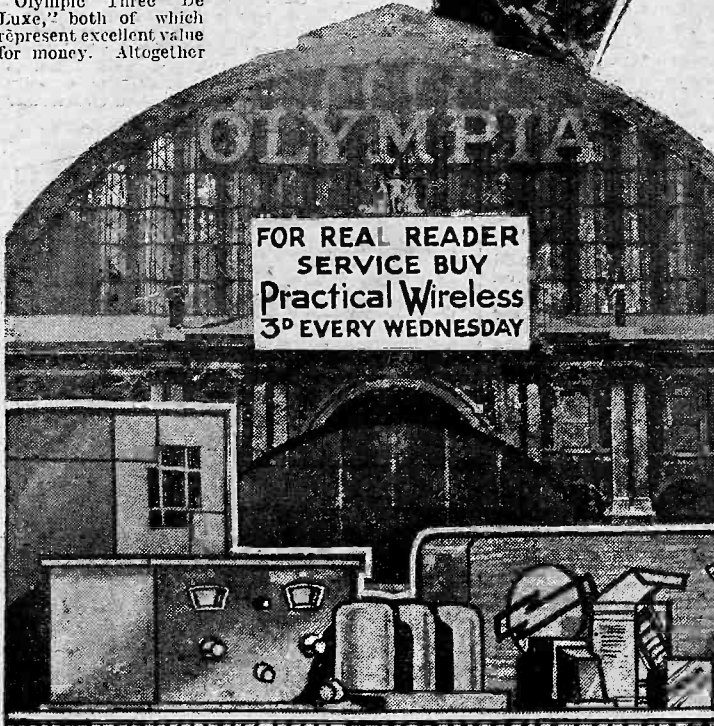
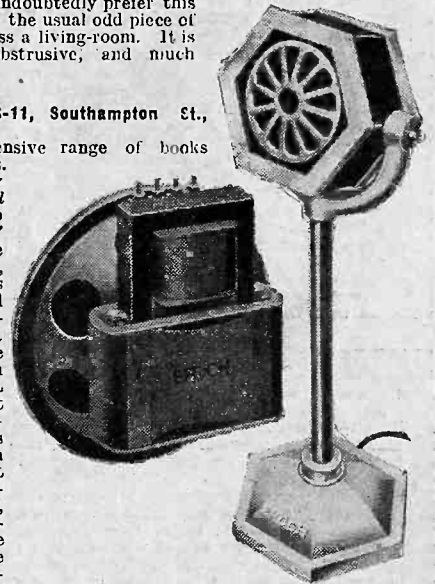
STAND No. 4
BURTON, C. F. & H., Progress Works, Bernard St., Walsall.
THE exhibits on this stand consisted very largely of small components and these were closely examined by many wireless constructors. They consisted of H.F. chokes, tuning coils, variable condensers, etc., of various types, all of which are sold at attractive prices. Additionally, there were some interesting mains units for both A.C. and D.C. use. Most of the A.C. ones were shown both with and without a trickle charger which could automatically be brought into use by switching off the set.

STAND No. 5
UNIVOLT ELECTRIC LTD., 11, Finsbury Pavement, E.C.2.
PRACTICALLY all of the apparatus required for the reproduction of gramophone records could be seen here, and from the small pick-up to the complete electric radiogram unit, the record fan was able to make a good selection for his needs. The reduction in prices should no doubt lead to an increased demand, and the pick-up, which now costs 25s. (as against 32s. 6d. last year), is a splendid proposition. The Het aerial was well demonstrated, and many will undoubtedly prefer this type of aerial to the usual odd piece of wire strung across a living-room. It is certainly less obtrusive, and much more efficient.

STAND No. 8
GEO. NEWNES, LTD., 8-11, Southampton St., Strand, W.C.2.

IN addition to the extensive range of books published by Messrs. Newnes, and noteworthy among which are "Practical Wireless," "The Radio Times," "The Listener," "World-Radio," and the many wireless handbooks, the specimen receivers which were exhibited proved probably the biggest attraction in the whole exhibition. Here were seen most of the receivers which have been popularized by PRACTICAL WIRELESS during the past season, and with the attractive display which was arranged in conjunction with the new PRACTICAL WIRELESS receivers introduced for the exhibition, home constructors were intensely interested in the ingenuity displayed in the various designs. The Technical Staff are being kept busy answering queries for readers and assisted in solving some tricky problems which had caused some amateurs many sleepless nights.

(Continued overleaf)



STAND TO STAND SHOW REPORT

(Continued from previous page)

**STAND No. 9
HAYNES RADIO, 57, Hatton Garden, E.C.1.**

THIS stand proved to be a very popular one to the more advanced constructors and experimenters, due to the fact that a very wide range of specially designed and guaranteed kit sets were on view. The sets included the "Haynes Class B Four," the "Haynes Quality Receiver," superheterodynes for both A.C. and D.C. operation, as well as a special short-wave superhet and a short-wave converter.

A new component in the form of a noise-free volume control also attracted a good deal of attention because of its unusual features. It has a very narrow edge contact, an insulated spindle, adjustable stops to limit the amount of rotation of the arm and a simple system of ganging so that two or more components can be operated by the same knob.

**STAND No. 12
HIGGS MOTORS, Witton, Birmingham.**

SOME interesting types of converter were seen on this stand, together with other types of electric motors and similar apparatus. The new converter delivers a heavy output suitable for the largest radio-gram, and is intended for use on the standard D.C. house supply. It will no doubt prove valuable to many who are at the moment restricted to the use of D.C. mains and who wish to use one of the splendid A.C. receivers which may now be obtained.



One of the neat signal devices which were a great feature of the *Bulgin Stand*. Several different models are obtainable and the one illustrated is called "Meditation."

**STAND No. 14
COSMOCORD, LTD., Cambridge Arterial Road, Enfield, Middlesex.**

A NEW pick-up, known as the "Universe," was given the most prominent position on this stand. This is an interesting component, having an audio output of some 4 volts. It has been designed to give maximum response to the bass in order to compensate for record deficiencies, and it has a "top cut-off" at about 4,000 cycles so that needle scratch is reduced to a minimum. The track arm is provided with an adjustable balance weight whereby the needle pressure may be varied to suit different records.

An interesting component also shown was a combined potentiometer and Q.M.B. switch. This is a very neat little article built in a bakelite case and fitted with accessible soldering tags. It is remarkable for its very smooth action and steady resistance variation over the full range of movement.

**STAND No. 16
HEAYBERD, F. C., & CO., 10, Finsbury Street, E.C.2.**

ON this stand was seen practically every component for the construction of mains apparatus, in addition to chargers for home use or for the service station. Small transformers delivering L.T. supplies at 4 volts 4 amps, to multi-wound transformers delivering H.T. of the order of 500 volts with several L.T. windings; smoothing chokes; fixed condensers in single units or blocks containing several different values; metal rectifiers; metal cases for complete mains units; connecting cable; the complete range seemed to embrace every item which could be thought of in connection with a complete mains-operated receiver. In addition, complete units were displayed, and the various types of trickle charger enabled a very accurate selection to be made to suit any individual need.

**STAND No. 17
SIMPSONS' ELECTRICALS, LTD., Grange Road, Leyton, E.10.**

THE synchronous turntable manufactured by this firm has already proved extremely popular in the past, and should be even more popular in the future. The simple one-hole fixing which is adopted enables the motor to be speedily fitted to an existing cabinet after the old clock-work motor has been removed, or in the case of a new radio-gram. It necessitates only the drilling of an inch hole. It works, of course, from A.C. mains of 50 cycles only, but is of extremely simple construction, having no governors or other complicated mechanism. It rotates at the correct speed all the time. The new Straight Track Pick-up is a splendid partner for this turntable, and is a most efficient and robust piece of apparatus.

**STAND No. 20
WILKINS & WRIGHT, LTD., Holyhead Road, Birmingham.**

ON this stand the new version of the "Utility" straight-line dial was the point of interest, and it was ably backed by the combination reaction condenser and potentiometer. The new switch, bakelite knobs, and other accessories gave a good idea of the vast field covered by Utility products and called for comment regarding the high standard which was set.

**STAND No. 21
STRATTON & CO., LTD., Balmoral Works, Broomsgrove Street, Birmingham.**

THE short-wave enthusiasts spent a good deal of time round this stand, and, undoubtedly the Eddystone short-wave apparatus merited attention. Apart from the smaller components, the complete receivers also showed what could be done with short-wave reception, and, no doubt, many who have not previously shown any interest in this sphere of wireless will have decided to carry out some short-wave experiments in one direction or another as a direct result of the exhibits on this stand.

**STAND No. 22
BLOCK BATTERIES, LTD., Abbey Road, Barking.**

THE most interesting exhibit here was the entirely new plateless high-tension accumulator which was shown in various patterns. Having a capacity of 5,000 milliampere-hours, these accumulators are only half the size of corresponding ones of normal construction. Moreover, due to the shape of the electrodes, they are particularly robust, and should have a long trouble-free life.

The "Block" L.T. accumulator, which has proved so popular since its fairly recent introduction, was also shown and attracted a considerable amount of interest from users of battery sets.

**STAND No. 23
GRAMPIAN REPRODUCERS, LTD., Station Avenue, Kew Gardens, Surrey.**

MESSRS. GRAMPIAN were, we believe, the first to introduce dual balanced midgeet loud-speakers, so it was only natural to find that these were accorded a prominent position on the stand. The overall sizes of the pairs of balanced midgeets is only 1 3/4 in. by 7/8 in. by 3/16 in. deep, yet they are capable of handling the enormous output of 5 watts.

A large number of other types of Gramplan speakers were also shown, and it was interesting to observe that most complete and useful technical information was available in regard to each one. In every case there was a pattern specially intended for Class B use. Messrs. Gramplan's slogan, "A Year Ahead," seemed to be fully justified.

**STAND No. 26
REDFERN'S RUBBER WORKS, LTD., Hyde, Cheshire.**

SOME very interesting ebonite panels were seen on this stand, and the combination of two different finishes on one panel (mahogany on one side and black on the other) will enable the listener to purchase a panel and use the side which appeals to him at the time of construction.

**STAND No. 27
RONNIE ENGINEERING, Crewsdon Road, S.W.9.**

THE new Mineral Compound for ensuring a good earth connection, and the new types of earth tube proved one of the high lights of the show. Many visitors seemed to find it an important point to improve their existing earth connections, and this new Mineral, obtainable in cartons at 1s. 3d., enables the present earth connection to be kept continually damp owing to the action of the chemical of which it is composed. The earth tubes, in copper and chromium plate, are filled with the mineral and this is a splendid idea and is simple to fit. Some other radio novelties were also seen.

**STAND No. 31
SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, E.C.4.**

THE "Full o' Power" batteries made a splendid exhibit here, and the range was most extensive. The new types of Class B battery will do much to popularize this method of amplification during the coming season, and the prices are most competitive. These batteries are all made at Woolwich by special machinery, and this is, of course, only a part of the extensive Siemens business.

**STAND No. 32
WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD., 82, York Road, King's Cross, N.1.**

A MOST comprehensive range of mains apparatus was seen here and probably the main portion of the exhibits consisted of the famous metal rectifiers. In all types, these were set out to show the extensive range which may be covered by means of a mains unit utilizing this form of rectifier. In addition, the new receivers, in which the rectifier was fitted as part of the mains equipment, also called for inspection, and the smaller rectifiers and photo-cells, etc., attracted the more technically-minded visitors.

**STAND No. 34
FULLER ACCUMULATOR CO. (1926), LTD., Woodland Works, Chadwell Heath, Essex.**

A NEW accumulator, styled the MDG, was the most notable exhibit on this stand. Made in the 2-volt 45-ampere size, and selling at 8s. in a dry-charged

state, this latest accumulator represents unusual value for money.

The well-known "Sparta" high-tension batteries were also shown in all varieties, and with discharge rates varying from 10 m.a. for small sets to 20 m.a. for those using large power or Class B valves. A comprehensive range of other batteries and accumulators attracted well-merited attention.

**STAND No. 35
BAKER'S "SELHURST" RADIO, Sussex Road, Croydon, Surrey.**

A N entirely new and very convenient Class B unit, which can almost instantly be attached to any kind of battery-operated receiver, was one of the most interesting exhibits. Another which attracted a considerable amount of attention was the combined moving-coil loud-speaker and complete Class B Unit mounted together on a single metal chassis of rigid construction. A wide range of speakers of all patterns was also on view.

**STAND No. 37
LECTROLINX, LTD., 79a, Rochester Row, S.W.1.**

THE well-known Clix components formed the centre of this stand, and in addition to the chassis-type valve-holders, the terminal strips, plugs, sockets, and similar items were worthy of close inspection. Non-corrosive spade ends for accumulator connections are quite cheap and will save time in hunting for bad connections which may be due to the effects of acid on the ordinary flex used by many listeners for battery connections. Similarly, the plugs and sockets form a ready means of ensuring that connections between various parts are firmly made and noises due to poor connections are completely avoided.

**STAND No. 38
BRITISH GENERAL MANUFACTURING CO., LTD., Brockley Works, Tyrwhitt Road, Lewisham, S.E.4.**

THIS firm is well known as manufacturers of dual-range tuners and the latest model was well in evidence. A parallel feed inter-valve coupler and a new screened H.F. choke were also displayed and attracted interest. Another very small but interesting component was the flexible coupling which has been specially designed to enable the constructor easily to gang together any number of ordinary variable condensers.

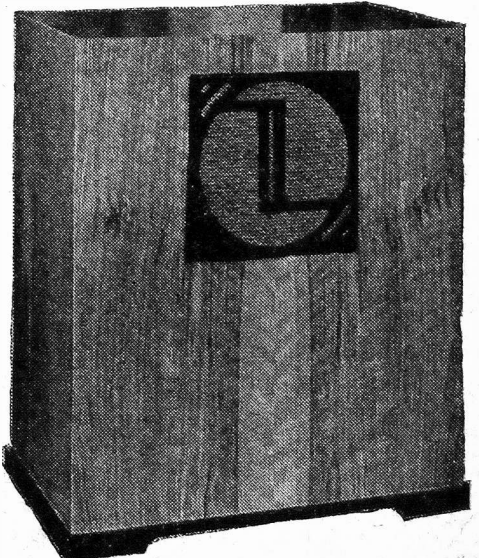
**STAND No. 40
ORR RADIO (INC. UNITED RADIO MANUFACTURERS), 63, Lincoln's Inn Fields, W.C.2.**

A N interesting feature on this stand was the A.C. mains receiver employing the new H.F. screened pentode. Although only a three-valver, this gives admirable results and is a splendid receiver. The battery receivers which were shown were also of really up-to-date design, and the tuning dials were of the plain, easily read type.

**STAND No. 41
RADIO INSTRUMENTS, LTD., Purley Way, Croydon.**

IT was really difficult to say which exhibit here offered the greatest attraction. The receivers, the components, the new iron-core tuning coils all seemed to claim attention. The six-valve superhet will doubtless prove an important receiver next season, and this employs automatic volume control and full vision tuning. The four-valve Class B battery receiver with iron-core tuning coils is a really up-to-date receiver which will appeal to the listener who has not the advantage of the mains supply. In addition to being economical to maintain, it delivers a really powerful output. The new auto-parafeed transformer

(Continued on page 819)



The new Camco "Argyll" Cabinet. This is recommended for the Auto-B Three.

PETO-SCOTT RADIO BY MAIL

NEW COSSOR MODEL 341. S.G., Detector and Pentode, and balanced armature Speaker, complete with Cabinet. Cash or C.O.D., Carriage Paid, £6/7/6. Balance in 11 monthly payments of 11/9. **Send 11/9 only**

NEW R. & A. "ALPHA" P.M. MOVING-COIL SPEAKER DE-LUXE, with tapped input transformer. Cash or C.O.D., Carriage Paid, £2/12/6. Balance in 8 monthly payments of 6/6. **Send 6/6 only**

NEW W.B. Type P.M.4.A. MICROLODE, complete with input transformer. Cash or C.O.D., Carriage Paid, £2/2/0. Balance in 7 monthly payments of 5/9. **Send 5/9 only**

NEW ROLA CLASS-B PERMANENT MAGNET MOVING-COIL SPEAKER AND AMPLIFIER with Valve and Input Transformer. Two models: A for PM2B, PD220, and 220B; B for 240B and HP2 (state which when ordering). Cash or C.O.D., Carriage Paid, £3/11/0. Balance in 11 monthly payments of 6/6. **Send 6/6 only**

F. J. CAMM'S 1934 SUPER-SET

KIT "A" Author's Kit of First Specified parts, including Peto-Scott "Metaplex" chassis (less valves and cabinet). **YOURS FOR 14/9**

CASH or C.O.D. Carriage paid, Balance in 11 payments of 14/9
£8 : 2 : 0

KIT "B" As Kit "A," including valves but less cabinet. CASH or C.O.D. Carriage Paid, **£11 : 2 : 9** or 12 monthly payments of 20/6.

KIT "C" As Kit "A," including valves and cabinet. CASH or C.O.D. Carriage Paid, **£12 : 7 : 9** or 12 monthly payments of 22/6.

AUTO-"B" 3

KIT "A" Author's Kit of First Specified Parts, including metal chassis, but less Valves, Cabinet, Speaker. **YOURS FOR 8/6**

CASH or C.O.D. Carriage Paid, Balance in 11 monthly payments of 8/6
£4 : 12 : 0

KIT "B" As Kit "A," but with Valves only. CASH or C.O.D. Carriage Paid, **£6 : 1 : 9** or 12 monthly payments of 11/3.

KIT "C" As Kit "A," but complete with Valves and Cabinet less Speaker. CASH or C.O.D. Carriage Paid, **£7 : 19 : 9** or 12 monthly payments of 14/6.

