4D

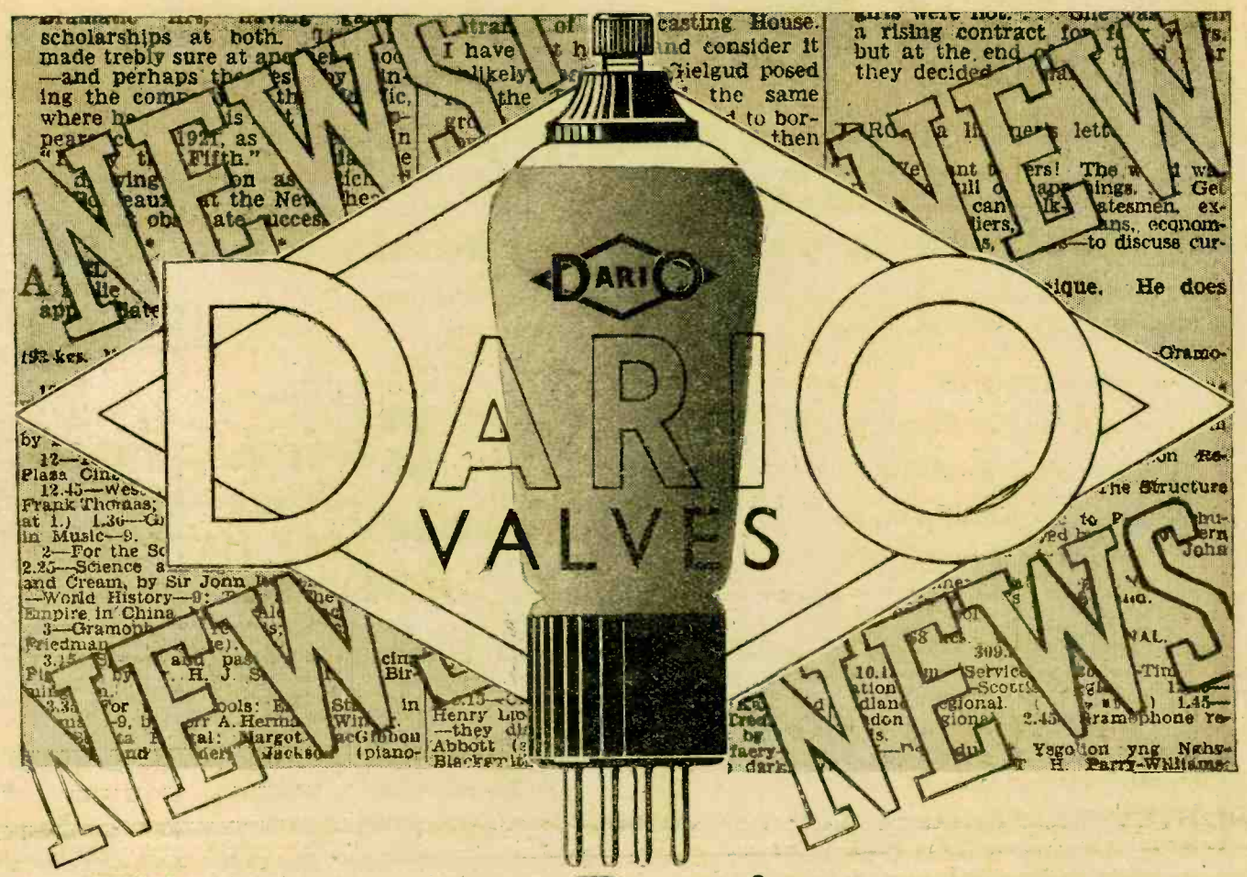
The Wireless World

THE PRACTICAL RADIO JOURNAL

with

Complete Foreign Programmes

Friday, December 1st, 1933.



The new Dario range is here!

Never before such value, such prices, such perfect reproduction as you now find with the new DARIO range.

Every new type and improvement.

2-VOLT BATTERY.

Screened Grid and Variable Mu S.G.	10/6
H.F. and Detector	5/-
Super Power	6/6
Class "B" Output	10/6
Pentode	10/6

DIRECTLY HEATED A.C. MAINS.

Output Pentode	12/6

INDIRECTLY HEATED A.C. MAINS.

Screened Grid and Variable Mu S.G.	12/6
Screened H.F. Pentode	12/6
Diode Tetrode	13/6
General Purpose	8/6
Output Pentode	12/6

POST THIS COUPON TO US

We will be pleased to send you our catalogue of the latest DARIO Valves. You will be astonished both by the completeness of the range and the very low prices.

W.W.

Name .....

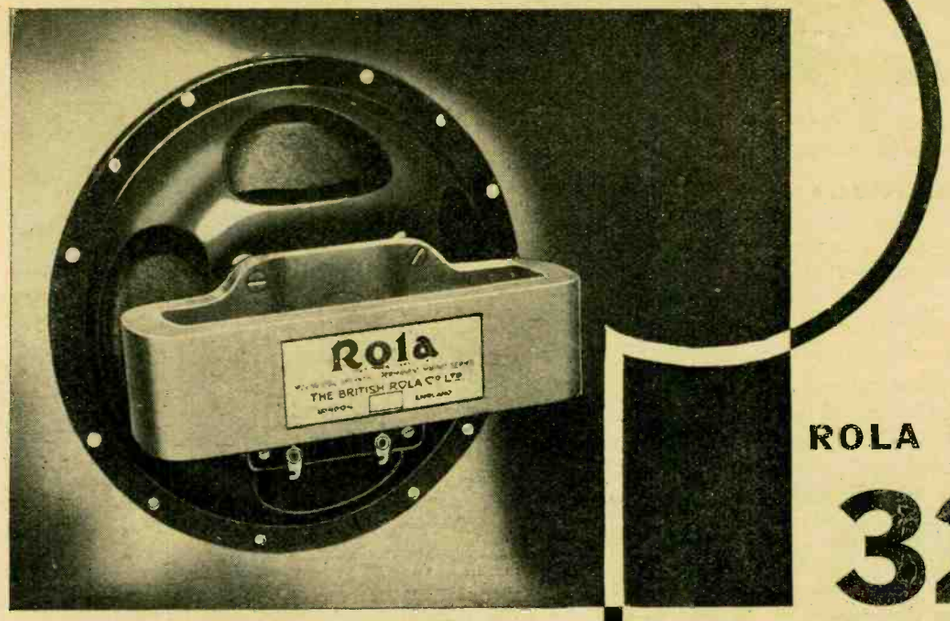
Address .....

.....

To IMPEX ELECTRICAL LTD., 47, Victoria St., Westminster, London, S.W.1. Telephone: VIC. 3914. Telegrams: Dariolect, Sowest, London.

Advertisements for "The Wireless World" are only accepted from firms we believe to be thoroughly reliable.

Extension Speakers



ROLA FR6-PMM

32/-

8" DIAMETER

THE ROLA EXTENSION SPEAKER IS AN *8 DIAMETER SPEAKER OF THE SAME SIZE AS THAT USED IN THE SET.* **THIS SPEAKER IS VASTLY SUPERIOR TO A MIDGET SPEAKER WITH SMALL INPUT TRANSFORMER WITH HAPHAZARD TAPPINGS.** *Why use a Midget Extension Speaker when you can get a full size Rola exactly suitable at no greater cost ?*

You Must Use Rola if you wish to Match the Speaker in the Set

SINCE ROLA SPEAKERS HAVE BEEN STANDARDISED BY THE LARGE MAJORITY OF BRITISH RADIO MANUFACTURERS THE NECESSITY FOR USING ROLA EXTENSION SPEAKERS IN ORDER TO ENSURE ACCURATE MATCHING OF SPEECH COIL IMPEDANCES IS MANIFEST. In the majority of cases the speech coil of Rola Extension Speaker (**WITHOUT INPUT TRANSFORMER**) can be connected to the speech coil of the Rola Speaker in the receiver. **MATCHING COMPLICATIONS ARE THUS AUTOMATICALLY AVOIDED WHEN ROLA IS USED.**

THE BRITISH ROLA CO. LTD.,
Minerva Rd., Park Royal, N.W.10
'Phone : Willesden 4322-3-4-5.