Set of Specified Valves - £1 : 9 : 9
 Camco "Argyll" Cabinet - £1 : 18 : 0
 Amplion Sonnette Class "B" Speaker £1 : 7 : 6

1 Varley "Nictet" L.F. Transformer - 7 6
 1 Bulgin Type "B" "Controlatone" - 5 0
 1 Peto-Scott "Metaplex" Chassis - 3 6
 1 Peto-Scott Classic Cabinet, as illustrated - £1 5 0

FIRST AGAIN LISSSEN SKYSCRAPER 7 VALVE SUPER-HET

FREE CONSTRUCTIONAL CHART WITH EVERY KIT CHASSIS MODEL **YOURS FOR 15/-**

Complete Kit with Lissen Valves in Sealed Carton

CASH OR C.O.D. CARRIAGE PAID **£8 : 17 : 6**

Balance in 11 monthly payments of 16/6

TABLE CABINET MODEL, complete with valves. Cash or C.O.D., Carriage Paid, £9/15/0. Balance in 11 monthly payments of 17/6. **Send 17/6 only**

CONSOLETTA CABINET MODEL, complete with Valves and Permanent Magnet Moving-coil Speaker. Cash or C.O.D., Carriage Paid, £11/10/0. Balance in 11 monthly payments of 21/-. **Send 21/- only**

NEW LISSSEN SKYSCRAPER FOUR ALL-WAVE CHASSIS MODEL, complete kit comprising all components, including set of Lissen Valves. Cash or C.O.D., Carriage Paid, £5/12/6. Balance in 11 monthly payments of 10/3. **Send 10/3 only**

NEW LISSSEN SKYSCRAPER FOUR ALL-WAVE CONSOLETTA CABINET MODEL, complete kit comprising all components, including set of Lissen Valves, Cabinet and Moving-Coil Speaker. Cash or C.O.D., Carriage Paid, £8/2/6. Balance in 11 monthly payments of 15/-. **Send 15/- only**

NEW EPOCH MODEL 200, 200B, or 200C PERMANENT MAGNET MOVING-COIL SPEAKER for ordinary power. Class-B or Q.P.P. respectively, complete with input Transformers. Cash or C.O.D., Carriage Paid, £1/15/0. Balance in 6 monthly payments of 5/6. **Send 5/6 only**

NEW AMPLION SONETTE P.M. MOVING-COIL SPEAKER, with Class "B" Input Transformer. Cash or C.O.D., Carriage Paid, £1/7/6. Balance in 5 monthly payments of 5/-. **Send 5/- only**

NEW BLUE SPOT 99P.M. PERMANENT MAGNET MOVING-COIL SPEAKER, complete with tapped input Transformer. Cash or C.O.D., Carriage Paid, £2/19/6. Balance in 11 monthly payments of 5/6. **Send 5/6 only**

NEW ATLAS ELIMINATOR C.A.25 for A.C. Mains, Class "B" and Q.P.P. Four Tappings, 60/80; 50/90, 120; 150, 25 m.a. Cash or C.O.D., Carriage Paid, £2/19/6. Balance in 11 monthly payments of 5/6. **Send 5/6 only**

NEW HEAYBERD ELIMINATOR, MODEL D.120 for A.C. Mains. 120v., 18 m.a., and 2 v., 0.25 amp. Trickle Charger. Tappings 40/110 var. S.G., 100v., and 120v. fixed. Cash or C.O.D. Carriage Paid, £4/5/0. Balance in 11 monthly payments of 7/9. **Send 7/9 only**

NEW EXIDE H.T. ACCUMULATOR, 120 VOLTS, W.H., in crates, 5,000 m.a. Cash or C.O.D., Carriage Paid, £4/13/0. Balance in 11 monthly payments of 8/6. **Send 8/6 only**

NEW FERRANTI "CLASS B" SUPER POWER CONVERTOR. Instantly converts your present set to "Class B." Complete with valve. Ready assembled. Cash or C.O.D., Carriage Paid, £3/3/0. Balance in 11 monthly payments of 5/9. **Send 5/9 only**

KIT BITS You pay the postman. We pay post charges on all orders over 10/-

1 Set of Valves - £3 0 9
 1 British Radiophone 3-gang Cond., with full vision scale, Type 604 - £1 8 6
 1 (Lissen) Set of 3 Iron Cored Coils - £1 17 6

ALL-WAVE TWO KIT "A" Specified Values £1 - 3 - 6 Peto-Scott/Metaplex Chassis 12in. x 7 1/2in. x 2 1/2in. **YOURS FOR 7/6** Balance in 11 Monthly Payments of 7/6

PILOT AUTHOR KITS - Exact to Specification

PETO-SCOTT CLASSIC WALNUT CABINET

With standard fret as illustrated, an ultra-modern design with graceful lines combining beauty of appearance with utility and efficiency. The ideal cabinet for the Home Constructor, in keeping with present-day set design. In chosen, veneered walnut with contrasting silk covered fret. Front drilled to your specification. Size inside: 20in. long, 10in. high, 12in. deep. Takes panel 12in. by 10in.; baseboard 12in. by 12in. **Cash or C.O.D. Carriage Paid (less stool). 25/-**



STOOL IN VENEERED WALNUT TO-MATCH (28in. high) Cash or C.O.D. 25/- Carriage 2/6 extra.

CLASSIC CABINET AND STOOL. Cash or C.O.D. Carriage Paid £2 12 6 or 7/6 Deposit and 10 monthly payments of 5/-.

PILOT "CLASS B" CONVERSION KIT—Converts your present Battery Set to "Class B" Amplification Complete with all necessary components, including driver transformer, "Class B" output choke, W.B. 7-pin valve holder, B.V.A. Class "B" valve, wire and screws, etc. Full-size Blueprint, assembly instructions and diagrams. Cash or C.O.D., 37/6. Balance in 7 monthly payments of 5/6. **Send 5/- only**

All "Class B" Components and other Parts unobtainable from your local dealer SENT C.O.D. Easy Terms Available orders value over 33/-. We have the largest stocks in the country. Orders over 10/- Sent Post Paid.

CASH, C.O.D. or EASIWAY

IMPORTANT MISCELLANEOUS COMPONENTS, Paris, Kits, Finished Receivers or Accessories for Cash, C.O.D., or H.P. on our own system of Easy payments. Send us a list of your wants. We will quote you by return. C.O.D. orders value over 10/- sent carriage and post charges paid.

NEW GARRARD RADIOGRAM UNIT, Send COMPRISING 202A MOTOR, Pick-up tone-arm with speed regulator and needle cup. Cash or C.O.D., Carriage Paid, £4/1/9. Balance only in 11 monthly payments of 7/6. **Send 7/6**

PETO-SCOTT CO. LTD., 77, City Rd., London, E.C.1. West End Showrooms: 62, High Holborn, London, W.C.1. Dear Sirs, Please send me CASH/C.O.D./H.P.

for which I enclose £.....d. CASH/H.P./DEPOSIT

NAME ADDRESS



SUPERCHARGED WITH POWER!

MORE and more power: that is the demand of the modern radio set. And no battery is so densely packed with power as the Grosvenor.

For, by the Grosvenor process, MERCURY protects the all-important zinc cells against corrosion. So long do the cells last that, to use them up, they are crammed with extra chemicals by hydraulic pressure.

That is why Grosvenor batteries give such astonishingly long life. For sheer value-for-money, try Grosvenor next time, and see for yourself!

MERCURY

means **ENORMOUSLY INCREASED LIFE**

GROSVENOR
MISCANLITE
ELECTRIC
TORCHES

Beautifully made from the new material MISCANLITE. Very strong, will last for ever, and finished in artistic assorted colours. Buy one now, for autumn and winter use. All sizes and types, priced from

1/6 to 12/6

Grosvenor Mercury Batteries are made in three grades for every Radio need.

- Grosvenor Red Line 5/6 to 11/-
- Grosvenor Brown Line 6/- to 15/6
- Grosvenor Blue Line 7/- to 20/-

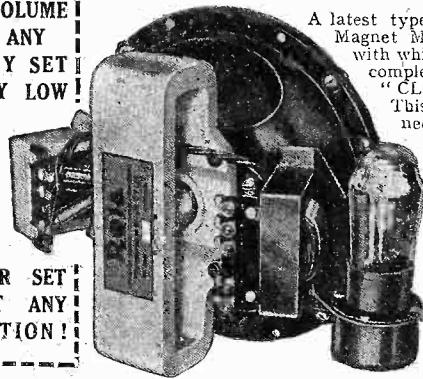
Also long-lasting Grosvenor Mercury Batteries for Torches, Pocket and Cycle Lamps.

GROSVENOR ELECTRIC BATTERIES LTD.
2-3 WHITE STREET, LONDON, E.C.2
Works: WATFORD, HERTS.
Telephone: METROPOLITAN 6866 (3 lines).
Grams: GROBATCOY, AVE, LONDON.

"CLASS B" SIMPLIFIED! THE NEW ROLA P.M. MC. & UNIT SPEAKER & IN ONE

MAINS VOLUME
FROM ANY
BATTERY SET
AT VERY LOW
USE OF
H.T.

JUST
CONNECT
TO YOUR SET
WITHOUT ANY
ALTERATION!



A latest type ROLA Permanent Magnet Moving Coil Speaker with which is incorporated a complete, properly matched "CLASS B" amplifier. This assembly when connected with any Battery Set converts it to "Class B" output, increasing the overall sensitivity of the set several times, and increasing the Power Output or Volume up to 5 Times!



SEND FOR IT ON 7 DAYS' TRIAL

Send only 5s. for 7 days' trial, if satisfied, pay balance in 10 monthly payments of 7s. 6d. (Cash, in 7 days, £3 11s.).

SEND ONLY 1/6
for the
Famous "PIFCO"
Radiometer



If satisfied, complete purchase by 5 monthly payments of 2/6 (Cash, 12/6.) Tests everything - valves, components, circuit, etc.

This Rola "CLASS B" SPEAKER AMPLIFIER UNIT can quickly and simply be connected to any battery set, and is complete with Cossor, Mullard, or B.T.H. "Class B" valve, with full instructions.

The result of adding this unit to your battery set will be equivalent in performance, as regards richness of tone and volume, to a high grade all mains set, whilst at the same time retaining economy in battery consumption. Send deposit to-day!

E. J. HERAUD, Ltd., Dept. P.21, Number One, EDMONTON, LONDON, N.18
Branches: 78/82, Fore St., Edmonton; 77, West Green Rd., Tottenham; 34, St. James St., Walthamstow; and 130, Hertford Road, Enfield Wash.

SERADEX RESISTORS

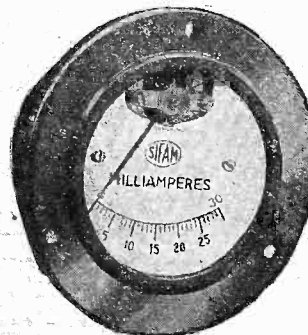
as specified for the "Wireless World Monodial Superhet," and "Modern Battery Four"



- M-75 3/4-1 Watt rating, most values 6d. each
- M-150 1 1/2-2 Watts rating 8d. each
- M-300 3.0 Watts rating 1s. 3d. each
- SERADEX GRID LEAKS. .1, .25, 5, 1 and 2 Megs. 5d. each.

Illustrated lists of above and other types free on mentioning "Practical Wireless."

TREVOR PEPPER, WAKE GREEN RD., BIRMINGHAM



SIFAM ALL BRITISH METERS

Sifam moving-coil meters fitted in the new black bakelite flush type case are now available in a complete range of volts, amperes and milliamps. Sifam meters have been extensively used for the last nine years for checking voltages of batteries or eliminators and measuring filament currents, also for indicating poor quality due to distortion. Sifam moving coil meters are accurate, reliable and inexpensive.

Volts 3-500. Amps. 1-10. Milliamps 1-500.
Prices from 25/- to 42/6.
1,000 ohms per volt and A.C. Rectifier type 50/- to 72/6.

SIFAM ELECTRICAL INSTRUMENT Co., Ltd., York Works, Browning Street, S.E.17.

STAND TO STAND SHOW REPORT

(Continued from page 816)

is a neat component which will receive close attention during the forthcoming season and the remaining L.F. components are already well known.

STAND No. 42
BENJAMIN ELECTRIC, LTD., Brantwood Works, Tariff Road, N.17.

A FULL range of excellent Class B components was perhaps the most interesting feature of the Benjamin stand. Various types of transformers were shown, of which two were of the universal type, being tapped so that a number of alternative ratios can easily be obtained.

The well-known "Transceda," as well as various types of valve-holders and switches were also to be seen, and proved to be of more than passing interest to the many home constructors who looked over this stand.

STAND No. 43
DARWINS LTD., Fitzwilliam Works, Sheffield.

A WIDE and comprehensive range of magnets for all wireless purposes was shown on this stand. Various types included those for moving-coil and balanced armature speakers, gramophone pick-ups, telephones, galvanometers, etc.

STAND No. 44
REPRODUCERS AND AMPLIFIERS, LTD., Frederick Street, Wolverhampton.

THE well-known speakers bearing the name "R. and A." made a delightful setting on this stand, and comprised the small Bantam, the Challenger, the Victor, and the new 12-inch moving-iron model. The new Class B unit and speaker assembly will, no doubt, encourage many listeners to scrap their existing speaker and purchase one of these in order to obtain the benefits of Class B amplification plus a good moving-coil speaker, and this will, of course, lead to an increased demand for quality apparatus.

STAND No. 45
BELLING AND LEE, LTD., Cambridge Arterial Road, Enfield, Middlesex.

BESIDES the extremely wide variety of connecting and safety devices shown by this firm, considerable interest was centred round the ingenious "Clip-on" pick-up fitted with track arm and volume control, and which can easily be fitted on to any kind of gramophone when electrical reproduction is wanted.

Another item of general interest was the Disturbance Suppressor. The object of this is to obviate interference with radio reception often caused by the electric lighting mains. The unit actually consists of a pair of large-capacity fixed condensers connected in series. Three terminals are provided and these should be connected to the two mains leads and to earth respectively.

STAND No. 46
AUTOMATIC COIL WINDER AND ELECTRICAL EQUIPMENT CO., LTD., Winder House, Douglas Street, S.W.1.

A WORTHY successor to, and smaller brother of the well-known "Avometer" and known as the "Avomitor," was perhaps the outstanding item of interest on this stand. This instrument is not intended to supplement the larger instrument, but is a cheaper version which is sure to find favour with those who require a reliable multiple instrument at a distinctly reasonable price. The "Avodaptor" and "Avometer" were also well in evidence and attracted not a little attention.

STAND No. 47
SLEKTUN PRODUCTS, LTD., Winder House, Douglas Street, S.W.1.

THE new Slektun receivers proved very interesting amongst the smaller Slektun products which have proved so popular during the past season. The two-valve receiver for A.C. mains operation is an ideal receiver for the listener who desires a choice of only one or two stations at really good quality and with the minimum of trouble from the point of view of handling and risk of replacements. The new band-pass coils should also be used a great deal during the coming season.

STAND No. 49
HALFORD RADIO, LTD., 39, Sackville Street, W.1.

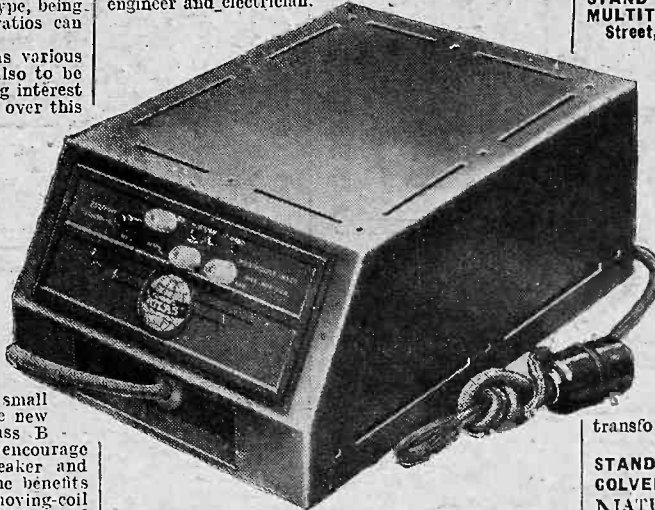
UNDOUBTEDLY the most intriguing exhibit here was the recently introduced "Tele-control." This is, in effect, a complete remote control by means of which the receiver can be operated entirely from any point in the house. The device consists of a cleverly arranged system of relays which are actuated automatically by the simple process of selecting the required station on the scale and depressing a small knob. Although somewhat expensive at the moment, due to the complicated nature of its construction, the unit is extremely interesting and strikes one as being almost uncanny. Nevertheless, it is free from all "snags" and can be considered as almost completely foolproof.

A number of high-class receivers were also exhibited and of these special mention should be made of five short-wave models which have been especially designed for the overseas market.

STAND No. 50
LANGASHIRE DYNAMO AND CRYPTO LTD., 94, Petty France, S.W.1.

A NEW and unusual type of battery charger was the feature of chief interest. Known as the "Karadio" it is probably the only unit of its kind on the market, and has been specially designed to enable motor car and wireless batteries of all sizes to be charged without any adjustment being required. It automatically regulates itself to the correct voltage and requires no attention whatever.

The well-known "Crypto" battery chargers were also shown, and were of chief interest to the service engineer and electrician.



The well-known Atlas Mains Unit. Several different types of this Unit are available for A.C. or D.C. mains.

STAND No. 51
S. SMITH AND SONS (MOTOR ACCESSORIES) LTD., Cricklewood Works, N.W.2

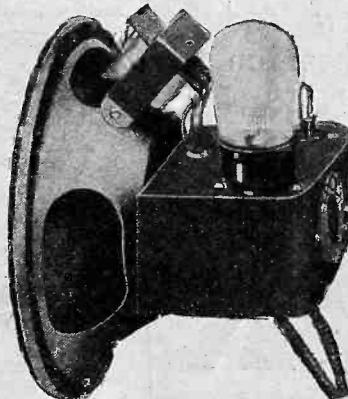
ACCUMULATORS and H.T. batteries made a wonderful show on this stand, and the attractive Anodex labels gave a very good indication of the various ratings which were obtainable, from the small 60-volt battery to the largest Class B type. The accumulators, both of the small 2-volt type and the large H.T. blocks, were worthy of attention and represent very good value.

STAND No. 52
BRITISH ROLA CO. LTD., Minerva Road, Park Royal, N.W.10

IT is rather difficult to label any one exhibit as the most popular on this stand, but it was noticed that great interest was shown in the miniature speaker units and in the complete speaker with Class B amplifier. But loudspeakers of every conceivable pattern, from the midget to the large auditorium model, were on view and no matter what the visitor's speaker requirements happened to be he could certainly satisfy them.

STAND No. 53
HENLEY'S TELEGRAPH WORKS CO. LTD., Holborn Viaduct, E.C.1

THE new "Empire Solon" soldering iron was the item of outstanding interest here, and one which appealed particularly to set repairers and constructors. Straight or angle bits can be interchanged so that the tool is applicable to every type of soldering job. It has a consumption of only 70 watts, and can be obtained for any kind or voltage of mains supply. The older "Solon" iron which has proved so popular in the past was also shown, and its use was demonstrated in an interesting manner.



Manufactured by Epoch, this complete loud-speaker and Class B amplifying stage forms a valuable unit for adding to an existing low-powered receiver.

STAND No. 54
HARLIE LTD., Balham Road, Lower Edmonton, N.9.

A POPULAR exhibit on this stand was the "Fix-a-gram," a cleverly designed unit consisting of a motor, turntable, and pick-up, which can be used with any type of receiver. It was shown with both clock-work and electric motors and was seen to be a very attractive piece of furniture, in addition to its being a most useful and efficient accessory.

Other items shown were the Harlie pick-up, various types of switches, microphones, automatic gramophone motor stops, and tone selectors.

STAND No. 55
MULTITONE ELECTRIC CO. LTD., 95-98, White Lion Street, Islington, N.1.

SOMETHING entirely new to wireless was shown on this stand in the form of a five-valve Class B receiver, having two S.G. stages by which it is claimed that the deaf can hear wireless programmes with perfect ease. This claim does not only apply to those who are more or less temporarily deaf, but even to deaf mutes who have never heard before in their lives. In addition to its use as a normal broadcast receiver, the instrument can also be employed as an amplifier in conjunction with a microphone to enable the deaf to hear normal conversation. This set is undoubtedly revolutionary and should prove of extreme value to those who have been deprived the privilege of hearing.

Other interesting exhibits were the new Class B unit which can instantly be connected to any battery receiver, the popular Multitone tone control transformer and a wide variety of Class B transformers and output chokes.

STAND No. 56
GOLVERN LTD., Mawney's Road, Romford, Essex.

NATURALLY, the principal exhibits on this stand were a complete range of Ferrocart coils. These were shown in every type and in numerous ganged combinations, suitable for use in almost every type of multi-valve receiver. An interesting example of complete tuning unit is one comprising a set of band pass and tuned-grid coils for two-S.G. sets, and fitted with an interesting 4-point switch which gives "long waves," "medium waves," "gramophone," and "off" when set to the alternative positions. A number of special coil assemblies for modern superheterodynes were also shown, and these attracted considerable attention.

For the constructor who is more interested in the making of simple Det.-L.F. receivers the new Ferrocart aerial coil, which is specially designed to give high selectivity and freedom from break-through, proved a most interesting new line.

STAND No. 57
EVER READY CO. (G.B.), LTD., Hercules Place, Holway, N.7.

BATTERIES for every requirement were to be seen on this stand. It was noticeable that most types of high-tension batteries were shown in both low capacity and Class B patterns. The latter probably proved to be of greatest interest, due to the popularity which Class B amplification has lately achieved.

STAND No. 58 and 60
REGENT RADIO SUPPLY CO., 21, Bartlett's Buildings, E.C.4.

MESSRS. REGENT RADIO SUPPLY CO. were one of the first firms to produce high tension eliminators, and their "Regentone" units have attained a position of great popularity with listeners in every part of the country. It was not, therefore, surprising to find an excellent series of mains units of every conceivable type displayed on this stand. Units for A.C. and for D.C., with and without trickle chargers, were very much in evidence, whilst a staff of engineers was in attendance to give free advice in regard to the suitability of the various units for different kinds of receivers.

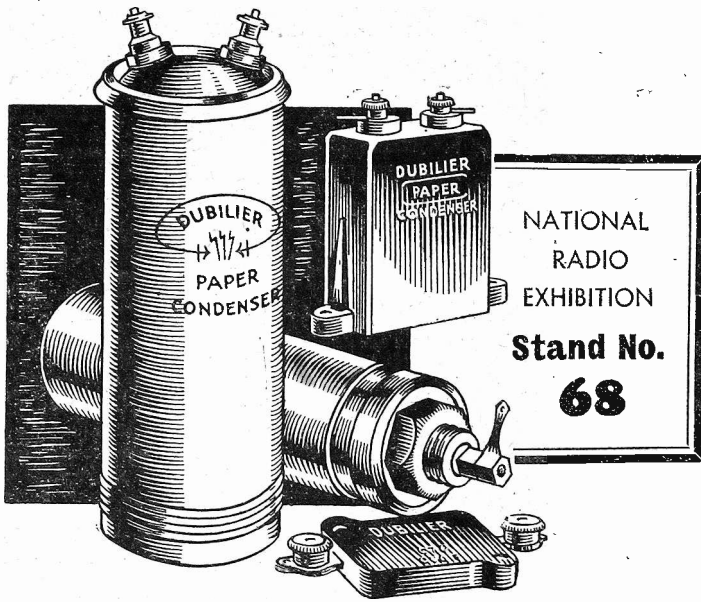
STAND No. 61
A. J. BALCOMBE, LTD., 52-58, Tabernacle St., E.C.2.

THE good range of superheterodyne receivers in both mains and battery forms attracted most attention on this stand. The novel tuning control, consisting of two scales for medium and long waves, disposed one on each side of the tuning knob, came in for much favourable comment, whilst the distinctive cabinet work was warmly appreciated. Battery users found the self-contained four-valve Class B set of particular interest, and it was shown in both console and radiogram form.

STAND No. 63
KOLSTER-BRANDES, LTD., Cray Works, Sidcup, Kent.

THREE interesting superheterodynes were very noticeable on this stand, and they were in four, six and eight-valve models. The six-valver is fitted with A.V.C. and automatic tone correction, whilst the eight-valve set has quiet automatic volume control, operated through a double-diode

(Continued on page 821)



NEW and IMPROVED CONDENSERS AND RESISTANCES FOR 1933-4

THE new Dubilier products mark a great advance in Condenser and Resistance design and will maintain Dubilier's established position as the foremost manufacturers of the highest quality products, at the lowest price levels. Write for new illustrated booklet fully describing the new and unique designs, or inspect them on the Dubilier Stand, No. 68, National Radio Exhibition, Olympia.

DUBILIER CONDENSERS AND RESISTANCES

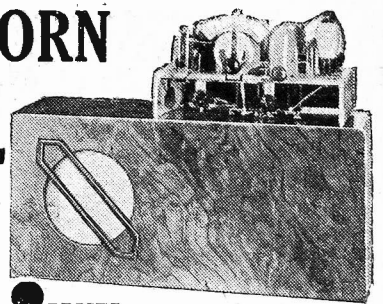
Dubilier Condenser Co. (1925) Ltd., Ducon Works, Victoria Road, North Acton, W.3

this OSBORN CABINET

SPECIFIED FOR F. J. CAMM'S 1934 SUPER-SET

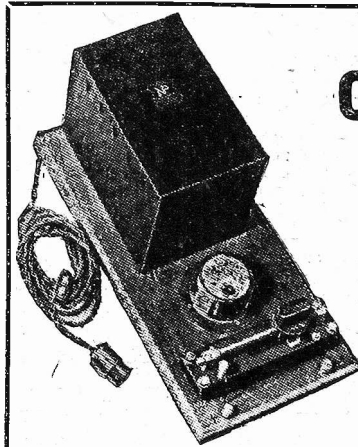
Another proof of the popularity of Osborn Cabinets—this new Ultra-Modern radio cabinet has been specified for F. J. Camm's 1934 Super-Set. Size 25ins. wide, 11ins. deep, 11ins. high. Obtainable in Oak, Mahogany or Walnut.

All Models Carriage Paid. WRITE FOR CATALOGUE. CHAS. A. OSBORN, Dept. P., Regent Works, Arlington St., New North Rd., London, N.1. Tel.: Clerkenwell 5093. Showrooms: 21, Essex Rd., Islington, N.M. Tel.: Clerkenwell 5634.



PRICES: Machined Ready to Assemble, Kit of Parts, Oak 12/6, Mahogany 15/-, Walnut 15/-. Assembled Ready to Polish, Oak, 17/-, Mahogany £1.0.0, Walnut £1.0.0. Assembled and Polished, Oak £1.2.6, Mahogany £1.5.0, Walnut £1.5.0.

OSBORN SUPER ACOUSTIC BAFFLE BOARD. Prevents 90 per cent. speakerworry. Any size hole cut FREE. 18ins. by 18ins., 3/-; 24ins. by 24ins., 5/-; 30ins. by 30ins., 8/-; 36ins. by 36ins., 11/3. Carr. paid U.K. Send For Free Sample.



BATTERY CHARGERS

For A.C. Mains THE SENIOR TWO TYPE N.P.

(Illustrated) will charge one to thirty batteries at once. 15-20 volts at 3 amps. Sliding Variable Resistance from small amperage—Westinghouse Metal Rectifiers. For H.T. and L.T. Cells.

Trade Price 105/- Complete delivered.

Other models up to £40 Eliminators from 57/6

Send for 1933 trade list.

NASH PRODUCTS LTD. STECHFORD, BIRMINGHAM (9)

PEAK BRITISH MADE CONDENSERS



Write for New Complete Illustrated Price List "B."

Compared with other leading makes PEAK Condensers are low in price, but they are of the very highest quality. Made by the most up-to-date machinery from the finest materials obtainable, they are representative of the very latest developments and can be relied upon for unflinching service.

"PEAK" ARE SPECIFIED FOR "THE AUTO-B THREE"

These are the ones you need:—

- One 8 mfd. Electrolytic, Type "W," 4/9
- Two 1 mfd., Type "A4," @ 2/2 each
- Two .01 mfd., Type "M," @ 1/- each

WILBURN & CO.,

Wheatshaf House, Carmelite St., London, E.C.4. Tel.: Central 6810. Northern Agents: W. Andrew Bryce & Co., Tile St., Bury.

SAVE 50% ON VALVES

Buy British 362 by post direct from the makers. There is a FULLY GUARANTEED type for every purpose.

362 are Non-Microphonic and are definitely as good as any and better than most. They bring you better radio at lower prices. BRITISH ALL THROUGH.

Post-Free from **3/6**



The 362 "Class B" —the first and most successful of all "Class B" valves.

- R.C., H.F., L.F., or Det., 3/6. Power, 4/- Super-Power, 4/6. S.G. or Var-Mu., 7/6. Pentode type, 10/-.
- All in 2v., 4v., or 6v. Metallised 3d. extra.
- "CLASS B" 2v. filament, 7-pin base, 9/-.
- A.C. MAINS VALVES, 4-volt, 1 amp. (Indirectly Heated). Prices 7/6 to 12/6. Full List post free.
- 362 UNBREAKABLE METAL VALVES (BATTERY type) will shortly be released.

Cash with order. Cheques and P.O.'s must be crossed and made payable to:— THE 362 RADIO VALVE Co., Ltd. (Dept. W. 15), Stoneham Road, London, E.5.

STAND TO STAND SHOW REPORT

(Continued from page 819)

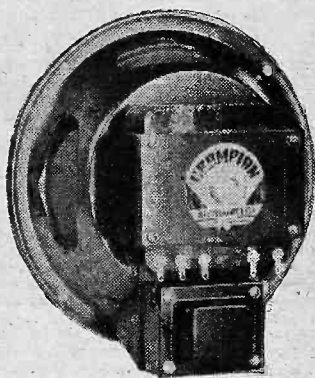
triode second detector. Two pentodes form a push-pull output stage and give over 5 watts signal output. All K.-B. receivers are designed for use with a screened aerial down-lead for the suppression of electrical interference, and the necessary equipment for this purpose was exhibited.

**STAND No. 64
BUS-RADIO, LTD., Woodger Rd., Shepherd's Bush, W.12.**

ALTHOUGH a range of excellent and interesting receivers was shown on this stand, one cannot deny the fact that the *pièce de résistance* was the complete television receiver. This latter was examined by every keen "fan," and proved of extreme interest. Those who found time to examine the receivers were pleased to observe their many up-to-date and novel features.

**STAND No. 65
SUNBEAM ELECTRIC, LTD., Sunbeam Rd., N.W.10.**

THE Universal receiver was first introduced to this country by the Sunbeam Electric, and now the Midget has been introduced by the same firm. Many visitors expressed surprise at the neat and compact receiver which has been developed, and the standard of reproduction — as well as could be judged by the method of re-broadcasting which was adopted — reflects quite a high standard. The Class B battery receiver at £10 10s. also proved extremely popular.



A Gramian Midget Loud-speaker. The cone is only 6ins. or so in diameter, but it can handle well over 2 watts.

**STAND No. 66
COLUMBIA GRAPHOPHONE, LTD., 98-108, Clerkenwell Rd., E.C.1.**

HERE there was a most extensive range of high-grade receivers and radiograms of all types, and at prices to suit any pocket. The new "Autoradigram" with automatic record changing device, and using a five-valve superheterodyne receiver, quite naturally proved to be the centre of attraction, and many onlookers were fascinated by the working of the ingenious record-changing mechanism.

There were plenty of smaller sets, which obviously had a wide appeal to every class of buyer, whether he was a mains or battery user.

**STAND No. 68
DUBILIER CONDENSER CO. (1925), LTD., Ducon Works, Victoria Rd., North Acton, W.3.**

IT would be almost superfluous to point out that I condensers of every conceivable type were displayed on this stand, but it might be mentioned that really useful booklets giving complete details of them were available. These latter were in great demand in view of the useful information which they contained. Many of the older and popular condensers were shown in new and improved form, and it was interesting to find that in most cases the ranges had been extended. Something quite new in the way of non-inductive paper dielectric condensers was shown. This was of tubular form and accommodated in a metal container fitted with a screw-on base; once the base has been attached to the receiver any number of alternative condensers can be screwed into it without the use of any tools whatever. This is a very ingenious feature and one which will have a strong appeal to the experimenter. Another notable point about the new condenser is that the terminals are mounted on a domed bakelite top in such positions that they cannot accidentally be short-circuited in wiring up.

The well-known metallised resistances were shown in an improved form, and they should now prove even more attractive than before.

**STAND No. 69
MCMICHAEL RADIO, LTD., Wexham Road, Slough, Bucks.**

TWO receivers of outstanding interest were shown on this stand, in addition to several existing models which are being continued. The first was the "Lodex 5," a five-valve Class B battery set fitted in the now-popular horizontal cabinet and having moving coil speaker, full vision scale and other McMichael features. The "Twin Supervox" is the second new set and is a 4-valve A.C. model with twin balanced moving coil speakers, one of which is mounted on each side of the central tuning panel. A horizontal cabinet is again used and the set has two S.G. stages and pentode output.

**STAND No. 70
COLE, LTD., E. K., Ekco Works, Southend-on-Sea, Essex.**

"EKCO" mains units in types suitable for every type of receiver were shown on this stand. As the first firm in this country to manufacture eliminators on a large scale, Messrs. Ekco undoubtedly know the requirements of their customers, and their latest models are clear proof that these have been amply fulfilled.

A large portion of the stand was devoted to a new range of "Ekco" superheterodyne receivers, which attracted a considerable amount of favourable comment. There is little doubt that these latest receivers will become even more popular than the previous models that have sold during the past few years.

**STAND No. 71
MULLARD WIRELESS SERVICE CO. LTD., Charing Cross Rd., W.C.**

UNDOUBTEDLY the most attractive feature here — apart from the stand and its exhibits — was the free gift which was obtained by probably every visitor to the Show. Who was there who did not find the attractive little fan of the greatest assistance in keeping cool? And who was there who did not avail themselves of the chance of obtaining one of the neat little carriers in order to carry away the various pamphlets and catalogues which were obtainable throughout the exhibition? However, the arrangement of this stand — in the form of a fortress, attracted many, and one could see well arranged displays of the very latest valves such as the variable-mu pentodes for H.F. work; Class B valves for power output in battery receivers; screen-grid valves, and so on. Altogether this was a stand where any type of valve could be seen, and undoubtedly many will make certain that their next valve replacement will be obtained by a Mullard product.

**STAND No. 72
LISSEN LTD., Worpole Road, Isleworth, Middlesex.**

IT is really difficult to pick out on this stand the item which proved most attractive. The kits sets, the complete receivers, the sundry components, all seemed to hold the attention. The new superheterodyne will undoubtedly prove one of the big lines of the coming season, and the new iron-core coils will also prove an important accessory in many receivers. The new Skyscraper kit for an All-Wave receiver, covering short, medium and long waves will also introduce many to the short waves for the first time. The 6-stage Band Pass super-het. with automatic volume control and Class B output at a cost of £11 10s. is a remarkable bargain and, in our opinion, this represented one of the best offers in the Show.

**STAND No. 73
PYE RADIO LTD., Africa House, Kingsway, W.C.2.**

SOME novel types of receiver were tastefully displayed on this stand, and the new Class B receiver was probably the most interesting, incorporating as it does the latest method of L.F. coupling. Many old receivers were still to be seen, and these have made a name for themselves in the past and are still in great demand.

**STAND No. 74
FERRANTI LTD., Hollinwood, Lancashire.**

AMONGST all the various types of receivers and loud-speakers, the various smaller components and meters seemed to form an exhibit of such a comprehensive nature that one could only stop and marvel. The Gloria was probably the high-light of the complete receivers, and this as well as some of the other models was also seen to be obtainable with a small electric clock forming part of the cabinet. Splendid representative types of loud-speaker were also seen, and the new Ferranti Valves, with the new carton, will no doubt be seen in many shop windows in the future.

**STAND No. 75
PORTADYNE RADIO, Portadyne Works, Gorst Road, N.W.10.**

THE portable receivers manufactured by this company were well set out, and some of the novelties were extremely interesting. The novel tuning dials, in which a red line has to be matched up to ensure that the station is accurately tuned will no doubt prove a great attraction to the listener with no wireless knowledge, and it is fool-proof. The new Class B receiver was also a great attraction.

**STAND No. 76
CROMWELL (Southampton) LTD., 32-33, Brinton's Terrace, Southampton.**

FIVE new receivers were seen here, and these embraced a Universal (A.C. or D.C.) receiver, as well as a battery Class B receiver. The 8-valve super-heterodyne, with automatic volume control and Class B output, complete with moving coil loud-speaker, will give many battery users the chance to obtain a really powerful receiver. The cost is 18 guineas, and for the same figure one can obtain a powerful A.C. mains receiver fitted with a 3.5 watts pentode.

**STAND No. 77
MARCONIPHONE COMPANY LTD., 210, Tottenham Court Road, W.1.**

NO fewer than a dozen different types of receiver could be counted on this stand, and they ranged from a small battery receiver using only 2 valves, to a multi-valve superheterodyne radio-gram complete with automatic record changer. Obviously here was a set for anyone, and they represented the last word in design and workmanship. In addition, there were several different types of loud-speaker, from the simple cone to the large energized field moving coil. All types of valves were seen, including the new Double-Diode Triodes, and the new Class B. The new Pick-up is also a most interesting model, showing a great improvement on last year's design.

**STAND No. 78
ULTRA ELECTRIC LTD., Erskine Road, N.W.3.**

THE receivers here displayed were of the very latest type, and in addition to the superheterodyne principle, automatic volume control and other modern developments were incorporated. The cabinets were certainly modern so far as design is concerned, and the names applied to the receivers are certainly well remembered.

**STAND No. 79
RADIO GRAMOPHONE DEVELOPMENT CO. LTD., 18-20, Frederick Street, Birmingham.**

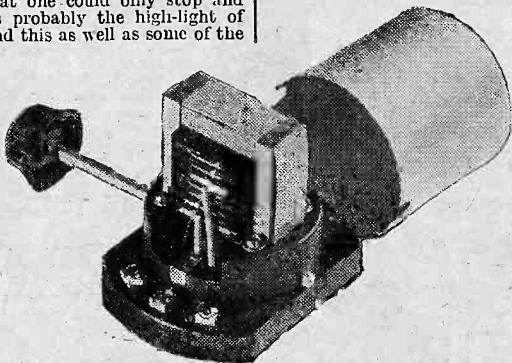
THE 12-valve superheterodyne radio-gram was undoubtedly the *pièce de résistance* on this stand. Although so many valves are employed many of them are, in effect, "passengers." These include, for instance, an automatic volume control valve, a "squelch" valve, a rectifier, etc. The output utilizes a push-pull circuit on the resistance-capacity principle, and it is altogether a de luxe receiver, delivering an undistorted output of 6 watts. Other splendid receivers on this stand also showed considerable ingenuity and concentration on detail.

**STAND No. 80
GRAMOPHONE CO., LTD., 98-108, Clerkenwell Road, E.C.1.**

AN item of outstanding interest on this stand was the new "Superhet Selective Five," which is an all-mains five-valve superheterodyne receiver selling at the attractive price of 15 guineas. A larger instrument, which proved extremely popular, was the "Superhet Ten Autoradiogram." This is really a super de-luxe ten-valve radiogramophone fitted with delayed automatic volume control, tone control, automatic record changer and mains aerial device. The cabinet work is most elaborate and of particularly pleasing appearance, and the instrument is one which will harmonise with practically any furnishing scheme. The "Superhet Portable Six" was another receiver that received close attention by visitors. This is a battery set of an advanced type and has a wavelength calibrated tuning dial and self-contained M.C. speaker.

**STAND No. 81
PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2.**

THE Superinductance receivers formed the greater part of this exhibit, although the various types of rectifying valves, etc., also had an important position on the stand. The Superinductance Five is probably the most popular of the complete range and this gives results almost equal to those obtained with a superhet. type of receiver. The various Philips accessories also attracted attention.



Already familiar to our readers, this is one of the new Igranicores dust-iron core tuning coils.

**STAND No. 82
EDISON-SWAN ELECTRIC CO., LTD., 155, Charing Cross Road, W.C.2.**

THE cathode ray oscillograph was the centre of attraction on this stand and was carefully inspected by the many visitors who are now taking an interest in television. Many were fascinated by the wave forms reproduced by the oscillograph of the music being reproduced by the loud-speakers.

There were also on exhibition a wide range of R.K. moving-coil loud-speakers and the well-known range of B.T.H. pick-ups. The former were shown both as "baro" units and also as complete cabinet models of attractive design.

**STAND No. 83
CARRINGTON MFG. CO., LTD., 24, Hatton Garden, E.C.**

AMONG the particularly extensive range of cabinets shown on this stand one was at once attracted by several of the very latest designs. These included both consolelets and complete radiogram cabinets in patterns to suit every taste. One could not fail to recognise the high-class workmanship which was

(Continued overleaf)

STAND TO STAND SHOW REPORT

(Continued from previous page)

undoubtedly put into their construction and the fact that they were obviously of both sound construction and good appearance was responsible for a number of visitors deciding to use one for his new set.