ROLA
the World's Finest Reproducers

Some examples of correct FULL SIZED British Rola Extension Speakers for well-known Radio Receivers.

AERODYNE		
Swift, Swan	FR6-PMM	32/-
Kestrel, Falcon	FR6-PMM	32/-
Sphinx, Eagle	FR6-PMM	32/-
ALBA		
Models 22, 23, 33, 44, 55, 66, 77, 88, 50, 70, 54, 56, 67, 78	FR6-PMM	32/-
BRUNSWICK	FR6-PMM	32/-
BURGOYNE		
B3, "Class B"	FR6-PM-23	39/6
Dreadnought Silver 7	FR6-PMP	39/6
BURNDEPT		
Super Merrymaker	FR6-PM1	39/6
BURTON, C. F. & H.		
A.C.4	FR6-PMM	32/-
CLIMAX RADIO		
BP3, TC3	FR6-PMP	39/6
S4 Superhet	FR6-PMP	39/6
CONSOLIDATED RADIO		
Rolls Caydon 3	FR6-PMP	39/6
Band Pass 3	FR6-PMP	39/6
Band Pass 3 D.C.	FR6-PMP	39/6
All-wave Band Pass	FR6-PMP	39/6
A.C.2 Band Pass	FR6-PMP	39/6
"Class B" Transportable	FR6-PMM	32/-
COSSOR, LTD.		
Models 222, 22A, 732M, 533, 533A Mains Console, Mains Kit, Mains Superhet	FR6-PMP	39/6
	FR6-PM1	39/6
1932 Battery Receiver	FR6-PMP	39/6
1933 Battery Kit, 341 and 342	FR6-PM-20	39/6
1933 Receiver, 732M	FR6-PM-20	39/6
Model 344 "Class B," Model 2456 "Class B"	FR6-PM-23	39/6
DECCA GRAMOPHONES		
16, 19, 22, 350 280	FR6-PMP	39/6
28, 430 360,550/480	FR6-PM1	39/6
G.E.C.		
Gala 3 & Viking 4	FR6-PMP	39/6
Nomad 4	FR6-PMP	39/6
Superhet 5	FR6-PMP	39/6
All-wave Super	FR6-PM1	39/6
Console	FR6-PMP	39/6
Superhet A.C. D.C.	FR6-PMP	39/6
Console A.C. D.C.	FR6-PMP	39/6
Radiogram S'het	FR6-PMP	39/6
Superhet 8	FR6-PMP	39/6
Superhet 6 Battery "Class B"	FR6-PM-23	39/6
Battery M.C.C.	FR6-PM1	39/6
HACKER & SONS (Dynatron)		
Dynatron 32	FR6-PMP	39/6
Ether Emperor	FR6-PM-01	39/6
Ether King	FR6-PM1	39/6
Ether Prince	FR6-PM1	39/6
Ether Lord	FR6-PMP	39/6
Commodore	FR6-PMP	39/6
Ambassador	FR6-PMP	39/6
B41 Battery	FR6-PM1	39/6
EKCO (E. K. Cole)		
M23, RS3, S.H.25, C25, A.C.74, D.C.74	FR6-PMP	39/6
B74 "Class B"	FR6-PM-23	39/6
HART COLLINS, LTD.		
Passport 4	FR6-PMP	39/6
Passport D.C.	FR6-PMP	39/6
Universal	FR6-PMM	32/-
5V Superhet	FR6-PMM	32/-
KOLSTER BRANDES		
KB888, 666, KB444	FR6-PMM	32/-
KB 333 Battery	FR6-PMM	32/-
LISSEN, LTD.		
2V A.C.	FR6-PMP	39/6
8012, 8039, 8051	FR6-PMP	39/6
8043, 8052, 8060	FR6-PMP	39/6
8005, 8020, 8030	FR6-PMP	39/6
8019 or 8033 Battery	FR6-PMP	39/6
100 Station Receiver	FR6-PMP	39/6
MARCONIPHONE CO., LTD.		
42 A.C., 42 D.C., 253, 256, 272, 274, 271, 278, 270, 280, 290	FR6-PMP	39/6
276, 275, 281	FR6-PM1	39/6
McMICHAEL, LTD.		
Duplex AC4	FR6-PMP	39/6
Supervox	FR6-PMP	39/6
Lodex Battery, "Class B"	FR6-PM-22	39/6
Super 5V Portable	FR6-PM-22	39/6
MURPHY RADIO		
A3A, A8, A4, B4, B5	FR6-PMM	32/-
PHILCO RADIO & TELEVISION CORP., LTD.		
24 SEB, 24 SEL, 247EB, 71X, 237, 55 Baby, 55 Lowboy, 7, 43, 260, 261	FR6-PMP	39/6
PHILIPS LAMPS, LTD.		
830A, 634A, 830C, 634C, 630A, 834C, 834A, 832B	FR6-PMP	39/6
PORTADYNE RADIO		
B.M.C., A.C.3	FR6-PMP	39/6
S AC Superhet	FR6-PMM	32/-
S B Battery S'het	FR6-PMM	32/-
P B Portable	FR6-PM-23	39/6
PYE RADIO, LTD.		
K, MM, G, Twintriple AC, S, School Set, PAC, PB, EAC, EB, OB, EAC RG	FR6-PMM	32/
RADIO INSTRUMENTS		
Madrigal	FR6-PMM	32/-
Superhet Radiogr'm	FR6-PMM	32/-
REGENTONE		
Quadradyne	FR6-PMP	39/6
Band Pass 4	FR6-PMP	39/6
Superhet	FR6-PMP	39/6
"Battery" Class B"	FR6-PMP	39/6
A.C.2, A.C.3, Super 3	FR6-PMP	39/6
SOVEREIGN PRODUCTS		
Doric	FR6-PMP	39/6
Universal 3 V	FR6-PMP	39/6
SUNBEAM ELECTRIC		
B33, SGP3, A.C.-D.C.3, SG4, B37, B40, BL40, M30, M34	FR6-PMM	32/-
U35, UL35	FR6-PMP	39/6
TELSEN		
Golden Voice	FR6-PMP	39/6
464 3V A.C.	FR6-PMP	39/6
474 3V A.C. Band Pass	FR6-PMP	39/6

Write to-day for Rola Extension Speaker Broadsheet

Advertisements for "The Wireless World" are only accepted from firms we believe to be thoroughly reliable.

The Wireless World

THE PRACTICAL RADIO JOURNAL

23rd Year of Publication

No. 744. FRIDAY, DECEMBER 1ST, 1933. VOL. XXXIII. No. 22

Proprietors: ILIFFE & SONS LTD.

Editor:
HUGH S. POCOCK.

Editorial,
Advertising and Publishing Offices:
DORSET HOUSE, STAMFORD STREET,
LONDON, S.E.1.

Telephone: Hop 3333 (50 lines).
Telegrams: "Ethaworld, Watloo, London."

COVENTRY: Hertford Street.
Telegrams: "Cyclist, Coventry." Telephone: 5210 Coventry.

BIRMINGHAM:
Guildhall Buildings, Navigation Street, 2.
Telegrams: "Autopress, Birmingham." Telephone: 2970 Midland (3 lines).

MANCHESTER: 260, Deansgate, 3.
Telegrams: "Iliffe, Manchester." Telephone: Blackfriars 4412 (4 lines).

GLASGOW: 26B, Renfield Street, C.2.
Telegrams: "Iliffe, Glasgow." Telephone: Central 4857.

PUBLISHED WEEKLY. ENTERED AS SECOND CLASS MATTER AT NEW YORK, N.Y.

Subscription Rates:
Home, £1 1s. 8d.; Canada, £1 1s. 8d.; other countries abroad, £1 3s. 10d. per annum.

CONTENTS

EDITORIAL COMMENT

Reception Under the New Conditions

When Droitwich Becomes the National

IT is perhaps not sufficiently widely appreciated that when the new long-wave station at Droitwich takes over from Daventry next year, a material change will take place in reception conditions under the B.B.C. programme distribution arrangements which will coincide with the inauguration of that station.

Taking London as an example, here we now have alternative programmes both emanating from Brookmans Park and both on the medium band; signal strength is more or less equal for both and a comparatively small alteration in tuning of the receiver gives us one station or the other.