STAND No. 84.
CLIMAX RADIO ELECTRIC, LTD., Haverstock Works, Parkhill Road, Hampstead, N.W.3

UNDOUBTEDLY the most interesting receiver on this stand was the entirely new Model S.4 superheterodyne. This is a four-valve (plus rectifier) A.C. mains receiver and includes several novel features. Amongst these one might mention the balanced band-pass input circuit fitted with a special second channel interference suppressor; illuminated tuning scale with station names and wavelengths clearly marked; straight line volume control; mains aerial; provision for connecting an external aerial; adaptability for either 100/120 or 200/250 volts A.C. mains, and an attractive walnut cabinet with silver speaker grill. Numerous other very up-to-date receivers of diverse types were also shown and these deserved the praise which they received.

STAND No. 85
VARLEY (OLIVER PELL CONTROL), LTD., 103, Kingsway, W.C.2

RECEIVERS, as well as small components, were tastefully displayed here, and it was really difficult to find the principal item of interest. The receivers certainly were worth a thorough inspection, but the mains transformers, chokes, etc., as well as the new iron-core tuning coils also held a prominent position. The new superhet, undoubtedly held a premier position in the complete receiver class, but the complete stand served to show how thorough is the range of Varley products for the home constructor. The permeability tuner is undoubtedly a forerunner of the tuner of the future and no doubt interested every visitor. The high-class finish on all the Varley products was most conspicuous.

STAND No. 86
IGRANIC ELECTRIC CO., LTD., 149, Queen Victoria Street, E.C.4

THIS was a very tastefully arranged stand, showing many various types of the new iron-core coil. In addition, new types of tubular condenser were displayed and two short-wave adaptors. Amongst the many other exhibits were Class B transformers; standard L.P. transformers; a neat loud-speaker; chokes; microphones, etc. The complete range is very vast indeed, and there was an atmosphere of refinement about all of the samples shown, and this, together with the well-known name, served to convince many that here were components which could be relied upon.

STAND No. 87.
MONTAGUE RADIO INVENTIONS & DEVELOPMENT CO., LTD., Beethoven Works, Great College Street, Camden Town, N.W.1.

THE new S.G. 4 receiver is the principal model which this firm has developed for this exhibition, and it is a very good little receiver. Iron-core coils are employed and with the Pentode output valve and moving coil loud-speaker it represents splendid value at 11 guineas. Several other models were also to be seen.

STAND No. 88.
TELSEN ELECTRIC CO., LTD., Thomas Street, Aston, Birmingham.

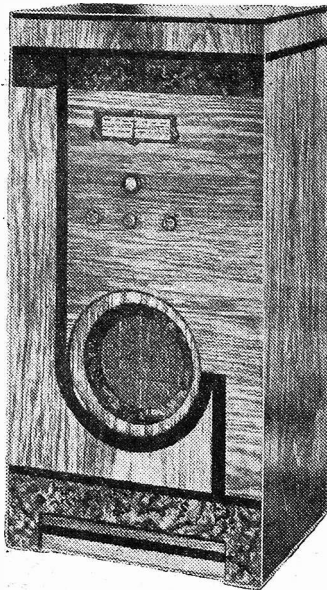
RECEIVERS and components. This sums up the total exhibit but gives no idea of the vast range which was exhibited in both classes. Switches, coils, condensers, resistances — practically every component required for the construction of a receiver was shown, and the very latest in design was included. For instance, the new iron-core tuning coil was shown, as well as the very small electrolytic condensers for biasing purposes. The receivers also were of modern design, incorporating all those features which have been developed during the past season. The workmanship was worthy of comment, and judging by the crowds which always surrounded the stand it was a most popular show.

STAND No. 89.
COSSOR, A. C. LTD., Cossor Works, Highbury Grove, London, N.5.

SOME interesting features were seen on the Cossor stand, and many were attracted to the large scale model of the electrode assembly of the Cossor Pentode. This gave the visitor an admirable idea of the work which is put into a valve, and many were surprised to think that so much could be



The new Six Sixty H.F. valve.



A fine super-heterodyne radio-gramophone manufactured by Radio Instruments. This instrument costs £35.

was first impressed by the new 5-valve mains superheterodyne. Fitted with tone control, station calibrated tuning dial and other up-to-date features the set is contained in a very handsome grained walnut cabinet. An 8-valve de-luxe A.C. superhet was also an interesting exhibit. It was shown in both table and console types, both of which were very attractive. The "Thirty Three" kit set for home construction proved to be an interesting exhibit and one which will prove a worthy successor to the well-known range of "Music Magnet" receivers that have been produced during the last few years.

Three new "Osram" battery valves were also the centre of considerable interest: these include a special screened grid one with non-microphonic construction, a short base variable-mu and a Class B.

STAND No. 91.
CLARKE & CO. (M/c), LTD., George Street, Patricroft Street, Manchester.

BESIDES the wide variety of well-known "Atlas" mains units (including special types for Class B and Q.P.P.) there were some particularly interesting receivers shown on Messrs. Clarke's stand. The most popular of these were the mains one, type A.4, having an undistorted output of 3 watts, and a four-valve Class B battery set fitted with an excellent moving coil loud-speaker.

STAND No. 92.
OSRAM VALVE, Magnet House, Kingsway, W.C.2.

THE Catkin valve was undoubtedly the main attraction on this stand, and the method of assembly was clearly seen in the larger models which were displayed. In addition, the ordinary types of valve which were seen included some of the newer types such as the Class B. This latter differs from the majority of the Class B valves which are obtainable in that an initial application of grid bias is required. It is claimed that this results in improved results and greater output.

STAND No. 93.
WINGROVE & ROGERS, LTD., Arundel Chambers, 188-189, Strand, London, W.C.2.

THE new types of condenser and slow-motion dials attracted considerable interest. The new types of dial, although shown on many stands at this particular exhibition, call for close attention, and from the remarks of many of the people round this stand it is certain that this type of tuning dial will find great popularity during the coming season. The novel addition of the air-dielectric trimmer to these dials was, in our opinion, the most important feature of the stand.

STAND No. 94.
CITY ACCUMULATOR CO., LTD., 18-20, Norman's Buildings, E.C.1.

A WIDE range of excellent cabinets was a strong feature of this exhibit, but a considerable amount of attention was directed towards various types of new receivers which were on view. These varied from a simple three-valve battery model, known as the "Norman Class B Three" and incorporating a Ferrocoat coil, to an ultra-modern superhet. The latter is a four-valve mains instrument, including the recently-introduced pentagrid converter, variable-mu pentode and double-diode pentode second detector. A gramophone amplifier giving an output of six watts also merited

crowded into the small glass bulb with which we are all familiar. The new Cossor receivers on the rotating shaft in a glass case also enabled one to see every part of the receiver and assisted in holding the attention. In addition to the many new valves, sundry components were also to be seen.

STAND No. 90.
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.

ON examining the exhibits on this stand one

the keen interest which was shown in it by those requiring a large output of undistorted record reproduction.

STAND No. 95.
SIX SIXTY RADIO CO., LTD., 17, Rathbone Place, W.1.

IN addition to the many different types of valves shown here the receivers also attracted considerable attention. The new types of mains valve will no doubt prove extremely popular in the receivers of the coming season, and the Super Five receiver will find many purchasers. This is a really high-class receiver giving a choice of many stations at really good quality.

STAND No. 96.
STANDARD TELEPHONES & CABLES, LTD., 364, Gray's Inn Road, W.C.1.

THE broadcast receivers shown on this stand were of high quality, and no doubt the A.C. superheterodynes claimed first place. The two-valve A.C. mains receiver with moving coil loud-speaker will no doubt prove a good seller during this season and is capable of a really fine performance, despite the small number of valves.

STAND No. 97.
THE BRITISH BLUE SPOT CO., LTD., 94-96, Rosebery Avenue, E.C.1.

ONE need hardly remark upon the fact that an extremely wide range of loud-speakers of both balanced armature and moving coil types was exhibited by this firm. New lines which attracted a good deal of well-earned attention consisted of a range of mains energised M.C. units in a variety of types to suit all kinds of supply mains. In addition to the "bare" speaker units a number of others in attractive and modern cabinets were examined with keen interest by the non-constructional amateurs.

STAND No. 98
TELEGRAPH CONDENSER CO., LTD., Wales Farm Road, North Acton, W.3.

THE familiar green cases for condensers identified this stand. In addition to the larger metal-cased Mansbridge type of condenser, the nudget (or Type "M") condensers were also shown, together with other types of small mica condenser. The total range—both for reception and transmission—covered a most comprehensive number of types and values and in most it was found possible to obtain models with terminals for connections, or soldering lugs for those who prefer that method of wiring. Some of the special manufacturer's models were also shown.

STAND No. 99
ORMOND ENGINEERING CO., LTD., Ormond House, Rosebery Avenue, E.C.1.

SPEAKERS, ranging in price from 12s. 6d. to nearly £3, formed one of the principal features here, and in addition to the models which have been so popular during the past year some new types were to be seen. In addition the range of variable condensers was well set out, and some of the vast range of products of the Ormond Company were seen.

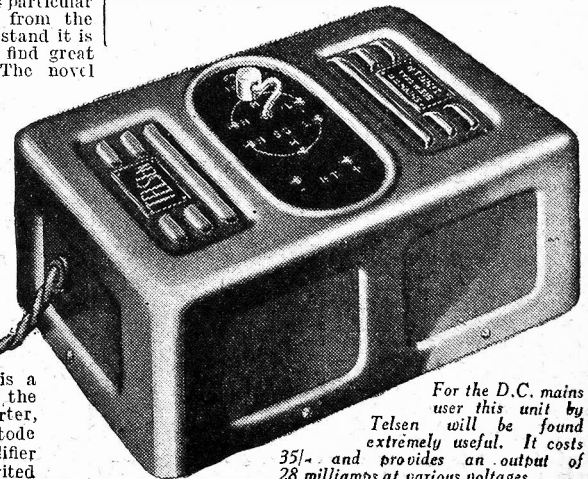
STAND No. 100
ELDECO RADIO, LTD., 62, Conduit Street, London, W.1.

THE Stenode all-mains six-valve superheterodyne with automatic volume control and electric tuning was the principal attraction on Stand No. 100, and in addition there were several other interesting types of receiver. The ingenious Log Box well repaid examination and no doubt many listeners will make certain that this forms part of their equipment during the coming winter months.

STAND No. 101
SOVEREIGN PRODUCTS, LTD., "Sovereign House," 52-54, Rosebery Avenue, E.C.1

A MOST extensive range of the smaller components was shown here, and they included many which were already familiar to the home-constructor. Such

(Continued on page 827)



For the D.C. mains user this unit by Telsen will be found extremely useful. It costs 35/- and provides an output of 28 milliamps at various voltages.

NOW!



**THE BRITISH
RADIOPHONE
RANGE OF
PRODUCTS**

RADIOPAKS

Band Pass
Super Het. R.F.
Super Het. B.P.
2 R.F.

COILPAKS

BAND PASS
SUPER HET.
2 R.F.

I.F. COILS

ALLWARE COILS
GANGED CONDENSERS
SHORT-WAVE CONDENSERS

SINGLE TUNING CONDENSERS

SLOW MOTION DISC DRIVES (5 types)

FIXED CONDENSERS
CLASS "B" TRANSFORMERS

PICK-UPS

POTENTIOMETERS
THE DUOVOL

RECEPTRU

Q.M.B. SWITCHES
VALVE HOLDERS

"PUSH-BACK"
CONNECTING WIRE
ETC., ETC.

CON-



**VISIT US AT
OLYMPIA
STAND . . 118**

**you can
be SURE
of Better Radio**

BRITISH RADIOPHONE have earned a high reputation for quality and accuracy. "Matched perfection" is their slogan, and they live up to it.

The proof of this is to be found in the fact that few sets of any importance are designed without the inclusion of one or another of Radiophone "matched perfection" components.

Where experienced professional designers evince so much confidence the private

constructor can have no doubt. Follow the golden rule for success. Use British Radiophone components and be sure of better radio. The British Radiophone range for 1933-34 is complete in every way. And every item from the latest ganged condenser down to the smallest switch is guaranteed to be accurate in the highest degree and of superlative quality.

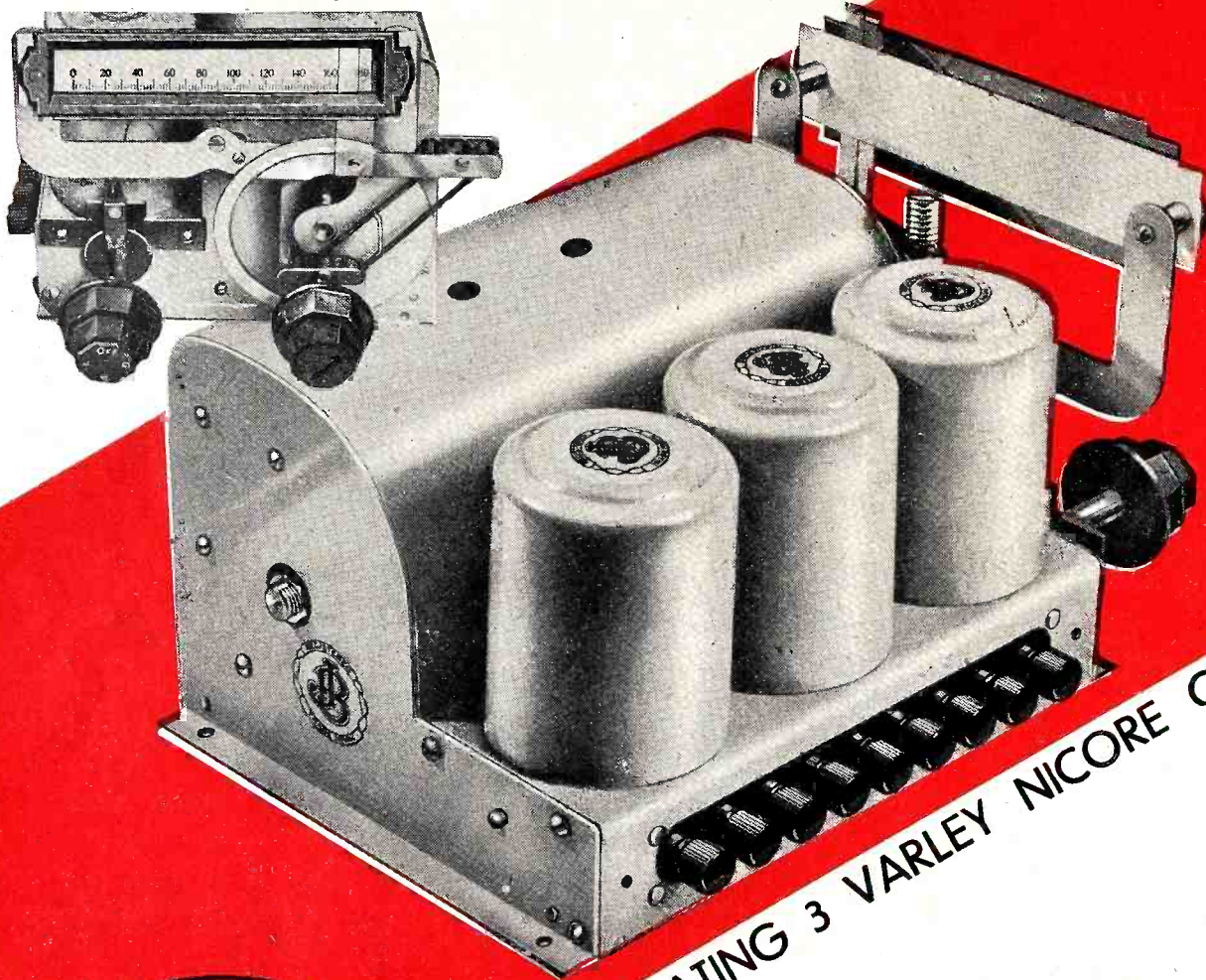
Ask your dealer or write for catalogue to British Radiophone, Ltd., Aldwych House, London, W.C. 2.

**BRITISH RADIOPHONE
"MATCHED PERFECTION"**

THE NEW J.B.

LINACORE

BAND-PASS TUNER



INCORPORATING 3 VARLEY NICORE COILS



The J.B. LINACORE... an exceptionally selective band-pass tuning unit employing the latest type of iron-cored coils. LINACORE takes all the worry out of set-building. Far more efficient than if home-assembled and far more compact. Obviates all ganging difficulties. Makes the most of its super-selective coils by very accurate matching of the condenser sections. Tunes from 200-550 and 800-2000 metres. LINACORE gives a 3-valve set a performance comparable to a superhet. Complete with volume and reaction controls and all switching. Fitted with the latest pattern J.B. Straight Line Dial. See it at STAND 116, NATIONAL RADIO EXHIBITION, OLYMPIA.

B.R.G. SPECIFIED AGAIN

**ACCEPT NO SUBSTITUTE
INSIST UPON  COMPONENTS**

As Used by Mr. F. J. CAMM
in The

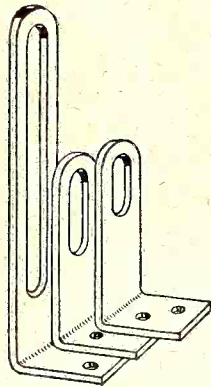
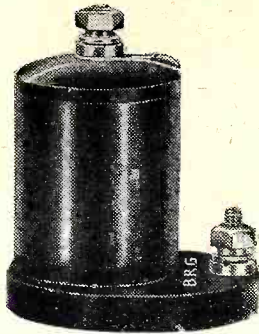
F. J. CAMM 1934 SUPER-SET AND ALL-WAVE TWO

B.R.G. COMPONENT MOUNTING BRACKETS

Solely specified for
F. J. CAMM 1934 SUPER-SET

Set of 3, Drilled and Plate-finished.

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B.R.G. SHORT-WAVE H.F. CHOKE

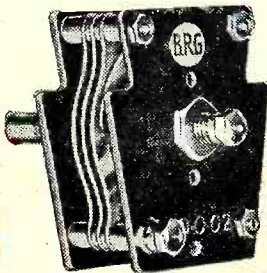
Solely specified for
ALL-WAVE TWO
Single layer wound for lowest possible loss. Terminal Connections.

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B.R.G. REACTION CONDENSER

Solely specified for
ALL-WAVE TWO
with solid di-electric. Positive contacts. .0002 mfd

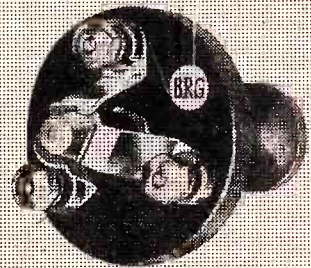
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B.R.G. 3 POINT SWITCH No. 48

Push-pull type. Solely specified for
F. J. CAMM SUPER-SET and ALL-WAVE TWO
Specially strong phosphor-bronze self-cleaning contacts

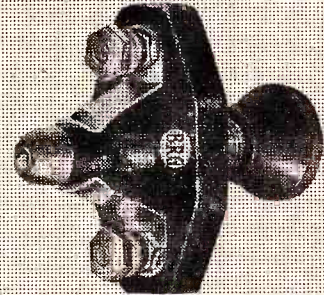
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B.R.G. 2 POINT SWITCH No. 49

Push-pull type as Solely specified for
ALL-WAVE TWO
Self-cleaning contacts and specially strong phosphor-bronze

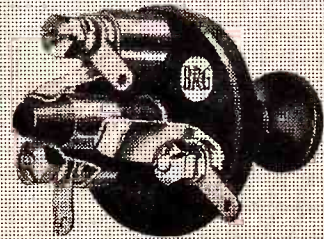
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B.R.G. 3 POINT SWITCH No. 50

Solely specified for
F. J. CAMM 1934 SUPER-SET
Push-Pull Type with special contacts.

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SOLE DISTRIBUTORS OF METAPLEX BASEBOARDS

Specified in the F. J. CAMM 1934 Super-Set and the All-Wave Two.