When Droitwich on long waves becomes the National transmitter, and Brookmans Park provides only the Regional programme on one wavelength on the medium band, the change in reception conditions is likely to be widely felt. It is well known, for instance, that small aerials, such as are often installed indoors, are very inefficient for the reception of long waves, and whilst such aerial arrangements may suffice at present for reception in the service area of Brookmans Park for the alternative programmes, they will not necessarily do when the alternative programme is transferred to long waves. Again, many sets which give adequate selectivity on the medium-wave band fail to receive on long waves without overlapping of stations.

So long as we can be sure that the new long-wave station is going to replace the National medium-band transmitters in different parts of the country with a satisfactory service, we can feel reasonably content with the new proposals, but it must be expected that contentment in many cases will only come after rather drastic alterations to the listener's receiving arrangements.

Background Mystery

A Matter for the B.B.C.

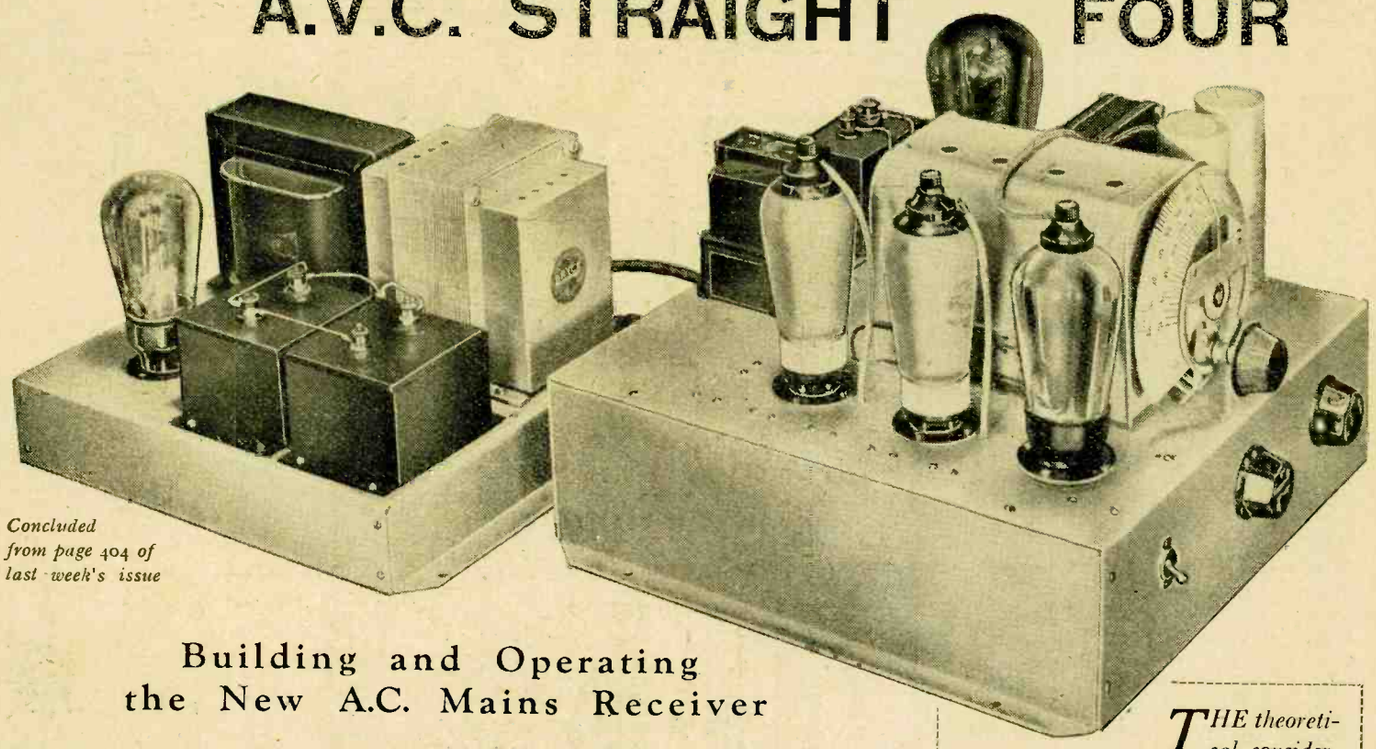
A NOTE appeared in a recent issue under "Broadcast Brevities" drawing attention to the frequent presence of a background of speech or music coming from the Regional transmitter, Brookmans Park, when the set is tuned to the National. This paragraph has produced so many letters from readers that it would seem to be a matter deserving of close investigation by the B.B.C. engineers. The letters are, for the most part, from readers who have obviously a good technical knowledge and wide experience and are well aware of the effects produced by cross-modulation, which is the explanation which the B.B.C. has put forward to some of them when they have made enquiries as to the cause. We feel fairly confident that if cross-modulation were the reason, most of these readers would have been aware of it.

If the B.B.C. engineers are satisfied that induction between lines is not the cause, it would seem necessary to look elsewhere for an explanation. As a pure conjecture, we might suggest that a common earth at the transmitters might be responsible.

Whatever the reason, it is an intensely irritating phenomenon. Whilst a few listeners would be interested in knowing the cause of the trouble, the vast majority of the B.B.C.'s audience care little for the cause, but would welcome elimination of the effect.

The Wireless World

A.V.C. STRAIGHT FOUR



Concluded from page 404 of last week's issue

Building and Operating the New A.C. Mains Receiver

THE theoretical considerations underlying the design of "The Wireless World" A.V.C. Straight Four appeared in last week's issue, and the present article deals with the construction and initial adjustment of the receiver. Some notes upon the performance to be expected are also included.

THE layout of the components of any receiver is a matter of importance, but this particularly the case with a two-H.F. straight set, otherwise serious difficulty from instability may be found. In order to facilitate the retention of that layout which has been found experimentally to be the best, therefore, the receiver is constructed on a metal chassis which is obtainable with all holes ready drilled. There is thus no possibility of error in positioning the components, and the drawings which accompany this article will serve as an aid in identifying the various holes.

It is important to remember that the coil assembly must be mounted before the gang condenser, and the two 1 mfd. condensers C16 and C19 before the L.F. transformer. The remaining components, however, may be screwed down in any convenient order. The fixing bolts are used for earth connections in many cases, and the frame of the gang condenser is earthed only by its contact with the chassis. Good connections at all these points are very important, and as the chassis is cellulose finished it is a wise plan to scrape off the enamel beneath the bolts in question, and not to rely entirely upon the screws cutting through of their own accord. The gang condenser is particularly important, and here a good connection at all four of the mounting legs is essential.

Apart from these points, no special difficulty should present itself, and the wiring is quite straightforward. As far as possible, this should be carried out in the manner of the original receiver, and it is essential that grid and anode leads be kept short and well away from one another, otherwise instability will be inevitable. No. 20 or No. 22 gauge wire will be found most convenient for wiring, and if desired may be used throughout. A somewhat more rigid construction, however, will be obtained by using No. 16 gauge for a few leads, of which the chief are the earthing connections to the fixed condensers. Certain leads are screened, and it is important that the correct material be used; large diameter metal braided sleeving should be employed with a thin internal wire, not thick rubber covered metal braided leads nor motor-car type armoured cable.

The Loud Speaker

It should be pointed out that although most of the components screwed to the chassis are at the same potential as the chassis, in one or two cases insulation is required. The aerial terminal and one of the pick-up terminals must be insulated by using the washers supplied with them. The 30-ohms Hum-Dinger R20 must also be insulated from the chassis, otherwise a short-circuit of the output valve grid bias will result, with a detrimental effect on the output valve.

The loud speaker used with this receiver must have a field resistance of 5,000 ohms and be rated for a field current of 50 mA. It should also have a 6-watts power handling capacity, and be suitable for matching the P.P. 5/400 output valve which requires a load impedance of 2,700 ohms. The Baker's Selhurst Radio Speaker specified meets all these requirements and has a bass response unusually free from resonances; moreover, the high frequency response is maintained at an even level up to at least 5,000 cycles. Since the speech coil is of the high impedance type, and a choke-condenser output circuit is used, no output transformer is required.

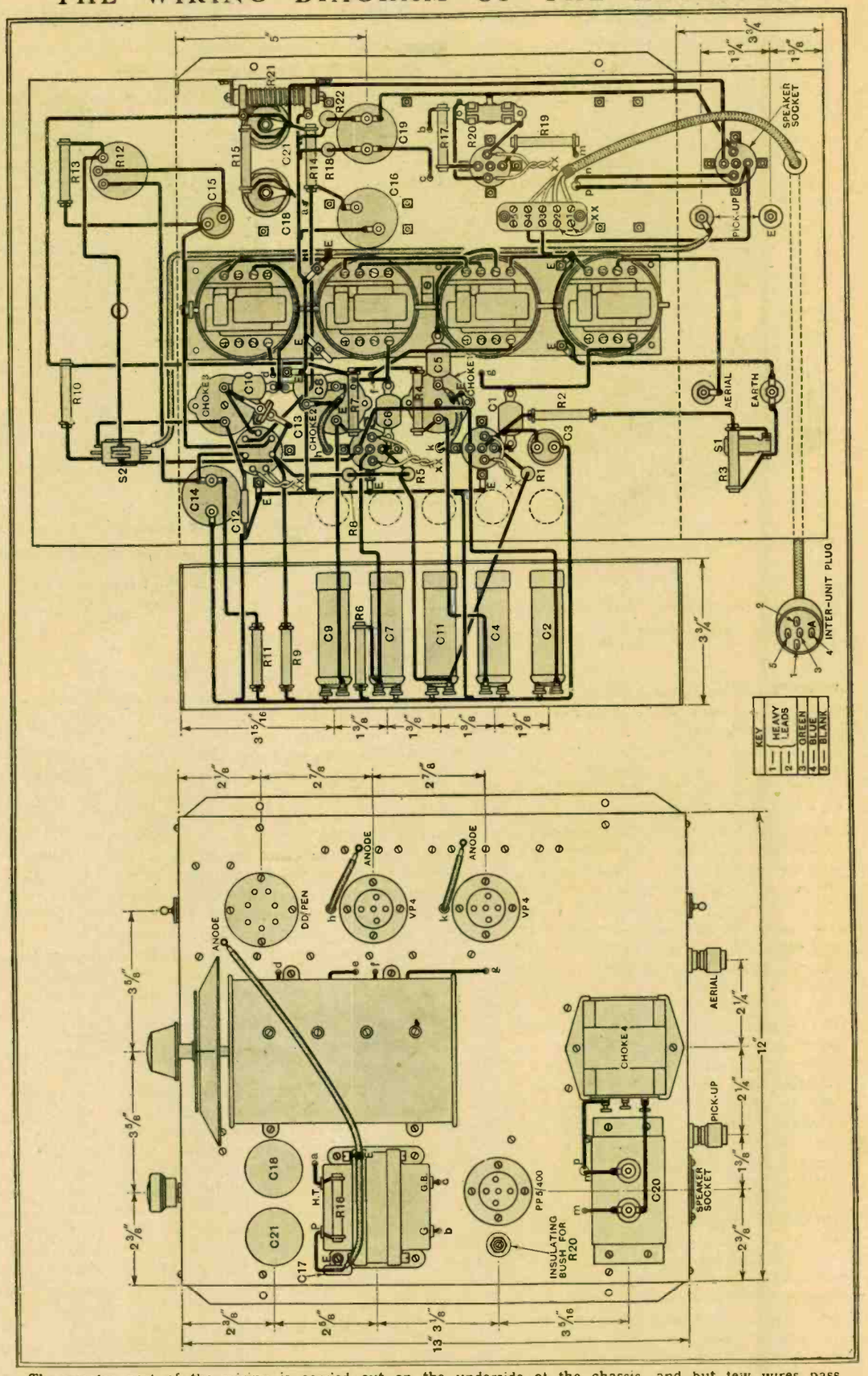
It should be pointed out that the cone develops quite a large amplitude of vibration at low frequencies, and in consequence, there is a possibility of accoustic reaction between the speaker and the receiver if both are mounted on the same cabinet. Such reaction, of course, would introduce a bass resonance, or in a bad case, a sustained howl. It is a wise plan, therefore, to mount the receiver chassis upon blocks of sponge rubber so that it can float freely.

When first setting up the receiver, some check on the voltages and currents should be made, and this should be done with the Local-Distance switch set to distance and with the set tuned to no signal. The anode potential of the H.F. valves, measured between the chassis and the valve anodes, should be about 190 volts, and the screen potential about 190 volts.

The A.V.C. Straight Four

The grid bias of these valves, measured between the chassis and cathodes, should be about 2.6 volts and the anode current about 3.7 mA. In the case of the detector, the measured anode voltage will be about 24 volts only, while the screen potential is about 120 volts. When a signal is tuned in, the anode voltage rises considerably. The no-signal anode current is about 8 mA, and falls on tuning in a station to such a degree that on a local station it may drop to 4 mA. A milliammeter connected in the anode circuit of this valve, therefore, can be used as a tuning indicator. The output valve passes an anode current of about 58 mA. and the voltage measured between the chassis and the valve anode is 410 volts; the bias between the chassis and the slider of R20 is 28.5 volts. The speaker field current should be about 48 mA. It must not be expected, of course, that these figures will be reproduced exactly in different receivers, and the results obtained will necessarily depend somewhat upon the meter employed; nevertheless, quite good agreement should be found.

THE WIRING DIAGRAM OF THE RECEIVER



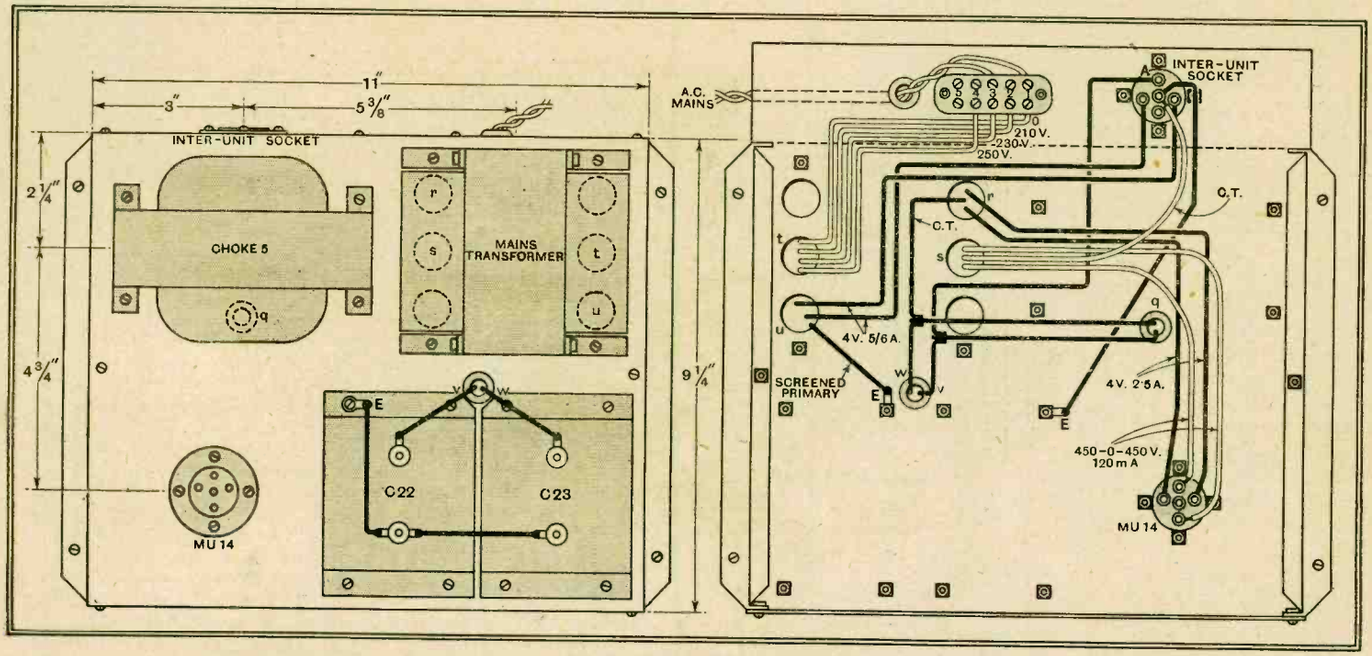
The greater part of the wiring is carried out on the underside of the chassis, and but few wires pass through to the upper side.