Dealers are invited to send for latest list of B.R.G. Components and Metaplex Baseboards

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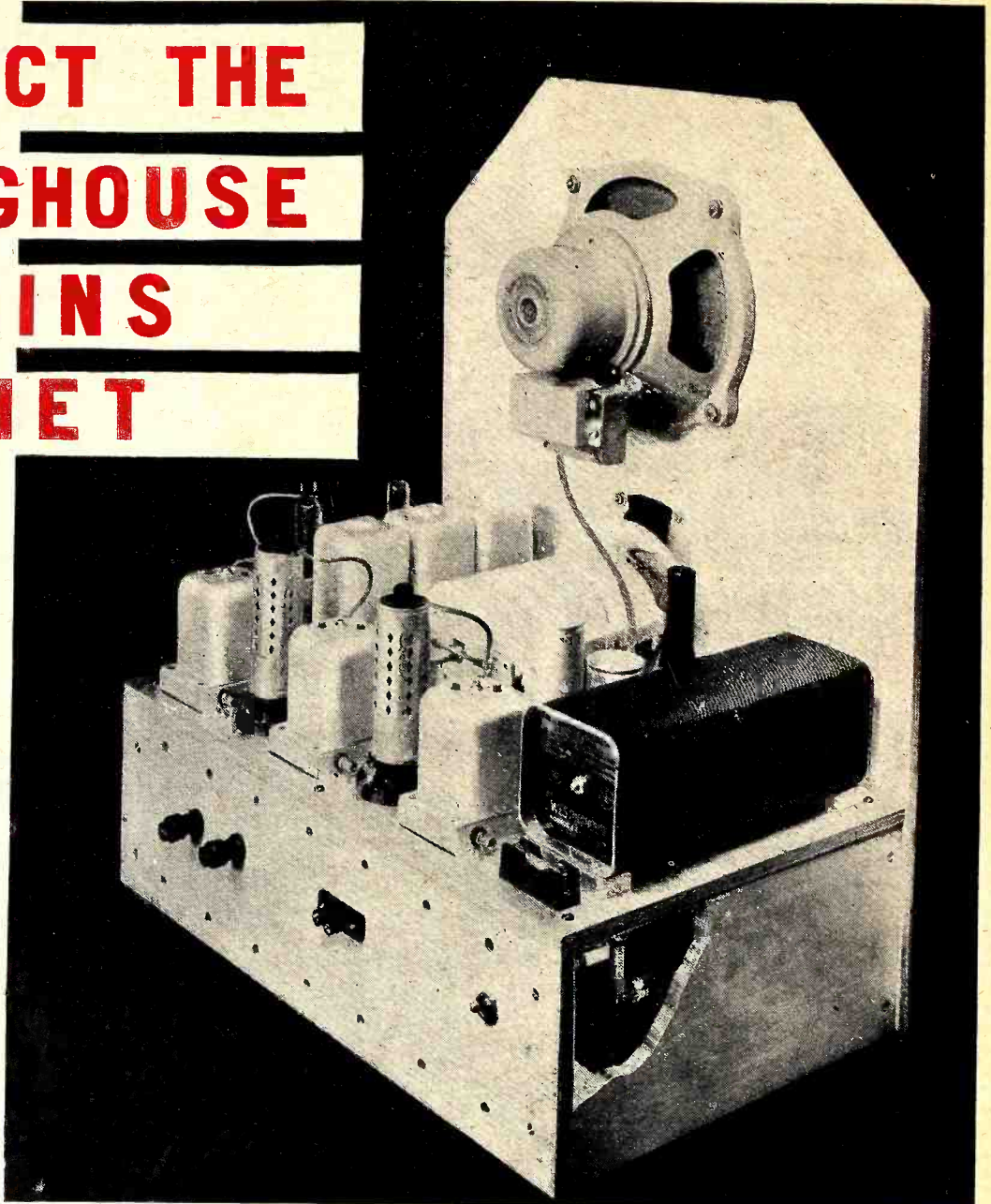
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CONSTRUCT THE WESTINGHOUSE A.C. MAINS SUPERHET



The first ALL METAL
A.C. Mains Superheterodyne
Receiver designed for
the Home Constructor.

Some of the special features are

- ★ WESTECTOR linear second detector
- ★ WESTINGHOUSE METAL RECTIFIER
for high tension supply
- ★ CATKIN VALVES 3 watts output
- ★ Automatic Volume Control
- ★ SINGLE DIAL TUNING
- ★ BAND PASS PRESELECTION
- ★ NOVEL RADIOGRAM ARRANGEMENT—
last I.F. valve used as L.F. amplifier on Gramophone

SEE IT ON STAND 32

Full size diagrams and complete constructional details will be on sale on the Stand, or post free 1/-.

THE WESTINGHOUSE BRAKE & SAXBY SIGNAL CO., LTD.,
82, York Road, King's Cross, London, N.1.

COUPON

Please send me diagrams and complete details of the new Superhet for which I enclose 1/-.

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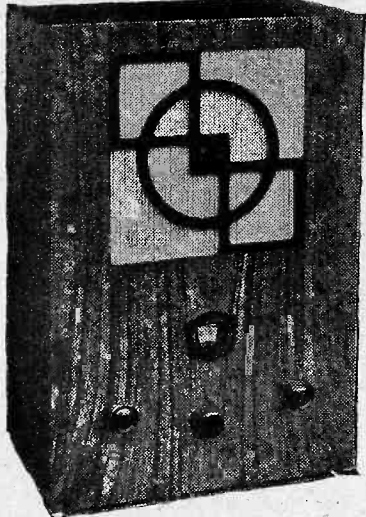
PRA. 26/8/33

STAND TO STAND SHOW REPORT
(Continued from page 822)

items as the pre-set condenser, fixed condensers chokes, etc., were extremely popular during the past season, but several new ones have now appeared. These included a new toggle switch and iron-cored tuning coils. Complete mains apparatus, and an electric soldering iron, selling at a really competitive price, also gave an idea of the extent to which Sovereign Products have now developed their manufacturing processes. The latest product was, of course, the permeability tuner, which removes completely the necessity for a variable tuning condenser. It is a forecast of the future.

STAND No. 102
BOWYER LOWE CO. & A. E. D., LTD., Diamond Works, Coombe Road, Brighton.

The principal feature on this stand was the revised edition of the well-known pick-up, and this was ably backed up by the volume controls and other types



A neat and moderately-priced receiver by Slektun.

of wire-wound resistances. The Mark IV pick-up is a magnificent de-luxe affair costing 42s., and it gives a remarkable output.

STAND No. 103
TANNOY PRODUCTS, 1-7, Dalton Street, W. Norwood, S.E.27.

NOT every visitor to the Exhibition wants a 100-watt amplifier in the home, but some of the amplifiers shown on this stand have been developed for public address work and social functions such as sports meetings, dances, etc. This firm does a most extensive business in this type of catering and at many open-air functions the familiar van and loudspeakers may be seen around the field. Smaller amplifiers were also seen and these will enable really ideal gramophone reproducers to be built up suitable for high quality domestic purposes.

STAND No. 104
AMPLION (1932), LTD., 82-84, Rosoman Street, London, E.C.1.

A NEW permanent magnet moving-coil speaker unit of the midget type attracted a considerable amount of interest. Known as the "Sonette" it sells at a low figure and due to its small dimensions it is very suitable for use in the now-popular ultra-small sets. Besides this item a number of new Class B components were to be seen as well as a binocular H.F. choke having extraordinarily good characteristics.

STAND No. 105
VINCE'S DRY BATTERIES, LTD., Lion Works, Garford Street, E.14.

PRACTICALLY every type of dry battery was represented on this stand, and the trade mark "Lion" served to focus the attention. The exhibit was very well staged and proved attractive in showing how many different types of H.T. battery can be required and are marketed by a firm who concentrates on this type of manufacture. The special Class B batteries will no doubt find a ready market during this season.

STAND No. 106
HELLESENS, LTD., Morden Road, S. Wimbledon, S.W.19.

THE well-known batteries have now been improved and they appeared with the new name "Hi-Life." Practically every type of battery was seen here, and the super types, especially designed for Class B receivers, etc., were one of the main attractions.



A public-address system by Tannoy Products. The neat microphone and stand may clearly be seen.

STAND No. 107
NEW LONDON ELECTRIC WORKS, LTD., East Ham, E.6.

AS was to be expected, aerial equipment formed the main portion of this exhibit, and a new production, known as Varial, formed the principal feature. This is a new type of variable aerial. In addition, different types of wire for indoor or outdoor use, and special ingenious indoor aerial were also featured.

STAND No. 108
THE HIGH VACUUM VALVE CO., LTD., 113-117, Farringdon Road, E.C.1.

SOME interesting valves were seen on this stand, and they included a new Class B valve, as well as various different types of battery valve. The PX 230 is a super-power output valve, delivering a very large output. These valves are all very reasonable in price, the Class B valve, for instance, costing only 10s. 6d., and the above-mentioned super-power valve costing 7s. 6d.

STAND No. 109
GOODMANS, 69, St. John Street, Clerkenwell, E.C.1.

WHILST loudspeakers formed the subject of this firm's exhibits, the special shallow car-type loudspeaker was probably the principal item. This has the chassis formed as part of the entire magnet system and results in great electrical strength as well as compactness. Several other interesting types were also seen.

STAND No. 110
VULCO DRY BATTERY CO., LTD., Vulco Works, London, N.19.

THE large range of batteries shown on this Stand attracted great attention. Some of the methods which were incorporated in the manufacturing processes proved of interest, and the new Stag batteries will, no doubt, be purchased during the forthcoming season by many battery users.

STAND No. 111
GRAFTON RADIO CO., 79, Lots Road, Chelsea, S.W.

THE Television receiver on this stand was one of the neatest combined sound and vision receivers which we have yet seen. Although so small it provides a really large television image, and the combined receivers are very well accommodated in the cabinet. The mirror-drum is utilised as the television system. Several other interesting receivers were seen.

STAND No. 113
SONOCHORDE REPRODUCERS, LTD., 1, Willesden Lane, N.W.6.

THE first Midget speakers were seen on this stand, and they were certainly most interesting items. To those who had previously never seen a midget speaker, they appeared more like scale models, but they are capable of a really hefty output, and the association of a field winding on such a speaker is certainly a clever piece of design work. All the speakers in the comprehensive Sonochorde range were well set out, and the centralizing device proved very interesting.

STAND No. 115
BULLPHONE RADIO, New North Road, Barking-side.

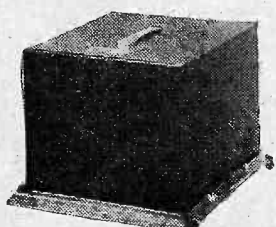
A.C. Mains Units, D.C. Mains Units and Loudspeakers formed a major portion of the Bullphone exhibit, and the new double cone speaker was one of the principal novelties. Among the many smaller components were the R.C. coupling Unit and the L.F. transformers. A dual-range coil was also shown, and this sells at the low figure of 4s.

STAND No. 116
JACKSON BROS. (LONDON), LTD., 72, St. Thomas Street, S.E.1.

IN addition to the well-known types of variable condenser, some interesting new dials were featured by Messrs. Jackson. These are of the new full-vision type, and provide very accurate readings. The most novel dial is that which incorporates a travelling pilot-light and so prevents any mis-reading due to shadows, etc. A special short-wave dial with two separate ratios was also seen, and this costs 6s. 6d., and provides the ratios of 8 to 1 or 150 to 1.

STAND No. 117
BAIRD TELEVISION, LTD., 133, Long Acre, W.C.

THE large number of wireless enthusiasts who now take an active interest in television found enormous pleasure in examining the very latest kit of parts for the home-constructed television displayed here. The kit was of the mirror drum type from which



a fair-sized picture can be obtained even in a normally-lighted room. An interesting variety of older types of television apparatus could also be examined.

STAND No. 118
BRITISH RADIOPHONE, LTD., Aldwych House, W.C.2.

A FEATURE of unusual interest on this stand was the model of the PRACTICAL WIRELESS "1934 Superset," which aroused widespread interest at Olympia and which will, no doubt, be extensively built during the coming season by thousands of home constructors. This set employs the latest model British Radiophone three-gang condenser which, although extremely compact, is guaranteed accurate to within quite negligible limits. Other types of variable condensers and a range of the latest "full-vision" tuning scales were also features of more than passing interest.



The first all-metal battery valve. This is a product of the 362 Valve Company, and is made under a patented process.

A new and excellent gramophone pick-up was also on view and this attracted much attention in view of its many up-to-date features and almost "straightline" response. Other interesting components, included fixed condensers, Class B components, and a range of complete "Radiopak" tuning units. Incidentally, it might be mentioned that Messrs. British Radiophone were first to introduce the latter kind of unit to the market, so there is no wonder that it received a considerable amount of attention by home constructors visiting the Show.

STAND No. 119
GARRARD ENGINEERING & MANUFACTURING CO., LTD., 17, Grafton Street, W.1.

AS manufacturers of the well-known gramophone motors, the stand was arranged to display to the best advantage the latest type of automatic gramophone unit. This incorporates not only a neat electric motor, but also an ingenious record changer. It is built as a complete unit, and may instantly be fitted to an existing gramophone. In addition, the pick-up, with or without volume control was also shown.

STAND No. 120
HACKER, H., & SONS., Perfecta Works, Ray Lea Road, Maidenhead.

A RADIO-GRAM employing twelve valves was the centre of this stand, and the manufacturers hold out great hopes from this circuit. It should certainly attract attention for some time to come, and it was ably backed up by the several other ingenious Hacker receivers.

STAND No. 121
EDGE RADIO, LTD., Bolton, Lancs.

ALTHOUGH newcomers to the radio industry, the products of this firm did not by any means betray the fact. The four-valve Class B receiver was a very high-class set, and the radio-gramophone version, costing 21 gns., was certainly a de-luxe instrument. Matched speakers were incorporated in the A.C. mains super-heterodyne, and this instrument is of such a design that it is not intended to make it on mass production lines for general stock. It will only be made to order.

STAND No. 122
BULGIN & CO., LTD., Abbey Road, Barking.

ONE could have spent a whole day on this stand, had time permitted, for there were components of nearly every conceivable pattern well displayed. Some of the newer lines probably proved most attractive, and in this respect special mention should be made of a really beautiful novelty known as the "Decorative Signal Lamp." This is an illuminated statuette, which can be stood on top of the wireless set and wired up to indicate whether the set is switched on or off. It is made in four different patterns, all of which were much admired.

The new "Mechanical Colour-Change Wavelength Unit" also came in for a good deal of well-earned praise. Of the smaller components, the "Controlatone" proved to be a popular exhibit; this unit consists, of course, of a fixed condenser and variable resistance mounted together in a bakelite shell. It serves as an excellent tone control when connected across the speaker terminals. It may also be joined in parallel with the primary winding of an L.F. transformer.

(Continued overleaf)

STAND TO STAND SHOW REPORT

(Continued from previous page)

STAND No. 123

OLDHAM & SON, LTD., Denton, Manchester.

THE Lively-O was the keynote of this stand, and the vast range of accumulators for all purposes was a most impressive show. The patented indicator, showing when the cell requires recharging, is a great feature of these batteries, and will save much trouble due to the over-running which many inexperienced listeners give to their L.T. battery.

STAND No. 124

BRITANNIA BATTERIES, LTD., 233, Shaftesbury Avenue, W.C.2.

AN extensive range of the well-known "Peritrix" batteries was shown on this stand, and particular attention was focused on the new large-capacity types specially introduced for Class B receivers. Special attention was drawn to the unique feature of "Peritrix" dry batteries, namely, that they do not contain sal-ammoniac, and have thus a longer shelf life than batteries of the more usual type.

STAND No. 125

CELESTION, LTD., London Road, Kingston-on-Thames.

THE different types of matched dual speakers attracted considerable attention on this stand, whilst the latest cabinet designs were appreciatively examined. Additionally, however, the latest pick-up was a feature of interest and was prominently displayed.

STAND No. 126

GROSVENOR ELECTRIC BATTERIES, LTD., 2-3, White Street, Moorgate, E.C.2.

A SPLENDID range of batteries was shown on this stand, and the patented method employed by the firm tends to prolong the life of the battery to quite an appreciable extent. The new types of heavy-discharge battery, produced especially for Class B types of receiver formed one of the additions to the existing range.

STAND No. 127

PARTRIDGE, WILSON & CO., Davenset Works, Evington Valley Road, Leicester.

THE numerous items for mains requirements were a great feature on this stand. The name Davenset is, of course, very well-known in this connection, and from the smallest mains transformer, to the largest charging equipment, the apparatus exhibited was of high quality.

STAND No. 128 and 129

WHITELEY ELECTRICAL RADIO CO., LTD., Radio Works, Victoria Street, Mansfield, Notts.

THE Microlode was probably the high-spot of the exhibition. Although so reasonable in price, a speaker incorporating the features which form the basis of the Microlode was bound to attract attention, and we venture to suggest that this will be a really star seller during the coming season. In addition to this model, however, the other W/B speakers created intense enthusiasm, especially in respect of the cabinet models.

STAND No. 202

OSBORN, C. A., Regent Works, Arlington Street, N.1

A REALLY splendid range of cabinets was seen here, and the new radio-gram. cabinet represents really splendid value. The great point is, of course, that these cabinets are obtainable in an unassembled form for those who would like to assemble the cabinet at home and carry out the finishing process of polishing. In addition, the cabinets are obtainable in an unassembled form, but unpolished, or absolutely complete and polished.

STAND No. 203

SHAWNDEL TOOL CO., 99, Regent Street, W.1

INGENIOUS coil-winding machines formed the main portion of this firm's exhibit, and although they interested the manufacturer primarily, they gave the lay visitor some idea of the ingenuity displayed in the machinery which is used for winding the various types of coil which are used in wireless receivers.

STAND No. 204

BRITISH PIX CO., LTD., Pix House, 118, Southwark Street, S.E.1.

A SPECIAL feature on this stand was the display of the famous "Pix" invisible aerial, which consists of an adhesive insulated strip that can be secured round the wall of a room to provide an excellent indoor aerial. Being made in a variety of colours, it can be made so to harmonise with the surroundings that it becomes almost invisible. Additionally, there was the well-known "Pix" selectivity device which is connected in series with the aerial lead-in. A full range of valves fairly recently introduced by this firm was also to be seen, and was examined with interest.

STAND No. 205

GRAHAM FARISH, LTD., Mason's Hill, Bromley, Kent.

IT was interesting to find that this well-known firm of wireless manufacturers have now turned their attention to tuning coils, and these were shown in types suitable for every kind of receiver. Another entirely new and extremely good component was the "Zelos" condenser. This is an air dielectric one built in a particularly rigid steel frame and having a readily adjustable spindle which can be made to project any distance to suit alternative operating dials; it also

enables any number of condensers to be ganged together with the greatest of ease.

Readers of PRACTICAL WIRELESS will be interested to note that this condenser was used in one of our "Show" sets, the "All-Wave Two."

Yet another new Graham Farish line is a complete kit of parts for an efficient aerial-earth system. Known as the "Aeroficient" aerial outfit, this comprises a length of aerial wire, lead-in tube, "Gard" lightning arrestor, a "Fit" earthing device, and the necessary insulators. Selling at 6s. 6d., this outfit was a very popular line at the Show.



The Camco Oxford Pedestal Cabinet.

STAND No. 206

RADIOLAB MANUFACTURING CO., Sandridge Works, St. Albans.

THE ingenious testing set manufactured by this company was certainly worthy of a few minutes' careful examination. It is built into a neat case and, in addition to the panel which contains meters, sockets, terminals, etc., a space is left at one end for the accommodation of soldering iron, pliers and other tools, which might be necessary to the service man or the keen experimenter.

STAND No. 207

BRITISH EBONITE CO., LTD., Nightingale Road, Hanwell, W.7.