Gramophone Operation

Since the radio-gramophone switch is arranged to open-circuit the screen supply on gramophone, there will be no break-through of radio signals. The manual volume control is operative on gramophone, so that a pick-up is the only additional apparatus required. The volume control, however, is of higher resistance than that needed by many pick-ups, for this is dictated by the radio requirements. It may be found necessary, therefore, to shunt the pick-up with a resistance in order to maintain the correct tone. This is best found experimentally, but a resistance value of some 50,000 ohms to 100,000 ohms will meet most cases.

On radio the chief adjustments necessary are those to the ganging. This should be carried out at a low wavelength and on a very weak station, unless a milliammeter is available to act as a tuning indicator. It is useless to attempt to gang on a strong signal without a meter, since the action of A.V.C. will make the optimum trimmer settings very difficult to determine. Trimming is carried out for maximum signal strength, whether as indicated by the ear on a weak signal or by minimum anode

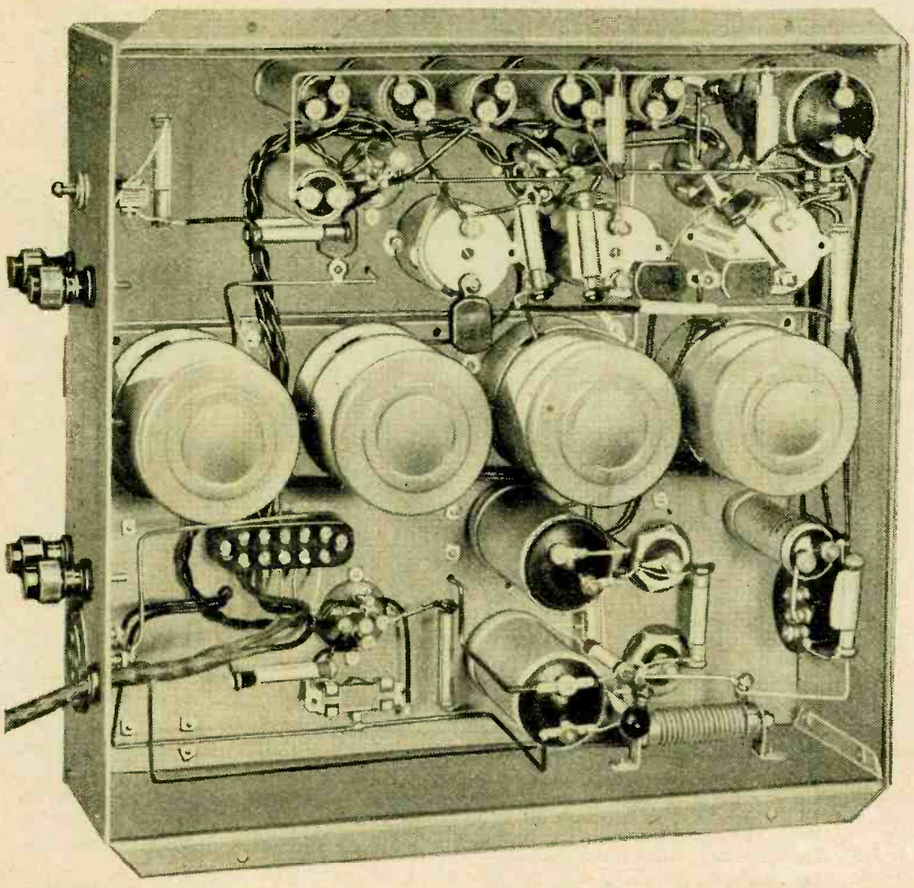
PRACTICAL WIRING PLAN OF THE ELIMINATOR



The wiring of the mains unit is extremely simple and it should be noted that both the mains transformer and the choke are fitted with leading-out wires instead of terminals

current of the controlled valves—the DD/Pen and the two H.F. stages.

Having tuned in some station on a wavelength below 250 metres, adjust each trimmer in turn for maximum signal strength. If it be found that this leads to one or more trimmers being fully screwed home or fully unscrewed, the capacities of all other trimmers must be reduced or increased respectively. If a very low wavelength station cannot be obtained at the first attempt, a rough adjustment of the ganging should be made on a higher wavelength station, after which no difficulty should be found in tuning in a station on a really low wavelength. The dial is calibrated in wavelengths, but whether this holds good in practice depends upon the precise values of trimmer capacity used in ganging. Small adjustments to correct for this are probably most conveniently made by slightly slipping the dial on the condenser shaft, but if the discrepancies are large a combination of this with the reganging of the circuits for different trimmer capacities will probably enable correction to be obtained.



An underview of the receiver chassis. It will be noted that the coils are mounted directly beneath the gang condenser in order to keep the connecting leads as short as possible.

Performance

The only further adjustment required is to R20, which must be set to the position of minimum hum. Distant stations spaced by 9 kc/s should be receivable clear of one another except for a certain amount of sideband splash which is inevitable in any receiver which reproduces the upper audible frequencies.

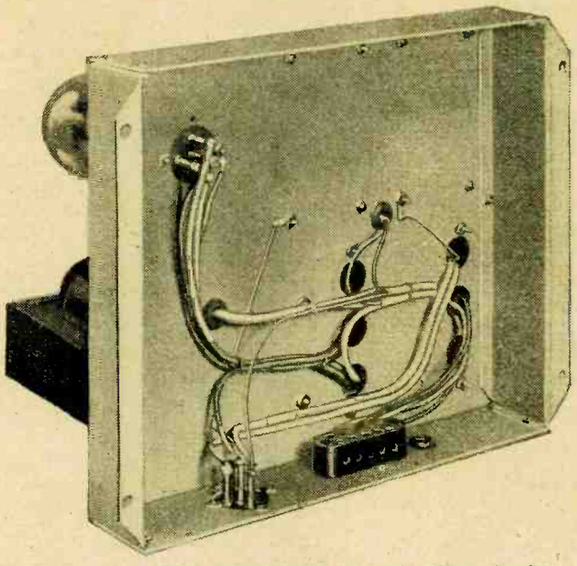
The receiver has been tested in the heart of London and gave a very good account of itself. The spread of the local stations was confined to two or three channels, and on the long waveband it proved easily possible to receive Deutschlandsender clear of Daventry National and

A full-size blue print combining the wiring diagrams of the receiver and power-unit is available from the Publishers. Price 1/6, post free.

The A.V.C. Straight Four

Radio-Paris, although it is a much weaker signal. The sensitivity proved adequate for most requirements, and with a reasonably efficient aerial should permit good reception of all the stronger Continental stations. It is not so high, however, as to necessitate the inclusion of an inter-station noise suppressor, and the Local-Distance switch is intended only for local reception. Automatic volume control has a sufficiently wide range of action to counteract the volume variations of fading, provided, as always, that the signal does not fade so badly that it falls below the A.V.C. threshold. The range of control, however, is not sufficiently great to keep local stations at the same level as the Continental, so that if the locals appear stronger than other stations, it should not be thought that A.V.C. is not functioning correctly. The use of the Local-Distance switch, or a slight readjustment of the setting of the manual volume control will correct for this.

The quality of reproduction was found on test to be of a high order and the volume adequate for all normal requirements. Mains hum was completely absent, in spite of the unusually good bass response. Incidentally, it should be pointed out that if full advantage is to be taken of the bass response, it is necessary for the speaker to be fitted with a large baffle or be used in a cabinet of large dimensions. If hum is to be avoided, it is necessary to keep the eliminator unit away from the receiver; in particular, at some distance from the L.F. transformer. In general, therefore, the receiver should be mounted on one shelf of a radio-gramophone cabinet, with the loud speaker and eliminator on another.



This view of the mains unit shows the few connections that are needed. A connecting block is fitted for the mains leads.

It will be as well to point out here a slight discrepancy between the circuit and the practical wiring diagrams. The resistance R10 is shown in the former as connected on the screen side of the switch S2, whereas on the latter it appears between the switch and the H.T. line. This has no effect on the performance of the set, and whichever way it be wired it will function equally well.

A sample receiver built to the specifications described in this article will be available for the inspection of readers at 116, Fleet Street, London, E.C.4.

DISTANT RECEPTION NOTES

The Boon of Automatic Volume Control

READERS have probably noticed a considerable increase in the volume obtainable from Strasbourg—or perhaps it would be better to write that a good deal more use has to be made of the volume control when Strasbourg is being received. I understand that Strasbourg is now using about three times the power with which the station is officially credited, and that a further increase to 75 kilowatts is to take place within the next few weeks. It was probably on account of the alterations that are being made that Strasbourg indulged now and then in silent nights.

There is no question that both Mühlacker and Munich are now using their old transmitters with a power rating of 1.5 kilowatts in both cases. Why they should have continued using high power for so long after the official date of the closing down of the big stations I cannot say, but there is no doubt that they did so, for no diminution of the field strength of either was noticeable.

Kalundborg appears to be using very much less than its full 60 kilowatts. During the daytime it is not, as a rule, so well heard now as in the days when it was a mere 8-kilowatt station.

Those who have not automatic volume control are doubtless making the discovery that fading is appearing once more. Curiously enough, it is at its worst at present in the middle of the medium waveband. The stations that have been chiefly affected are Toulouse Midi. Leipzig, and Athlone. It has not yet been of the very violent kind in which the transmission becomes horribly distorted, as it drops towards the minimum and sometimes disappears altogether for some seconds. Actually, there has so far been nothing that the automatic volume control cannot take charge of quite satisfactorily, though it is probable that fading of the severer kind will be in evidence, particularly towards the bottom of the medium waveband, during the next week or two.

Never has the long-distance enthusiast been so well equipped for indulging in his hobby as he is this year. Automatic volume control, besides counteracting fading to a great extent, also prevents blasting (I am speaking, of course, of the set) whilst searching for European stations, and for listening to transatlantic transmissions it is a heaven-sent boon. Tone-control, the next big advantage of up-to-date sets, makes all the difference in the world to one's reception of both Continental and American broadcasts.

American Wonder Station

Reception of both North and South American stations is now wonderfully good, and appears to be getting better as week follows week. On good nights stations such as WCAU, WKAQ, WTIC, and WBZ are as easy to find as Continentals, and they come in so strongly and steadily that one can listen with real pleasure to the programmes that they are sending out. The world's wonder station is WIOD of Miami, Florida, which has a genuine output power rating of 1 kilowatt. I first heard this station five or six years ago. When I was rash enough to mention the fact in print I was called all kinds of things, though none of my correspondents suggested George Washington as an appropriate pen-name. Since then thousands of listeners have recorded reception of WIOD not as a whisper, but at full loud-speaker strength. When conditions are at all favourable WIOD can be as strong as, say, Florence and Heilsberg. WIOD's one kilowatt does not belong to the same family as Fécamp's official 700 watts. The Federal Radio Board keeps a close watch on power outputs, and drops like the proverbial ton of bricks on any station engineer who exceeds the permitted rating.

On the long waves conditions are none too good at the moment. Radio-Paris and Zeesen are the best stations, with Warsaw, Motala, and Kalundborg as runners-up. On the medium waveband Vienna, Rome, Lyons Doua, Langenburg, Leipzig, Strasbourg, the Poste Parisien, Breslau, Heilsberg, Hörby, and Trieste are the most reliable.

D. EXER.

New B.B.C. Wavelengths

THE B.B.C. announces that in accordance with the Lucerne Wavelength Plan the following will be the frequencies and wavelengths to which the British transmitters will change on January 15th, 1934:

Station.	Kc/s.	Metres.
Daventry National (5XX)	200	1,500
North Regional	668	449.1
Midland Regional	767	391.1
Scottish Regional	804	373.1
London Regional	877	342.1
West Regional	977	307.1
North ~~Regional~~ National	1,013	296.2
Scottish National	1,050	285.7
Belfast	1,122	267.4
London National / West National	1,149	261.1
Aberdeen	1,348	222.6
Newcastle	1,429	209.9
Plymouth / Bournemouth	1,474	203.5

The B.B.C. is attempting to make other arrangements for Aberdeen, and, therefore, the wavelength on which this station will work, as shown above, may be modified.

It will be noticed that, with the possible exception of Bournemouth, the changes in the wavelengths of the British transmitters are small.*

* A special announcement concerning further changes in the B.B.C. wavelengths appears in "Broadcast Brevities."

UNBIASED

By FREE GRID

Solving the Dial Problem

THE Editor's stern remarks the other week (Opus No. 740, Nov. 3rd, 1933) castigating the set manufacturers on the general awkwardness of their knob and dial layout interested me exceedingly, for it showed that I have at least one faithful reader. For I see by reference to back numbers that it was upwards of two years ago that I commenced hammering away at this problem, and now that he has joined me there are hopes that something will be done about it.

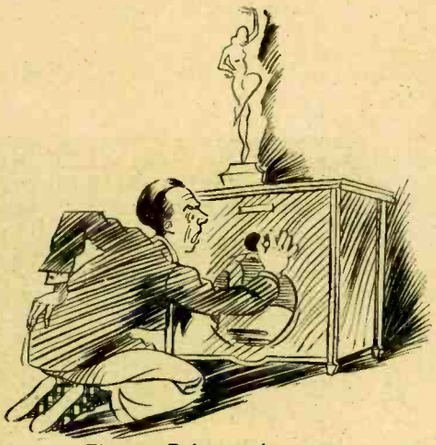


Fig. 1.—Before and . . .

Not that the Editor and I are playing a lone hand in this game, for our correspondence bags have revealed otherwise, at least two readers and a rather doubtful third being in agreement with us.

One of the two stalwarts I have mentioned, a well known R.A., is, in fact, so enthusiastic about the whole matter that he has sent me in two sketches, the first of which shows him in the agonies of tuning—or rather, attempting to tune—a console receiver by a well-known firm whose name is a byword for the sort of thing shown in Fig. 1.

The two sketches are really illustrative of a sort of "Before and after" business, as Fig. 2 shows the solution of the problem at which he has finally arrived, and which he warmly recommends to readers. I myself have not the slightest hesitation in strongly endorsing his advocacy of this method, for although I shall maintain my campaign with the stubborness for which we English are so justly famous, I really know in my heart that I am only beating my head up against a brick wall to expect the manufacturers to do anything about it.

I have *not* received permission to publish reproductions of these two sketches, nor to raffle the signed originals, although I have done the first and propose to do the second very shortly in aid of the Free Grid Christmas Charities Fund which, by the way, will soon be opened for public subscription.

Dressing to Suit

I AM very pleased to learn of the dress suit edict recently issued by the B.B.C. It is now commanded that all performers, save those taking character parts, must wear dress suits, while the latter must dress and make up for their rôles with as much care as if they were going to appear on the stage. "Dress suits," said a well-known B.B.C. official in an interview, "key up a performer."

I fully agree. From the very beginning I have always made it a rule to don full morning or evening dress before sitting down to write my weekly notes, and I have invariably found that the quality of my work suffers visibly on those occasions when some emergency has caused me to leave off my collar and tie.

Just lately I have been even more particular, and am cultivating the habit of dressing for the particular item concerning which I am writing, and, in addition, to acquire as much local colour as I can. Thus, when writing a recent paragraph about boxing, I not only stripped to the requisite degree, but even assumed the recumbent position so beloved of some of our heavyweights.

Spice of Life

WHILE enjoying many of the talks provided by the B.B.C. I must confess that I am not infrequently bored by the foolish vapourings of speakers with whose opinions I disagree. "Audi alteram partem" is the motto which appears on my family coat of arms, and it is high time, I think, that the B.B.C. adopted it in place of their present one, whatever it is.

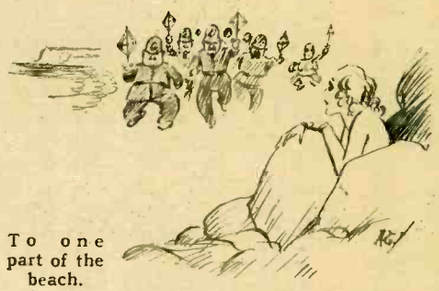
Fig. 2.—. . . after.