AN extremely wide range of coil formers and small ebonite parts were shown on this stand, and these were favourably criticised by thousands of amateurs and experimenters who are interested in the constructional side of wireless. There were, of course, a large number of panels in various finishes.

STAND No. 208

RIST (1927) LTD., A., Wavney Works, Lowestoft.

THIS stand was principally of interest to the manufacturer, since the exhibits consisted chiefly of wires of all kinds, battery cords for commercial receivers, and small bakelite parts.

STAND No. 209

BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, W.C.2

ELECTRIC gramophone motors were the items of interest here. All the last year's models (which are to be continued during the new season) were shown.



Another neat Bulgin signal device

These included the "Truspeed" with synchronous mechanism, the "Golden Disc" induction type, and the very popular "Universal." An entirely new model, the "Truspeed D.C.," was also shown. This is suitable for use on 100 or 200-volt D.C. mains, and sells at 67s 6d.

STAND No. 210

SEABROOK BATTERIES, LTD., 205-207, Bedford Avenue, Trading Estate, Slough, Bucks

SEABROOK wireless batteries in all types for both H.T. and G.B. were the main exhibits on this stand. A new pocket-lamp battery, fitted with wireless terminals, was also shown.

STAND No. 211

MAINS POWER RADIO, LTD., Broadway Works, Eastern Road, Rbmford, Essex.

A WIDE variety of mains units and battery chargers formed the exhibit here. The units were of attractive design and appearance, being enclosed in pressed steel containers which were bronze finished. The full range of eliminators shown covered all A.C. and D.C. requirements and many of the A.C. models were also fitted with trickle chargers.

STAND No. 213

SOUND SALES, LTD., Tremlett Grove Works, Junction Road, N.19.

THE most noticeable exhibit on this stand was a new M.C. speaker incorporating an entirely new system of cone suspension. This was in two forms, one of which was for use as a speaker purely and simply, whilst the other was intended for converting an ordinary battery receiver to a class B instrument.

Cathode ray television apparatus and a wide range of mains transformers were additional exhibits of interest.

STAND No. 214

THE 362 RADIO VALVE CO., 415, Mare Street, Hackney, E.8.

THE first all-metal battery valve formed the centre of attraction on this stand, and some of the examples of valve construction served to show how the wireless valve is made up. Although at the moment only the more popular two-volters are being produced by this company, we understand that in the forthcoming season several mains valves will be put on the market.

STAND No. 215

CHORLMEY RADIO ELECTRIC, LTD., Arras Mills, Rochdale Road, Manchester.

A NUMBER of "Triotron" Class B components were in evidence on this stand. One of the most interesting was a speaker complete with a neat Class B unit. A separate Class B unit assembled in a bakelite case also attracted attention.

STAND No. 216

PETO AND RADFORD, 50, Grosvenor Gardens, S.W.1.

A COMPLETE range of "Dagenite" accumulators in both H.T. and L.T. types figured most prominently on this stand. The rest of the exhibits consisted of special accumulators of various patterns for use by service engineers and charging stations.

STAND No. 217

TELEPHONE MANUFACTURING CO., LTD., Hollingsworth Works, West Dulwich, S.E.21.

THE new "Hydra" condensers were one of the principal attractions on this stand, and although these have in the past been well-known they have been of foreign origin. The new arrangements entered into with the German company will now enable these condensers to be manufactured in this country by the Telephone Manufacturing Company, and in addition to the types which were exhibited it is proposed to manufacture the complete range required for modern wireless practice.

STAND No. 218

BIRMINGHAM SOUND REPRODUCERS, LTD., Claremont Road, Old Hill, Staffs.

HIGH-POWER amplifiers for halls and public address work were the chief feature and the "Dual Path Console" delivering an output of either 30 or 60 watts attracted considerable interest. Other exhibits included an eight-valve superhet receiver, and interesting band-pass wireless chassis and a full range of mains transformers and chokes.

STAND No. 219

LAMPLUGH RADIO, LTD., 177, Foleshill Road, Coventry.

THE "Timpani-Tone" speaker baffle was the centre of this exhibit. This is an unusual type of baffle, incorporating several new features, the cone being of metal instead of the more usual paper. A very full range of "Silver Ghost" speakers and "Farrand" inductor speakers were also shown in conjunction with a new "Antistat" aerial interference eliminator unit.

STAND No. 220

AERIALITE LTD., 10, Amber Street, and 17, Manover Street, Manchester.

THE outstanding exhibit on this stand was a new aerial wire, known as the "Levenstrand" which consists of eleven strands of copper wire insulated with a double covering of the special "Aerialite" material. Undoubtedly the most interesting point in connection with this aerial wire is that every sample is supplied with a £200 insurance against lightning.

(Continued on page 830)

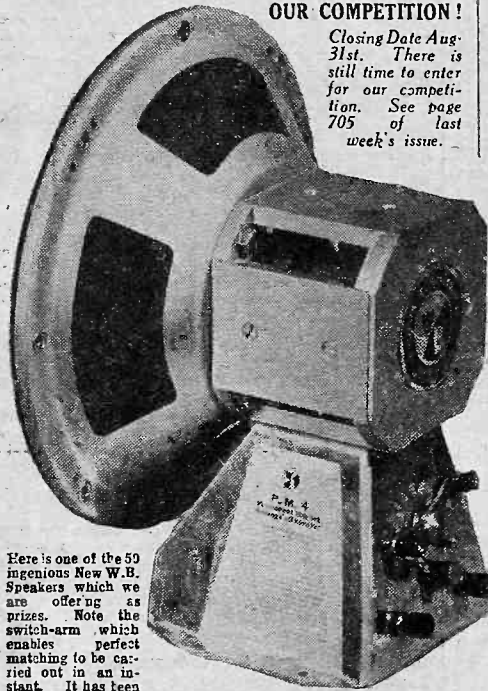
**THE W.B. TYPE P.M. 4A.
"MICROLODE" LOUD-
SPEAKERS**

An Entirely New and Clever Departure
in Loud-speaker Design.

THIS speaker has been carefully designed to eliminate one of the greatest bugbears to the amateur and home constructor—that of accurately matching the output stage of the receiver to the speaker. This latter difficulty has recently become most acute, because of the extended use of Class B and Q.P.P. amplification, with the result that with the ordinary types of speaker several different output transformers would be required to enable one to match up the speaker to more than a single receiver.

OUR COMPETITION!

Closing Date Aug-31st. There is still time to enter for our competition. See page 705 of last week's issue.



Here is one of the 50 ingenious New W.B. Speakers which we are offering as prizes. Note the switch-arm which enables perfect matching to be carried out in an instant. It has been specially selected for F. J. Camm's 1934 Superst.

Messrs. Whitley Electrical Co. have removed this difficulty entirely by introducing the "Microlode." This is actually a new and excellent speaker with the addition of a universal output transformer with which almost any ratio can be obtained in an instant, and any output stage (whether it should consist of an ordinary power valve, a pentode, a Class B or two triodes or pentodes in Q.P.P.) can quickly and accurately be matched to the speaker. Three connecting terminals are provided and there are two brass arms which can be moved over nine tapping studs connected internally to the transformer windings. When the speaker is to be used with a power or pentode valve the outside terminals only are used and by suitably adjusting the tapping arms the necessary output ratio can be obtained. All three terminals are used with a Class B or Q.P.P. set, in which case the centre one is joined to H.T. positive in the usual way. Again, by moving the arms, any required ratio can be chosen in a second. A small chart is attached to every speaker to indicate the correct tapping points for various ratios and the proper one can easily be calculated when the impedance of the output valve is known, since the speech coil impedance is given as 3 ohms.

BULGIN

BRITISH MADE



RADIO PRODUCTS

PROOF OF LEADERSHIP

Evident in every page of the wonderful New Catalogue No. 153 (N) now ready for distribution. Bulgin have spared no effort this year to present to wireless constructors the largest and most up-to-date range of quality products ever offered by any component manufacturer. Contains full details of

Sixty-Four Price Reductions

and a new

28-p. TEXT BOOK & MANUAL, giving valuable technical information and diagrams.

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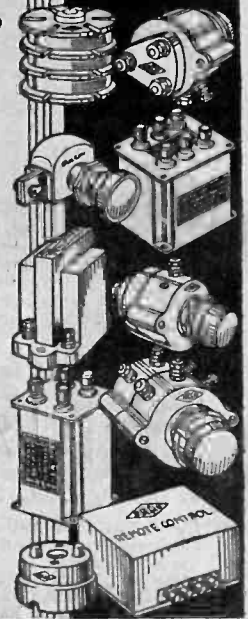
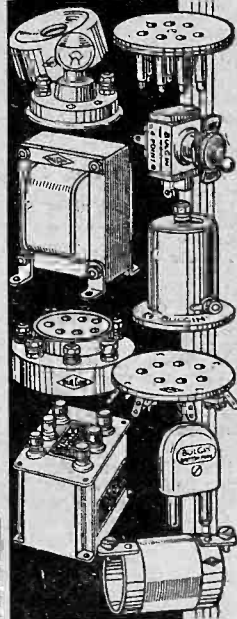
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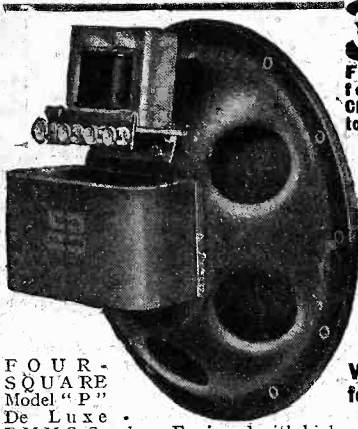
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FITTED WITH 3 TERMINAL STRIPS, GREY CELLULOSED FINISH AS SPECIFIED BY THE DESIGNER

Have you had particulars of PRICE Magnum Short-wave Adaptors, and list of latest short-wave stations? Free on request. **5/6**

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35/-
Fitted Trans-
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P.M.M.C. Speaker. Equipped with high cobalt content Magnet. Employs entirely new system of Cone mounting, eliminating all undesirable resonances. Extreme sensitivity with full Bass response gives performance in the highest class.

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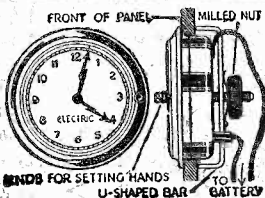
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OLYMPIA, AUG. 15 to 24

FOUR-SQUARE Auto P.M.M.C. Speaker for portable receivers. Unique design embodies entire chassis in magnetic system. Diam., 6 1/2". Depth, ONLY 2 1/2". Price, including Universal Ratio Transformer, 27/6.

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**FIT THIS
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NO MAINS NEEDED!
KEEPS CORRECT TIME!
NO WINDING!

Works off small battery lasting 12 months, or can be plugged into G.B. battery without affecting reception. Uses practically no current. Fits into hole 3 1/2 in. dia. in any panel up to 3 1/2 in. thick. Easy to fit—no screws required. Only 1/2 in. from front of panel to back of case. Swiss movement. Hands set from front. Nickel-plated bezel. Useful addition to any set.

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This book is indispensable to everybody who wants to understand the working of wireless receivers. The author, who has the remarkable gift of explaining highly technical matters in perfectly simple language, starts with elementary principles and covers the whole field of wireless reception, both from the theoretical and practical points of view.

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3/6

STAND TO STAND SHOW REPORT
(Continued from page 828)

STAND No. 221
BRIDGER & CO. (R. O.), No. 4, Factory, Shelford Place, Stoke Newington, N.16.

A SERIES of "Grantona" speaker cones occupied the whole of this stand and it was amazing to observe, how many different cones were available. The "Grantona" cones are of special seamless construction and are being produced in tremendous quantities to meet the requirements of the trade.

STAND No. 222
ELECTRICAL MEASURING INSTRUMENT CO., LTD., 55, Carrington Street, N.W.1.

A COMBINED testing instrument, known as the "Set Analyser," was the most prominent exhibit on the "Emco" stand, but numerous other measuring instruments and meters, made under the trade names of "Emicol" and "Wates," were also to be seen.

STAND No. 223
MAGNACORE, LTD., Magnacore Works, 85, Alsen Road, Holloway, N.7.

AN extensive range of transformers of both mains and L.F. types, including some newly-introduced Class B components, were displayed. A number of neon signs, intended for use by dealers, were also being demonstrated.

STAND No. 225
THE 362 RADIO VALVE CO., LTD., 415, Mare Street, Hackney, E.8.

THE most interesting exhibit here was an entirely new battery valve, known as the "Toledo," made in a tubular metal sheath. The valve is said to be practically unbreakable and is of small dimensions.

A full range of glass bulb valves, including S.G. power, Class B and rectifiers were also shown.

STAND No. 228
VANDERVELL, C. A., LTD., Well Street, Birmingham.

A VERY complete range of batteries was shown here, although there was little to see in the way of new designs. The NGM5 was a new season's production and represented splendid value at 9s. 6d.

STAND No. 229
ADEY PORTABLE RADIO, 99, Mortimer Street, Regent Street, W.1.

PORTABLE sets at all prices from £3 17s. 6d. to £15 15s. were shown here, and there was obviously a type for every need. A so-called "Self-coupling" valve was also on view which the makers claim has considerably improved the effectiveness of the "Radio-Hat" used by the police in many parts of the country.

STAND No. 230
ACTON BATTERY CO., LTD., Dorland House, Regent Street, S.W.1.

HIGH tension batteries in three different capacity ratings and sold under the respective names of "Cynthex," "Eltax" and "Gold-Seal," occupied a considerable amount of space on this stand. A range of special "Power-plus" batteries, giving an output of 35 m.a., was also shown and is made for those who require to operate a powerful receiver and who have no mains supply.

STAND No. 231
EGONASIGN CO., LTD., 137, Victoria Street, S.W.1.

THIS stand was of principal interest to traders who require stencil sets for the making of showcards and small advertisements.

STAND No. 232
SINCLAIR SPEAKERS, 49-50, Twyford Street, N.1.

AN extensive range of moving coil speakers at very reasonable prices was on view. Pairs of dual-matched speakers at the attractive price of 56s. were also shown, as well as a chrome steel magnet speaker at 25s.

STAND No. 238
NUVOLION ELECTRICS, LTD., Park Crescent, Clapham Park Road, S.W.4.

MOVING coil loud-speakers comprised the complete exhibit on the Nuvolion stand. The last year's models are being continued and were all on view, whilst two new P.M. models were also shown. The special one-piece seamless cone and speech coil feature was well demonstrated.

STAND No. 240
ELECTRO DYNAMIC CONSTRUCTION CO., LTD., 733b, Old Kent Road, S.E.15.

THE recently introduced high tension converter for use with motor car batteries, and which is specially designed for recessing into the floorboards, was the item of main interest here. It was shown in four alternative types for 6 or 12 volt batteries and with different output ratings.

STAND No. 241
CHLORIDE ELECTRICAL STORAGE CO., LTD., Exide Works, Manchester.

THERE was to be seen a most extensive range of dry batteries of types suitable for every purpose. The high tension batteries are made in various types, known by different coloured triangles, and are suitable for discharge rates from 6 to 20 milliamps. Accumulators of all kinds for fixed and portable sets were also to be seen.

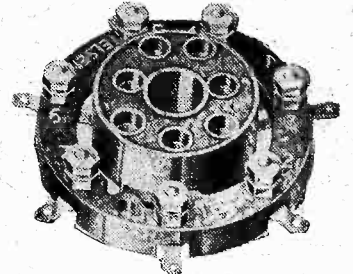
STAND No. 242
MILNES RADIO CO., Victoria Works, Church Street, Bingley, Yorks.

THERE were no new models shown here, but the existing types of H.T. units were well demonstrated. As most readers are aware, the Milnes

units consist of a number of alkaline accumulator cells which are mounted in cases fitted with series-parallel switches which enable them to be charged from the L.T. accumulator.

STAND No. 243
R. C. & WILSON ELECTRIC, LTD., 51, Whitcomb Street, Leicester Square, W.C.2.

ALTHOUGH the collection of exhibits on this stand covered so many different items, the self-feeding soldering iron was probably the most noticeable to the home-constructor. The method of



The new Telsen 7-pin valveholder

holding a stick of solder and so leaving one hand free to hold a wire or other item which is being soldered is most ingenious and does not cost a lot of money. At 10s. 6d. for a 60 watt iron, with an additional 3s. for the self-feeding apparatus, this represents a really splendid accessory for domestic use.

STAND No. 244
BOTOLPH RADIO, LTD., 2, Ravenscourt Square, W.5.

A MOST comprehensive range of sets at all prices were arrayed on this stand. They ranged from a simple "Chummy-de-Luxe" 3-valver at 4 guineas to a luxury "Social" model superb at 40 guineas. The latter is an elaborate piece of furniture embracing not only an efficient receiver, but also a cocktail cabinet and an electric clock.

STAND No. 245
KENSINGTON, LTD., 196, Upton Lane, E.7.

A WONDERFUL variety of wireless cabinets formed the Kensington exhibit, and special prominence was given to a number of floor stands suitable for accommodating table receivers of all the better known makes. Another innovation was a walnut electric playing cabinet for converting any ordinary table receiver into a complete radiogram.

STAND No. 246
FILM INDUSTRIES, LTD., 60, Paddington Street, W.1.

A NEW "Baby" public address equipment took pride of place on this stand. This consists of a moving coil microphone, self-contained battery-driven Class B amplifier and a permanent magnet horn-type loud-speaker. It is claimed that this apparatus is capable of giving clear reproduction of speech over a range of 500 yards.

STAND No. 247
RADIALADDIN, 46, Brewer Street, W.1.

STAND No. 248
TELEGRAPH CONSTRUCTION AND MAINTENANCE, LTD., E. Greenwich.

SPECIAL types of alloy used in the construction of modern transformers formed the principal feature on this stand, and the remainder of the exhibit was principally of interest to the manufacturer.

STAND No. 249
EARL ENGINEERING & ELECTRICAL CO., 132a, Much Park Street, Coventry.

SOME interesting loud-speakers were seen on this stand, and in addition to the more orthodox types of chassis, the newly-patented Earl chassis bracket, upon which is mounted a volume control, formed the main feature.

STAND No. 251
GRIPSO CO., 32, Victoria Street, S.W.1.

VALVEHOLDERS, self-locking tags, connectors and sundry other small items formed the subject of this firm's exhibit and some interesting features were noticed.

STAND No. 252
RAWPLUG CO., LTD., Rawplug House, Cromwell Rd., S.W.7.

STAND No. 253
POWERTONE PRODUCTS, 88a, Cromer Street, W.C.7.

THE interesting portable receivers seen on this stand possessed several novelties, and attracted great attention. The prices were certainly moderate.

STAND No. 254
SHALLESS & EVANS, Tranquil Works, Tranquil Vale, Blackheath, S.E.

A FINE range of mains receivers was seen on this stand, and the method of mounting the parts on the metal chassis left no room for complaint. The all mains 2-valver will no doubt prove one of the leading designs next season, and the Class B battery receiver will enable many listeners to obtain good quality, combined with large power.

TWO NEW MULLARD VALVES

Some Interesting Details Concerning the New High Efficiency Screened Pentode for H.F. Work, and the Class B Valve Produced by the Mullard Factory.—By W. J. DELANEY.

THE screen-grid pentode differs from the ordinary screen-grid valve only by the addition of a third grid, situated between the anode and the screening grid. It is not provided with a terminal, but is internally connected to the cathode. (The valve is, of course, at the moment only obtainable for mains use.) This extra grid acts in a very similar manner to the extra grid in the ordinary L.F. pentode, and, generally speaking, the H.F. pentode may be used in any set at present employing an S.G. valve.