Instead of permitting so-called leaders in politics and other matters to come to the studio and deceive us with half-truths, surely it would be better to carry the microphone to Hyde Park and hear vox populi naked and unashamed. One can obtain in the short space of an hour more really startling information there, to say nothing of entertainment, than the B.B.C.'s band of timid milk and water so-called controversial speakers are capable of giving in half a life-time.

In Hyde Park there is infinite variety, which the B.B.C. could bring into our homes by the simple expedient of having a microphone fitted at every speaker's platform and flitting from one to the other by means of the ever-handy stud switch. Thus there would be something to offend everybody, no matter what the colour of his shirt or flag, and after all, is not the taking of offence the very spice of life to the average citizen?

This Sun Bathing

THE great sport in Brighton at the present moment is, it seems, attempting to pick up the wireless messages radiated from Police Headquarters to the various constables in that district who, as most people know, now carry radio sets complete with call bell inside their helmets.



To one part of the beach.

Much difficulty it is stated, has been experienced in finding out the exact wavelengths on which these transmissions take place. This is surely rather a bitter commentary on the degenerate times in which we live, for in my young days nothing would have been thought of knocking off a policeman's helmet and investigating the matter at first hand.

What really does perturb me, however, is a letter from an acquaintance in that area who tells me that real trouble is brewing for the local police, insomuch that certain irresponsible practical jokers have conspired together to construct a transmitter to send bogus messages to the constables in question.

The idea is to get the whole of the police force up to one part of the beach by means of a spurious transmission relating to a sunbather, thus leaving the town to the mercy of any bandits who may be minded to execute a smart smash-and-grab raid.

Whether this be irresponsible practical joking or an underworld plot, as my acquaintance suggests, I think all licence holders should band themselves together to stamp out this threatened menace to the good name and amenities of this Naples of the North.

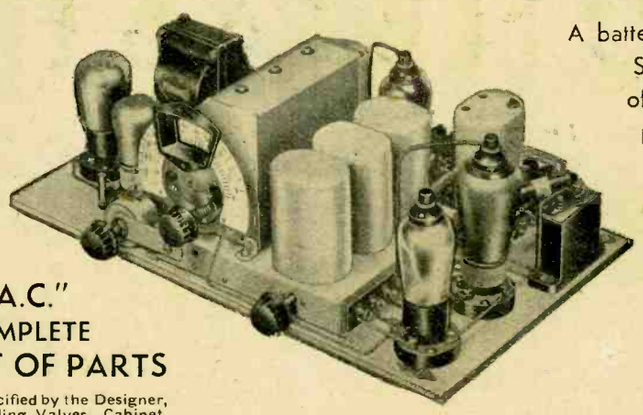
The RADIOPAK "MATCHED PERFECTION SEVEN"

Messrs. British Radiophone Limited, the originators of the well-known "Radiopak," are offering to the Home Constructor a circuit which they claim is far in advance of present-day design, embodying many features not previously available.

The "MATCHED PERFECTION SEVEN" is a single knob Super Heterodyne Battery Receiver of outstanding performance. It incorporates the new R.F. Super Radiopak, two Westectors, real Automatic Volume Control and Pentode output, and is characterised by knife-edge selectivity (without sideband "cut-off") sensitivity, volume and range as well as quality of the highest order.

When ordering a Kit of parts from your dealer, insist on a "C.A.C." Kit. You will then be assured of prompt delivery and can rely implicitly that every single component **has been tested before despatch and is unconditionally guaranteed by "C.A.C."**

Once again a "C.A.C." Cabinet has been exclusively specified by the Designer. A strikingly handsome cabinet in beautifully figured Walnut with Macassar Ebony inlays has been specially designed by us and supplies will be available for distribution to the Trade within a few days. At the price of 38/-, including Baseboard and Baffle-board, it represents the best value ever offered to the public.



A battery-operated SUPER-HET. of outstanding performance.

"C.A.C." COMPLETE KIT OF PARTS

as specified by the Designer, excluding Valves, Cabinet, Speaker and Batteries,

£8.0.0

ASK YOUR DEALER FOR FREE BLUE PRINT, OR SEND 3d. STAMPS, TO COVER POSTAGE, TO OUR ADDRESS

The C.A.C. Camberley "CONVERT-A-GRAM"

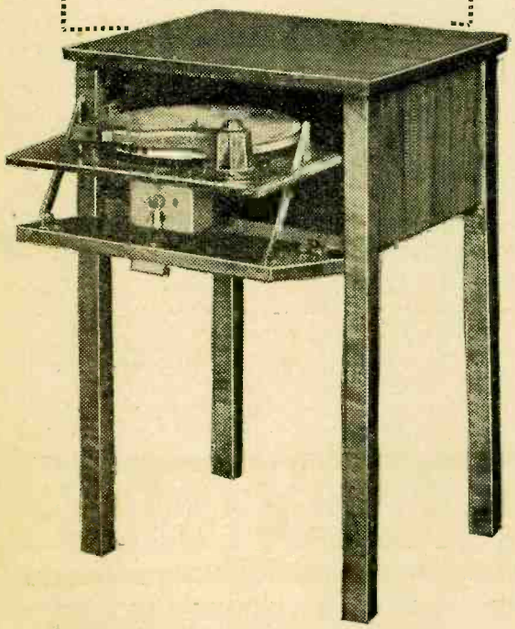
(For A.C. Mains only.)
Starts Automatically.
Stops Automatically.

The "Convert-A-Gram" instantly converts any Wireless Receiver into a Radio-Gramophone by the simple insertion of two leads. It is fitted with the well-known "Collaro" Induction Gramophone Motor, complete with Pick-up and Volume Control and can be used in conjunction with all receiving sets and amplifiers. The Pick-up runs on ball bearings, giving perfect freedom of movement, thus reducing record wear and ensuring freedom from "chatter," even on the most heavily recorded passages.

It is fitted with a unique opening device enabling the Cabinet to be closed whilst the record is being played and is constructed of finest selected Walnut. Height, 2ft. 6in. Space available for set, 18½in. by 16in.

Price complete, as illustrated, **£6 : 19 : 6**

Or 13/1 deposit and 11 monthly payments of 13/1.



An Ideal Christmas Gift.

C A C

Factory and Showrooms :—
18-20, Norman's Buildings, Central Street - - E.C.1
Telephone : Clerkenwell 1038 & 6206-7

West End Showrooms :—
4, Surrey Street, Strand, W.C.2
Telephone : Temple Bar 8620

Hours of business : 9.30 a.m. to 6 p.m. or later by appointment. Special demonstrations every Friday at Norman's Buildings until 9.30 p.m.

A Cordial Invitation

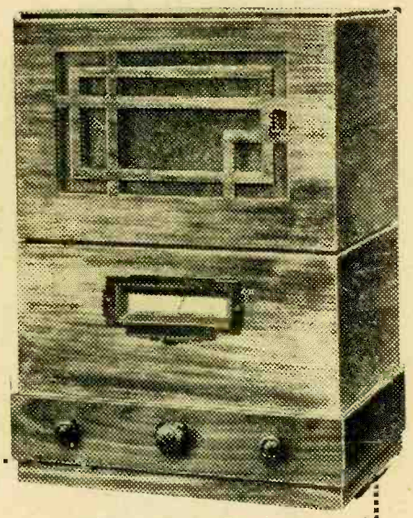
is extended to all to visit our Factory and Showrooms at Norman's Buildings, where a comprehensive display of the very latest in Receivers in a variety of superb examples of Cabinet-making craftmanship is on view.

In addition to our own products, we are giving continuous demonstrations of the marvellous

"W.W." New Monodial Super

which we supply either as a complete instrument in any desired cabinet, or as a Kit of Parts for home construction.

The results obtainable on this Receiver are a revelation, which must be heard to be appreciated.



The C.A.C. PENTAGRID SUPERHET

Designed by W. I. G. PAGE, B.Sc., late of the Technical Staff of the "Wireless World."

A four-valve A.C. Superhet of highly specialised technique using a Heptode as a single-valve frequency changer, which performs the dual functions of oscillator and first Detector in the most efficient manner known. In the I.F. stage a variable-mu-Pentode is used, which adds its contribution to A.V.C. The third valve is one of the new double Diode Pentodes, which gives almost perfect automatic volume control, and the fourth valve is a Catkin Pentode. The output is in the order of 2½ watts, whilst the sensitivity of this Receiver is a revelation. The four special valves give an overall performance equal to that of any six-valve superhet on the market. Note the separate "Rola" M.C. Speaker.