How it Works

In the ordinary S.G. valve the screening grid limits feed back between anode and grid which is due to the inter-electrode capacity. Unfortunately, the valve does not act as it should, and it has been found that in addition to the anode receiving the electron stream from the cathode it emits certain electrons (due, no doubt, to the heat which is generated) and this emission—known as secondary emission—passes back to the screen. The extra grid in the pentode acts as a barrier or trap, and conveys this secondary stream of electrons to earth. Therefore it is apparent that much greater amplification is possible, although it is important to remember that the impedance of the valve is greater than that of an ordinary S.G. valve, and therefore the maximum amplification will not be experienced unless the coupling is of suitable high impedance. It is interesting to note that the amplification factor of the new V.P.4 (which is one of the new Mullard H.F. Pentodes) is 5,000, a figure which has never before been achieved in any type of receiving valve. This valve is of the 4 volt 1 amp type, rated at 200 volts for the anode and 100 volts for the screening grid. The grid bias voltage may be varied between 1.5 and 22 volts in exactly the same manner as a variable- μ S.G. valve to provide perfect volume control. The S.P.4 is a similar valve, but without the variable- μ characteristic and is intended primarily for use as a first detector or frequency changer in a superheterodyne receiver.

The Class B Valve

The Mullard Class B valve is of the one and a quarter watt type, and is fitted with a .2 amp filament. It is therefore justly described as an economy valve and has the additional advantage that the driver valve may be of the ordinary general purpose type requiring an anode current of only 1 milliamp or so. The standing anode current of this Class B valve, when operated at the correct working point, is only 3 milliamps, and on the average signal which is heard from the B.B.C. stations working on maximum volume, the average current of this valve will only approximate 4 milliamps or so. It will be seen, therefore, that the standard H.T. battery may be employed with a receiver using this type of Class B valve, and the drain will be no greater than with a standard power valve.

You know FERRANTI QUALITY



now compare for
PRICE !

Ferranti recently introduced the Class "B" Speaker Amplifier—a complete stage of Class "B" amplification combined with special NEW P.M. MOVING COIL Speaker.*

Its instant and phenomenal success was due in no small measure to the speaker, which affords reproduction of exceptional brilliance and faithfulness over a wide range of frequencies.

This speaker is now available separately in two forms; Model M5, without transformer, and M5T with multi-range transformer to meet all normal needs.

For the thousands of critical listeners who have believed that, hitherto, a low price involved too great a sacrifice in quality of performance, this new Ferranti speaker will prove of exceptional interest.

MODEL M5 without Output Transformer.	MODEL M5T with Transformer suitable for Ordinary Power Valve, Super Power Valve, Pentode, or Class "B."
Price 30/-	Price 37/6

*CLASS "B" SPEAKER AMPLIFIER.
Complete with Valve, 8/-
Without Valve, 70/-

Attractive Modern Cabinet
for above 35/-

It will take its place at STAND No. 74 at Olympia (also Stand No. 38 at the Scottish National Radio Exhibition, Glasgow), along with the full range of the world-famous Ferranti Speakers.

FERRANTI
MOVING COIL SPEAKER

FERRANTI Ltd., HOLLINWOOD, LANCASHIRE
London: Bush House, Aldwych, W.C.2.

SET CRACKLING IS ANNOYING!

IF IT'S YOUR SWITCH



FIT THE "BUSCO" SWITCH

1/0 each
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and ensure perfect switch contact! There is no contact point to turn round, and when you "switch on" you have contact like a power switch. They are as cheap as the inferior type, but far superior in operation.

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The Wonderful New Universal COIL FORMER

Ideal for home constructors. Suitable for all wave lengths. No slotting or drilling required. Make your own coils for the published circuits at half the cost and double the efficiency. Numerous unsolicited testimonials. Complete with instructions and wiring diagrams.

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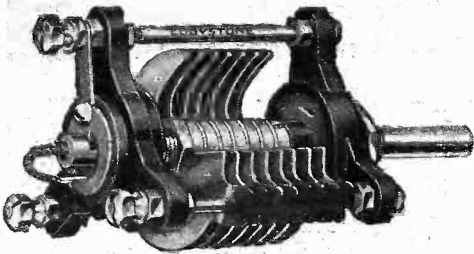
Price 1/3 ea.
Terminals 1d. each. Fixing brackets with screw 1d.
28 D.S.C. wire 2 oz. 1/-.

Full particulars 11d. stamp. Of all good wireless dealers or direct from the Patentees & Manufacturers:

THE EVINGTON ELECTRICAL MANUFACTURING CO.,
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MANY INTERESTING NEW SHORT WAVE COMPONENTS —By EDDYSTONE



SCIENTIFIC S.W. CONDENSER

A new "EDDYSTONE" production with special Isorex endplates, soldered brass vanes, a screened and insulated non-inductive pigtail and ideal for all short-wave use.

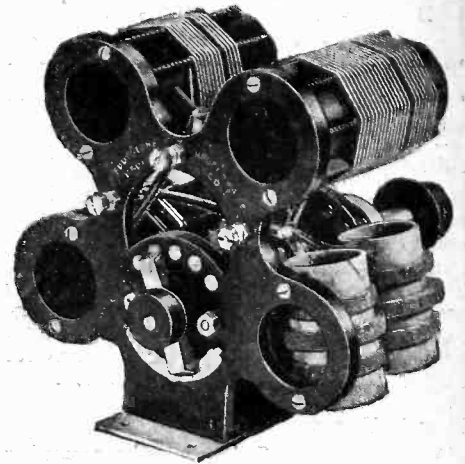
35 m.mfd. ... 6/- 100 m.mfd. ... 7/-
60 m.mfd. ... 6/8 150 m.mfd. ... 7/6



FREQUENTITE SHORT WAVE H.F. CHOKES

This choke is wound on a special Frequentite hollow former and consists of four small honeycomb coils spaced apart so that the self-capacity is exceedingly low.

PRICE 2/9

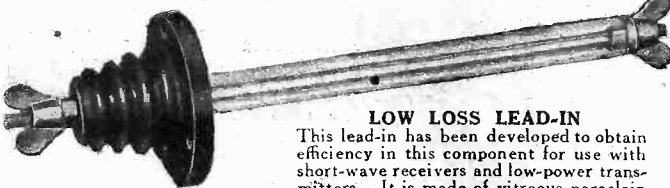


MULTI-WAVE SWITCHED COIL UNIT

This unit gives five wave-ranges, covering from 12/85, 220/540 and 1,100/1,900 metres. It carries three separate windings and forms the perfect tuning inductance for an all-wave set.

PRICE 35/-

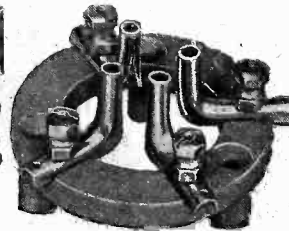
NEW COMPONENT LIST NOW READY



LOW LOSS LEAD-IN

This lead-in has been developed to obtain efficiency in this component for use with short-wave receivers and low-power transmitters. It is made of vitreous porcelain and special glass insulating tube. Overall length 9 in.

PRICE 2/6



FREQUENTITE LOW LOSS SHORT - WAVE VALVEHOLDER

Frequentite is a new material introduced by "EDDYSTONE" which is far superior to all present insulators for high-frequency work, its characteristics only being excelled by fused Quartz.

4-pin ... PRICE 1/5
5-pin ... PRICE 1/8

EDDYSTONE SHORT WAVE COMPONENTS

Sole Manufacturers—
STRATTON & CO. LTD., BALMORAL WORKS, BIRMINGHAM.
LONDON SERVICE DEPOT—
WEBB'S RADIO STORES, 164 Charing Cross Rd., W.C.2



HOME BATTERY CHARGING

You can charge your accumulators in your own kitchen—quickly, efficiently and cheaply. Simply instal a Heayberd Home Charger,

connect it to the mains and to the accumulator which, in a short time, is fully recharged. Moreover, besides the saving in cost and trouble, your accumulator is always kept at the peak of efficiency—never over or under-charged. Two models are available for A.C. mains. Both are enclosed in handsome metal cases with safety plugs and sockets and are ready for immediate use.

MODEL AO.2 Charges 2, 4 or 6 volt Accumulators at 1/2 amp. **35/-**
MODEL AO.3 Charges 2, 6 or 12 volt Accumulators at 1 amp. **42/6**

Should you prefer to build your own Charger, send for a copy of the Heayberd Handbook which gives details and circuits.

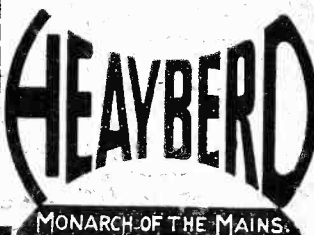
—SEND COUPON TO-DAY— **STAND 16—RADIOLYMPIA**

I enclose 3d. stamps for latest Handbook "Mains Power for your Radio"—packed with new hints and blueprints, etc.

Mr.

Address

Prac.
10, FINSBURY STREET, LONDON,
E.C.2.
One minute from Moorgate Underground Station.



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RESISTORS

To prove the superiority of our "B.A.T." (Best—After—Test) **BRITISH-MADE FIXED RESISTANCES** (1/2, 1, 2, 3, and 5-WATTS) we will send Free and Post-Free to applicants mentioning this Journal, our **2-Colour Art Booklet, 2nd ENLARGED EDITION, 16pp., entitled:**

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DOES YOUR

SET SUFFER

FROM



"HUM-M-M"

Do not let your reception be spoiled by objectionable Mains HUM-M-M-M. This can be either reduced to an extremely low level or entirely eliminated, by the use of our Type HD-30 "HUMDINGER" (Regd. No. 503,368). The cost is insignificant—only Half-a-crown. Full instructions, with circuits, with each. Obtainable from all good dealers, or direct in case of difficulty. Explanatory leaflet free on request.

CLAUDE LYONS, LIMITED,
76, OLDHALL STREET, LIVERPOOL.
40, BUCKINGHAM GATE, LONDON, S.W.1.



Practical Letters from Readers.

The Editor does not necessarily agree with opinions expressed by his correspondents.

A Reply to "Grid Leak"

SIR,—With regard to the trolley-bus interference in Nottingham, I think it is only fair you should publish the other side of the matter. The reason is not far to seek. No way of suppressing the interference has yet been found which is effective on the long wavelength of our local National Transmitter 5XX. The cost of equipping 106 buses is very high, and as only a partial cure would be effected by the coils at present on the market, it is only natural that the Corporation are waiting for the report of the Government Commission on the subject, and the introduction of a satisfactory stopper coil. When the latter are available steps will be taken.—W. HICKS (Nottingham).

Short-Wave Reports Wanted

SIR,—Our client, Mr. J. F. W. de Kort, of Bragaweg 34, Bandoeng, Java, Dutch East Indies, would be glad to receive reports on the reception, in this country, of his short-wave transmissions. His station works every working day from 23.45 till 00.15 G.M.T. on a wavelength 49.02 metres. Call PK1WK Bandoeng, Java, D.E.I. Announcements are in Dutch and English.—W. R. EVERETT (London, E.C.).

Ferranti Ropes Them In

SIR,—I read in the daily newspapers that millions of listeners were disappointed when an attempt was made to relay a broadcast interview with Amy and Jim Mollison from New York on Friday evening, July 28th.

It may interest you to know that I heard every word of the five minutes' broadcast with perfect clarity, and was astounded and greatly disappointed when the announcer apologized for the distorted conversation and complete fiasco.

My set is a Ferranti 3-Valve Console, 1931 model.

Yours faithfully,
(Mrs.)

[The above is a copy of a letter recently received by Messrs. Ferranti, Ltd. It will probably interest some of our readers.—ED.]

The "Featherweight Four"

SIR,—I wish to thank you very much for the co-operation and interest you have shown in advising and helping me to construct my portable. The Featherweight Four is the best portable I have constructed for good volume and tone, and I can recommend it to anyone desiring first-class results for little cost.—W. GREEN (London, W.C.).

From an Overseas Reader

SIR,—Thanks for your letter, and very many thanks for my copy of Encyclopædia. I must say it is quite beyond my expectations. I was in Perth yesterday and brought my copies of PRACTICAL WIRELESS up to date. It is certainly a practical paper

and worth its weight in gold. I am sending you under separate cover a copy of a wireless paper published in Sydney, as it features a new superhet circuit which I thought would be of interest. I much appreciate the constructional articles in PRACTICAL WIRELESS.—A. H. WILSON (Bassendean, W. Australia).

Neon Lamp Circuits

SIR,—I wonder at some future date if you will kindly let us have some theoretical diagrams of output circuits with a neon lamp arranged for television.—L. J. D. (Earlsfield). (Yes.—ED.)

Double-Diode-Triode Three

SIR,—I am writing to ask if you could publish a version of the double-diode-triode three, and include reaction and a mains energized speaker, and to specify a metal chassis that could be supplied ready drilled. I have never built a set before, but I have been reading PRACTICAL WIRELESS for the past nine months and I think I could construct such a set. It is cheaper to build from components here as the duty on them is only 20 per cent., while it is 70 per cent. on completed receivers. Wishing your paper every success.—PATRICK SHERIDAN (Arva, Ireland).

CUT THIS OUT EACH WEEK.

DO YOU KNOW?

- THAT mica has a dielectric constant of 6 as compared with a value of 1 for air.
- THAT one horse-power is equivalent to 746 watts.
- THAT 300,000 divided by metres will give you the frequency of a station in kilocycles.
- THAT 300,000 divided by the number of kilocycles will give you the wavelength of a station in metres.
- THAT the new short grid-base variable-mu H.F. valves enable a small grid-bias battery to be employed.
- THAT some interesting experiments may be carried out by burying various lengths of wire and employing them as an aerial.
- THAT a meter may be employed to enable you to watch a receiver working on the automatic volume control principle.
- THAT serious results may arise if you overload a fixed condenser.
- THAT overloading a condenser often results in an effect similar to a short-circuit, hence the above remark.

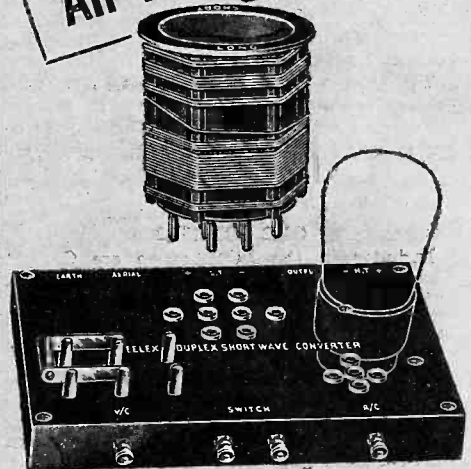
NOTICE.

The Editor will be pleased to consider articles of a practical nature suitable for publication in PRACTICAL WIRELESS. Such articles should be written on one side of the paper only, and should contain the name and address of the sender. Whilst the Editor does not hold himself responsible for manuscripts, every effort will be made to return them if a stamped addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL WIRELESS, Geo. Neveles, Ltd., 8-11, Southampton Street, Strand, W.C.2.

Owing to the rapid progress in the design of wireless apparatus and to our efforts to keep our readers in touch with the latest developments, we give no warranty that apparatus described in our columns is not the subject of letters patent.

BUILD AN EELEX SHORT-WAVE CONVERTOR CHASSIS INTO YOUR NEW SET

—Make it an
All-Wave Receiver



When you build your new receiver, make it an all-wave set by incorporating an Eelex Short-Wave Chassis in the circuit. You will then be able to receive short-wave stations from America, Australia, and other distant countries. There are various types obtainable for Mains or Battery receivers.

DUPLEX CHASSIS

Single valve chassis supplied with Duplex coil. Price £1.15.0. Other components extra.

For further particulars send for free leaflet No. EE6.

J.J. EASTICK & SONS

Eelex House, 118, Bunhill Row, London, E.C.1

'Phone: Metropolitan 0314 (6 lines)

ANNOUNCEMENT

★ to men who want careers in **RADIO**



In the sign language of the Broadcasting Room this symbol means "Announcement."

The I.C.S. Radio Courses cover every phase of radio work, from the requirements of the youth who wishes to make wireless engineering his career to the man who wants to construct and maintain a broadcasting set for his home.

The Radio industry is progressing with amazing rapidity. Only by knowing thoroughly the basic principles can pace be kept with it. Our instruction includes American broadcasting as well as British wireless practice. It is a modern education, covering every department of the industry.

OUR COURSES

Included in the I.C.S. range are Courses dealing with the Installing of radio sets and, in particular, with their Servicing, which to-day intimately concerns every wireless dealer and his employees. The Operating Course is vital to mastery of operating and transmitting.

There is also a Course for the Wireless Salesman. This, in addition to inculcating the art of salesmanship, provides that knowledge which enables the salesman to hold his own with the most technical of his customers.

We will be pleased to send you details of any or all of these subjects. Just fill in, and post the coupon, or write in any other way, stating which branch of Wireless interests you—the information you require will be forwarded at once.

International Correspondence Schools, Ltd.,
Dept. 94, International Buildings,
Kingsway, London, W.C.2.

Without cost, or obligation, please send me full information about the Courses I have marked X

- COMPLETE RADIO
- RADIO SERVICING
- RADIO EQUIPMENT
- RADIO SERVICING AND SALESMANSHIP
- WIRELESS ENGINEERING
- WIRELESS OPERATORS

Name..... Age.....

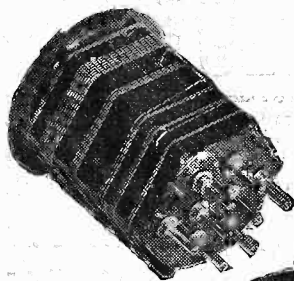
Address

THE "EELEX" SHORT-WAVE CONVERTER.

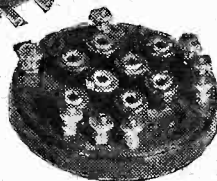
An Efficient and Inexpensive Unit with which any S.G. Receiver can Easily and Quickly be Converted into a Short-wave Superheterodyne.

SO far as we are aware, the "Eelex" short-wave superheterodyne converter, made by the old-established wireless firm of Messrs. J. J. Eastick & Sons, was the first instrument of its type to be put on the market. Since its introduction some few years ago it has earned a truly enviable reputation for its sound design and high efficiency. It has been referred to in these pages before, but in view of the wide interest now being shown in short-wave reception by our readers we are taking this opportunity of again recommending it to those who wish to participate in world-wide short-wave reception without going to the expense of a new receiver specially made for the purpose. The unit is particularly compact and is supplied in a neat cabinet of attractive appearance. With the single highly efficient coil supplied, it will cover the two wavelength ranges of from 15 to 30 and from 28 to 60 metres. Actually these two bands include practically every powerful S.W. broadcasting station and every amateur transmitter in the world, but where other ranges are required they can be obtained by the simple process of changing the eight-pin plug-in coil for one of another size which is supplied by the makers at slightly extra cost. Tuning is remarkably easy and even the beginner will find no difficulty in bringing in innumerable short-wave stations.

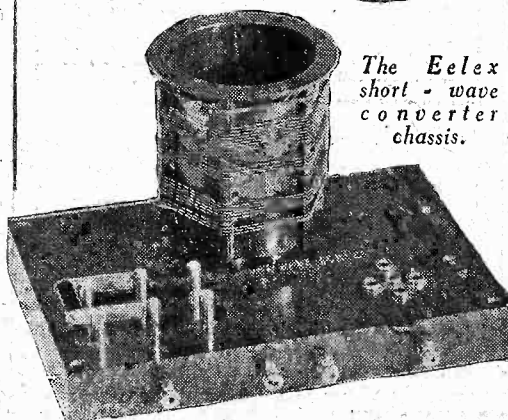
At the price of 52s. 6d. (less valve) this converter represents a sound investment for anyone wishing to participate in real short-wave reception.



The Eelex short-wave 8-pin reversible coil and base.

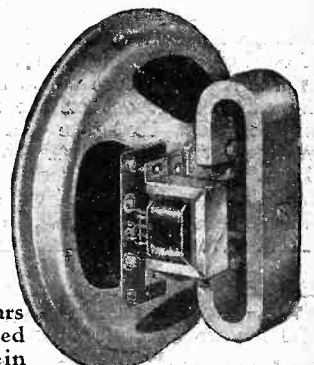


The Eelex short-wave converter chassis.



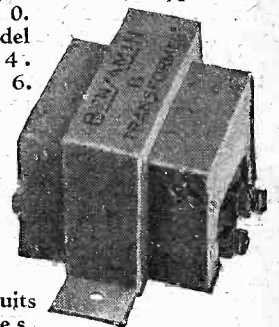
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Constructors realise that the ultimate success of their circuits depends almost entirely on the quality of component used in assembly. Good components made by skilled craftsmen are necessary; components made by engineers who have a thorough grasp of modern Radio requirements.



Twenty years accumulated experience in designing Moving-Coil Speakers has gone into the production of Magnavox Speakers, and we believe them to be the best that money can buy. Illustrated is the "Senior" Permanent Magnet Model, Type 252.

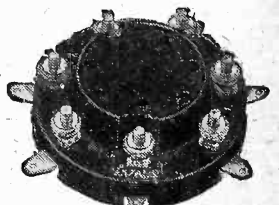
Price £3 3. 0.
Standard Model
Type 254.
Price £1 17. 6.



"B" Input Driver Transformer—For use with all types of circuits and valves.

Tapped to give choice of overall ratios 1½ to 1 and 1 to 1. Price 10/6.

The 7-pin Valve holder—Made of highest quality black bakelite with special self-cleaning contacts. Fitted with soldering tags and easy wiring terminals, which are reversible for under-chassis wiring. For Class "B" and other 7-pin valves. Price 2/.



Data Sheets are available giving full particulars of the complete Benjamin range of valveholders, transformers, chokes and Magnavox Mains-energised Speakers.

BENJAMIN ELECTRIC LTD.,
Tariff Road, Tottenham, London, N.17.

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LET OUR TECHNICAL STAFF SOLVE YOUR PROBLEMS

REPLIES TO



QUERIES and ENQUIRIES
by Our Technical Staff

If a postal reply is desired, a stamped addressed envelope must be enclosed. Every query and drawing which is sent must bear the name and address of the sender. Send your queries to the Editor, PRACTICAL WIRELESS, Geo. Newnes, Ltd., 8-11, Southampton St., Strand, London, W.C.2.

The coupon on this page must be attached to every query.

SPECIAL NOTE

We wish to draw the reader's attention to the fact that the Queries Service is intended only for the solution of problems or difficulties arising from the construction of receivers described in our pages, from articles appearing in our pages, or on general wireless matters. We regret that we cannot, for obvious reasons—

- (1) Supply circuit diagrams of complete multi-valve receivers.
- (2) Suggest alterations or modifications of receivers described in our contemporaries.
- (3) Suggest alterations or modifications to commercial receivers.
- (4) Answer queries over the telephone.

Please note also, that all sketches and drawings which are sent to us, should bear the name and address of the sender.

AMERICAN NOMENCLATURE

"I have had an American Radio set and it puzzles me very much just how to set it up. There are six valves and the wiring reads in this fashion: (Red) A—, (White) 90—, (Black) A—C—, (Brown) 135 B—, (Yellow) 45—, (Green) C—. The reading here is different and I have asked a few who are, like myself, at a loss, hoping someone of your staff can solve the problem for me. Also what kind of accumulator would be best, as I think myself that a 2-volt would be of no use."—(G. D. Catrine, Scotland.)

In America the following letters indicate the type of battery:—

- A—L.T. accumulator.
- B—H.T. Battery.
- C—Grid-bias battery.

You must find out the voltage of your valves to know the type of accumulator to use. As you do not give us the type numbers we cannot help you here. We feel sure you will find it quite easy to connect this set up now you know to which batteries the leads should be taken.

TUNABLE HUM

"I have recently built a mains three-valve, S.G., Det. and L.F. stages. All parts are of good make, and the mains side is well smoothed. In addition, each stage is efficiently decoupled. In spite of this, however, when I tune in the London station I get a terrible loud hum. This only occurs on the London station, and the set is quite silent all over the dial. Can you explain this, and perhaps indicate a cure?"—(R. B., Edmon- ton.)

The fault is known as a modulated hum, and is caused by the strong signal from your local station modulating the hum from the mains side of the set. The cure is quite simple and cheap. You require what is known as a Buffer condenser. This consists of two condensers of, say, 1 μfd., joined in series. The junction of the two condensers is joined to earth, and the other terminals are joined to the two anodes of the rectifying valve. Special condensers are obtainable for the purpose.

TESTING CONDENSERS

"I have some large fixed condensers in my set, and I wish to test them for leakage (if any), especially the two condensers in the R.C. transformer-coupled stages. I understand that any slight leakage in these condensers may result in bad distortion through placing positive bias on the L.F. valves, thereby cancelling any negative bias from grid-bias battery, resulting in incorrect milliammeter reading. Both Det. and L.F. stages are decoupled, also, I have a filter output, the choke being of first-class make, its specification being D.C.C. resistance, 260 ohms, inductance, 14/28 henries."—(R. W. F. O., Northumberland.)

The simplest test is to connect the condenser across a fairly high value voltage supply, and leave it joined there for some time. Then disconnect it and avoid touching the terminals. At the end of an hour, short the terminals with a metal object, and if you can obtain a fairly good spark, the leakage

from the condenser is negligible. The size of the spark will depend, of course, on the value of the condenser. In a dry atmosphere, the condenser will hold its more charge for a longer period. To carry out a more efficient test, connect a high voltage, say, 200, to a voltmeter through a .25 megohm grid-leak, and note the reading, if any. Then connect the condenser to be tested in place of the leak. If the reading is less, then its resistance is proportionately more than the leak.

L.F. INSTABILITY

"My receiver, which is of conventional design although built more or less from my own knowledge, suffers from the following peculiar fault. When I listen to the local stations the results are quite satisfactory and might even be called ideal. When, however, I turn up the reaction slightly to reach out, the set howls. I have definitely traced this to L.F. howling, although I am unable to see why it should do so. Can you offer any suggestion?"—(F. J. S., Barnet.)

The most probable cause of the trouble is the value of the grid leak and condenser. Try the effect of

DATA SHEET No. 49.

Cut this out each week and paste it in a notebook.

OPTIMUM LOAD VALUE FOR VARIOUS TYPES OF PENTODE.

Manufacturer	Type	Optimum Load (Ohms)
COSSOR	220 HPT	17,000
	220 PT	7,500
	410 PT	7,500
	PT 41	8,000
	PT 41 B	8,000
MARCONI OSRAM	MP/Pen.	10,000
	PT 2	17,000
	PT 425	9,000
	PT 4	7,500
	MPT 4	8,000
MAZDA	DPT	8,000
	Pen. 220	17,000
	Pen. 220 A	7,500
	AC/Pen.	8,500
	DC/Pen	10,000
MULLARD	DC2/Pen.	10,000
	PM 22 A	15,000
	PM 22	8,000
	PM 24 A	10,000
	PM 24 M	8,000
SIX-SIXTY	Pen. 4 V 1	8,000
	SS 220 Pen.	12,000

using a leak with a lower value, or change about both leak and condenser. Various values should be experimented with until you find a combination which suits the particular valve which you are using as a detector. The leak may actually be faulty, although in this case there would probably be some distortion when tuned to the local.

TUNING CONDENSER USELESS

"The tuning condenser in my set does not make the slightest difference to the tuning. I can turn it from 0 to 100 and the signals are exactly the same. What is wrong?"—(Y. S., Chepstow.)

You do not give any information which would enable us to definitely locate your trouble, Y. S. There are various faults which could arise and cause the trouble, but if the receiver has only just been constructed and the tuning condenser has never functioned, obviously the earth connection, or the lead to the coil has been omitted. If, however, the receiver has functioned for a time and has now ceased to work, the actual connection to the moving vanes may be broken. If this is a "pig-tail," you should carefully examine it, and in any case all connections to coil and condenser should be carefully traced and checked. If you have built the receiver from a

design in a book, you may have used a wooden chassis instead of a metal one and so omitted the earth return lead.

GRID-BIAS BATTERY

"I should like you to clear up a small point which has been worrying me for some little time. In the course of studying how the valve works, I have seen that the grid-bias battery is used to apply a negative potential to an L.F. valve, but that the circuit for this battery is incomplete and consequently no current flows. I can follow this more or less, but it seems to me that the battery should never need replacing if this is the case. In my own set I have found that the battery does not last three months. Can you associate these two facts?"—(A. L. K., Hornsey, N.)

The facts are not difficult to reconcile, A. L. K. Firstly, it is true that no current is taken from the grid battery, and therefore it does not "wear out." Secondly, your battery needs replacing every three months or so because it has "dried up." The active elements in the battery consist of zinc and a semi-liquid material. As has already been explained in these pages the latter part of the cell evaporates—slowly, it is true. Therefore, although the battery does not become used up it ceases to become active. It should, however, last longer than three months, and therefore we can only assume that you have placed your battery rather close to a valve, or the receiver is in a warm, dry position. All dry batteries should be kept, as far as possible, in a cool place.

INDOOR AERIAL INEFFICIENCY

"I have erected an indoor aerial but can only get very poor results. I used a good thick wire, I think about 22 D.C.C., and it runs round the picture rail for a total length of about 25 feet. Can you suggest how I might improve the results. I can hear the local faintly, but no other stations."—(S. M. N., Cardiff.)

The aerial is no doubt badly screened by water pipes, electric light conduit or similar earthed metal in the walls. In addition, a wire of this nature should not be sunk into the picture rail. Much better results are obtained when the wire is held at least one foot away from the walls, and, furthermore, it should not be turned to form various angles. A straight short wire will often prove more efficacious than a long wire which winds round three sides of a room. Try a shorter wire running direct from the set to the further point of the room (disregarding appearances for the time being). If you find this works efficiently you must contrive to utilise a similar arrangement unless you are content to have the wire showing. A further scheme is to run the wire vertically to a floor above.

BIASING A MAINS VALVE

"I am building up a mains set but I have come to rather a difficulty. The valves are all of the indirectly-heated type except the output which is a directly heated pentode. I appreciate that biasing resistances may be inserted in the cathode lead of indirectly-heated valves or in the centre-tapped heater winding of the directly heated valves. As, however, I wish to run all my four valves from a single 4 amp. winding I am at a loss where to put the biasing resistances for the two L.F. stages. Can you assist me, please?"—(T. Z. S., Shoeburyness.)

It is not difficult to carry out the biasing scheme. The resistance for the first L.F. valve should be inserted in the cathode lead in the ordinary way. We presume you know how to work out the required value. The resistance for the output valve should be joined between the centre tap of the heater winding and the earth line. The loudspeaker should then be fed by the usual output filter, and instead of connecting the loud-speaker to the earth line it should be taken direct to the centre-tap.

FREE ADVICE BUREAU COUPON

This coupon is available until Sept. 2nd, 1933, and must be attached to all letters containing queries.

PRACTICAL WIRELESS, 26/8/33.

CATALOGUES RECEIVED

To save readers trouble, we undertake to send on catalogues of any of our advertisers. Merely state, on a postcard, the names of the firms from whom you require catalogues, and address it to "Catalogue," PRACTICAL WIRELESS, Geo. Neveles, Ltd., 811, Southampton St., Strand, London, W.C.2. Where advertisers make a charge, or require postage, this should be enclosed with applications for catalogues. No other correspondence whatsoever should be enclosed.

REDFERN'S EBONITE PANELS
MESSRS. REDFERN'S RUBBER WORKS LTD.
 of Hyde, Cheshire, have sent to us a copy of a new price list for ebonite panels, low-loss formers, lead-in tubes, and a variety of moulded goods in rubber and ebonite for the wireless and electrical trades. Readers interested should write for a copy of the list to the address given above.

MULLARD PAMPHLET ON CLASS "B" AMPLIFICATION

WE have received a copy of a new pamphlet which has just been issued by The Mullard Wireless Service Co. Ltd. It describes in simple terms what Class "B" amplification is, the characteristics of the Mullard P.M.2B, Class "B" valve, how to use Class "B" amplification with existing sets, and how to design a Class "B" unit. A copy of this useful instruction sheet can be obtained from Mullard House, Charing Cross Road, London, W.C.2.

TANNOY EQUIPMENT
TANNOY PRODUCTS are well known for their power amplifiers and other radio apparatus, particulars of which are given in a loose-leaf folder issued by this firm. Amongst the apparatus dealt with in the leaflets are various types of power amplifiers, heavy duty speakers, radio-gramophone equipment, microphones and receivers. The address is Dalton Street, West Norwood, London, S.E.27.

THE SUPERSET
 (Continued from page 775)

may be turned to its maximum position (clockwise) without instability taking place. Having found this position you should be able to rotate the tuning control and hear a number of stations at full volume at various settings of the dial. Naturally, the volume control will have to be brought into use on many of them in order to prevent overloading.

Adjusting the Tone

The Controlatone knob will give a pleasing modification of the high-note response and remove any shrillness that may be apparent on certain musical items. Certain broadcasting stations are always received with a nasty high-pitched whistle in the background, and this control will be found invaluable in reducing or even completely eliminating this whistle. Although the above notes are, unfortunately, rather brief, I am sure they will enable you to put the set into operation and obtain some idea of its

station-getting properties and the high quality of reproduction which is obtainable on this receiver. The small switches on the rear of the loudspeaker must, of course, be adjusted to correctly match the Class B valve, and for this purpose they should be turned to cover the letters D and F, although your particular requirements may be better satisfied with the connections adjusted to provide a higher ratio, namely letters C and G. However, that is one of the great features of this particular speaker and you may quickly find the best ratio to give the particular results which your room's acoustics demand.

Replies to Broadcast Queries

STEVENSTON (Dringhouses): GMBJ, R.M.S. *Empress of Britain*. We cannot identify the other transmitter as you do not give the call-sign. SPARKS (R.A.F., Winchester): GNI, Niton (I.O.W.); FFB, Boulogne-sur-Mer (France); G.L.D., Land's End; cannot trace GJT, as you appear to have misread call; GQYJ, S.S. *Ile of Guernsey*; UNCC, Belgian S.S. *Carica Milica*; OYIC, Danish S.S. *Jane Maersk*; GSM, Fog Beacon, Start Point Lighthouse; GCM, Fog Beacon, Casquets Lighthouse (C.I.) both on 1,010 m. (297 kc/s). MEACHEM (Bletchley): Dutch experimental amateur transmitter; K. J. Asselberg, 8, Burgmeester Kerstenlaan, Breda (Holland).

SOUTHERN RADIO'S Wireless Bargains.—Set manufacturer's guaranteed surplus—

VARIABLE Condensers.—British Radiophone 4-gang superhet type, fully screened and trimmers, 6,0003, 8.9 (list 45/-). Same type, complete with dial knob and escutcheon, 12.9 (list 50/-). Hydra block condensers, brand new, 16 mfd., 2+2+6+2+1+1, 1,000 volt test (made for Canadian Marconiophone Co.), 8/9; 4 mfd., 2/6; 2 mfd., 1/9; 1 mfd., 1/-; all 750 volt.

SPEAKERS.—Celestion Soundex permanent magnet, 10" (list 27/6); Rola F6 permanent magnet, 28" (list 49/6); D.E. mains energised, 2,500 to 6,500 ohms, complete with humbucking coils and transformers 16/6 (list 39/6); Peter Grassman dynamic speakers and chassis, 10.6 each (list 35/-); G.E.C. Stork speakers, complete in magnificent cabinet, 19/9 (list 43/10); Ormond speakers, complete in cabinets, 10" (list 25/-).

CONSTRUCTORS' Kits.—Ready Radio "303" battery 3-valve kits, less valves, 18/- each; complete with 3 Mullard valves (P.M.I.L.F., P.M.2, 2D.X.), 33/- each (list 70/-); Ready Radio Meteor screen grid 3-valve kit, less valves, 26/-; with 3 Mullard valves (P.M.12a, P.M.2D.X., P.M.2a), 49/- (list 43/7/6); Universa Radio 3-valve kits, ready assembled on chassis, 12/6 (list 46/-).

READY RADIO S.T.400 Kits, as specified by Scott Taggart, £2 10/6 each (list 44/17/6).

READY RADIO Meteor Screen Grid 3-valve "A" Kit, complete with cabinet, permanent magnet speaker (less valves), 43/7/6, with 3 Mullard valves, 44/10 (list 48/17/6); Mullard Radio for Million 3-valve A.C. kit, complete with 3 Mullard A.C. valves (Pen. 4V, 354 V, 24V), 43/10 (list 46/10); Mullard Radio for Million 3-valve battery kits, complete with 3 Mullard valves 43/9/0 (list 46/2/6); all kit brand new, in original sealed cartons.

WE have Purchased a small liquidated stock of brand new components and offer a limited quantity of Pifco Radiometers All-in-One latest type bakelite case, 8/9 (list 12/6), 6 only; B.T.H. Junior Pick-ups, 17/6 (list 25/-); British General Band Pass tuning units, 10-K.C. aerial or anode, 5/- each (list 14/6).

ALL Goods Guaranteed Brand New and Perfect and Sent Carriage Paid.

PLEASE Note.—We have opened Branches at 271-275, High Rd., Willesden Green, N.W.10, and at 46, Lisle Street, W.C.2; where callers are cordially invited to inspect our large stocks of wireless bargains. Please send all post orders to 323, Euston Rd., N.W.1.

SOUTHERN RADIO, 323, Euston Rd., London, N.W.1 (near Warren St. Tube). 'Phone: Museum 6324.

STOP PRESS NEWS!
 Interesting items relating to the latest developments announced as we go to press. Where desirable further details will be given later.

NEW AMPLION SPEAKERS
 AMONGST the new Amplion speakers to be introduced this season are the Sonette and the M.C.22. The Sonette has already been mentioned, and is of the midget type, having a cone of only 6 1/2 in. diameter. The magnet is of a new type and provides a greater field strength than is usually obtained, resulting in additional sensitivity. In addition, the magnet-centring device is of unique design, enabling the frequency response to reach a really high standard. The M.C.22 is a very robust speaker, costing 30s. 6d. The over-all size of the cone is just over 5 in., and it will handle a really large output. The cone is weather-proofed, and certain improvements have been introduced into the moving-coil suspension. These facts, together with the addition of a universal input transformer result in a really high-class but moderately-priced loudspeaker.

VULCO STAG BATTERIES
 THE Vulco Company have incorporated in their new Vulco Stag Batteries the results of what they say is undoubtedly the most important discovery in the science of battery-making in the twenty years of the company's existence. Scientific research in battery making has been directed especially since the advent of wireless, towards the solution of three problems: (1) How to increase electrical conductivity in the cell or, in other words, how to lower the internal resistance; (2) how to increase the proportion of the active material—namely, the manganese—in the depolariser, at the expense of the merely conducting elements; (3) how to get rid of the gases which are formed while the battery is working, and which interfere with depolarisation and shorten the life of the battery. After considerable research, the solution to these three problems was found in the product of combustion, under pressure, of hydrocarbon bases. This material has now been incorporated in the new Vulco Stag batteries, and every cell in every stag battery is guaranteed to contain its due proportion and is also guaranteed to contain the increased proportion of active manganese which its presence makes possible. Owing to economies in production, this revolution and expensive alteration has been effected without exceeding normal prices.

Famous Maker's Offer! **£5 Radio-Gram CABINET for 65/-**
SEVEN DAYS' FREE TRIAL
 (OR 10/- MONTHLY)
 Polished Oak 1 and Piano built! The acoustic Tone brings a fine thrill. Makers to Radio-Press. B.B.O., 3,000 clientele. MODELS FROM 35/- to £15. Photographs and List FREE.
PICKETTS Piano-Tone Cabinets, (R.F.), Albion Road, Bezzel Heath
 £6-15-0

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