Price 14 Guineas.

Or 28/- Deposit, and 11 Monthly Payments of 28/-.

The "C.A.C." SHORT WAVE ADAPTOR

Designed by W. I. G. PAGE, B.Sc.

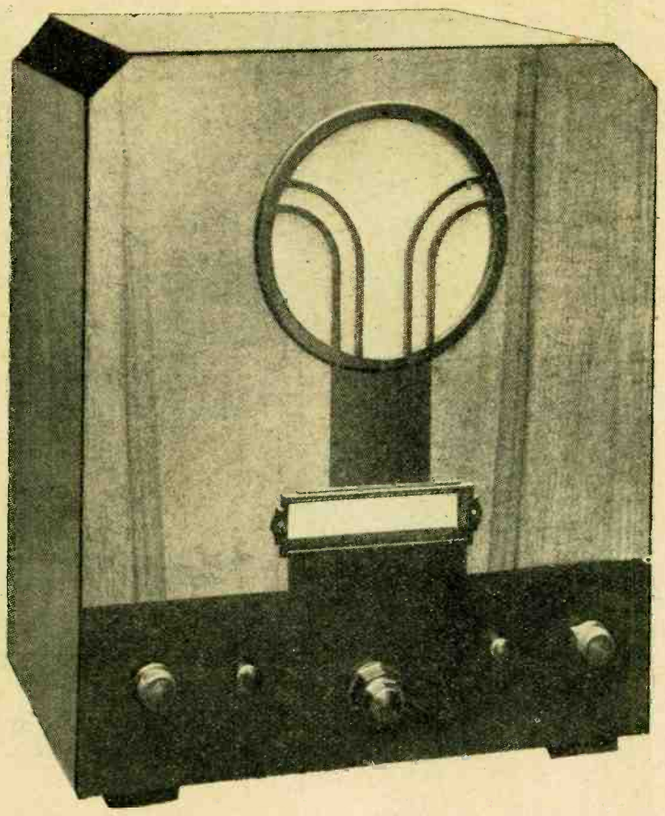
A three-valve unit (including Rectifier) with aperiodic H.F. stage coupled to an autodyne frequency changer valve. Complete with its own mains equipment and can be used with any set without alteration. Waveband 12 to 94 metres, covered by three interchangeable coils. Special tropical Insulation throughout.

PRICE, complete with Valves and Cabinet - - - - - - - - **£10**

ADVERTISEMENT OF THE CITY ACCUMULATOR CO., LTD., LONDON.

Advertisements for "The Wireless World" are only accepted from firms we believe to be thoroughly reliable.

E.M. PLUS 4



Great New Development on the famous

"EVERYMAN FOUR"

You remember the "Everyman Four"? Its amazing performance was obtained by using the most efficient coils that could be designed. Until now these coils have never been excelled or even equalled.

We set ourselves the task of adapting "Everyman" Coils to suit modern valves, and we succeeded. We claim, without fear of contradiction, that E.M. Plus Four Coils are the most efficient coils obtainable for modern H.F. amplification.

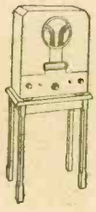
E.M. Plus Four Coils cost eight times as much to manufacture as any standard commercial coils. But, owing to their remarkable efficiency, the remainder of the set is simplified and the total cost is extremely low.

BETTER THAN A SUPERHET

Compare the E.M. Plus Four with any other battery-operated straight set or superhet, using four, five, or even six valves. The E.M. Plus Four gives superior results without any of the usual superhet disadvantages.

Every valve contributes its full efficiency, so that signal strength is amazing, whilst absence of complications prevents loss of quality.

Ease of handling, selectivity, signal strength, quality of reproduction, appearance, reliability—judge the E.M. Plus Four by any of these standards, compare it with any other set costing even twice as much, and you will choose the E.M. Plus Four.



Although the E.M. Plus Four is easy to build and operate, it is the only set that fully responds to the skill of the operator. The E.M. Plus Four is not only a set for domestic use; it is the set which every true constructor needs for serious work. Its scope is unlimited.

E.M. PLUS 4 MATCHED KITS

(Complete kit, less valves, including everything you need to build the E.M. Plus Four exactly to specification, with full-size chart and instruction.)

£4.17.6

OR 9/6 DOWN

and 11 monthly payments of 9/6

CABINETS.

E.M. Plus Four Oak Consolette Cabinet with Moving-Coil Speaker, £2.0.0.
In Walnut, with Moving-Coil Speaker as illustrated - - - £2.10.0.
E.M. PLUS FOUR Pedestal, as illustrated, 15/- extra.

SPECIFIED MULLARD VALVES:
P.M.12V., P.M.2DX, P.M.1H.L., P.M.202 (or P.M.2).

FULL-SIZE WIRING CHART FREE
GO TO YOUR DEALER, OR POST COUPON NOW

COILS OBTAINABLE SEPARATELY

For the benefit of constructors wishing to modernise their present sets, E.M. Plus Four Coils can be supplied separately at

27/6 per pair.

To READY RADIO, Ltd., Eastnor House, Blackheath, London, S.E.3

Please send me a copy of the E.M. Plus Four Wiring Chart.

Name .....

Address .....

.....

W.W.1. Please enclose 1½d. stamp for postage, etc.

READY RADIO

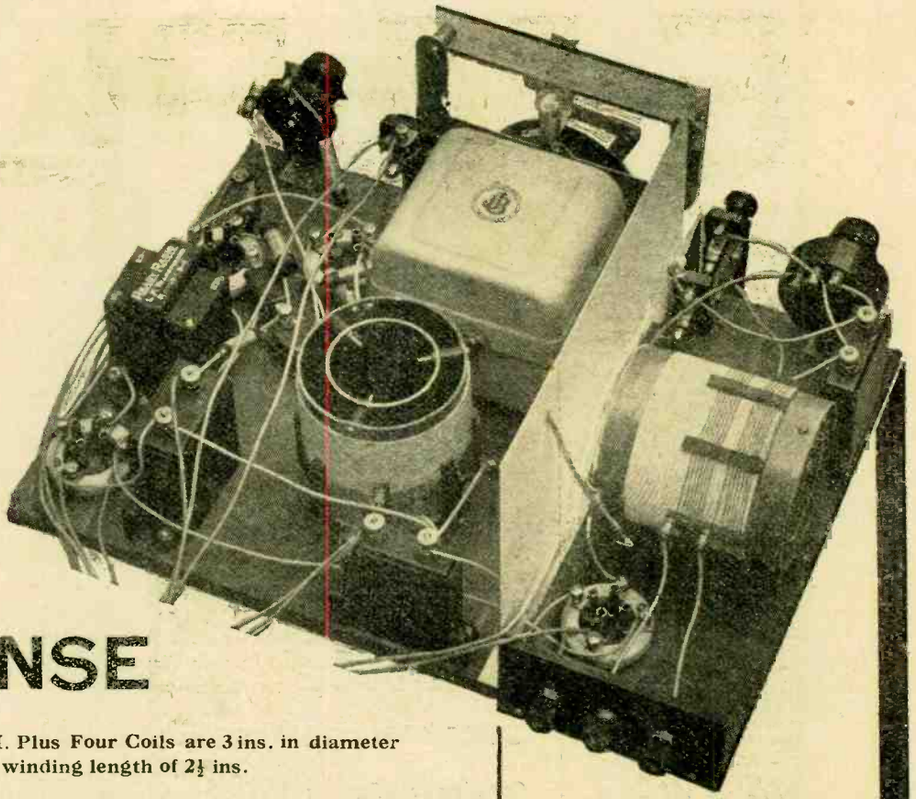
EASTNOR HOUSE, BLACKHEATH, LONDON, S.E.3.

Telephone: Lee Green 5678.

Mention of "The Wireless World," when writing to advertisers, will ensure prompt attention.

KIT

A serious contribution to radio Progress



SHEER COMMONSENSE

1. The length of a coil should not be greater than the diameter.	**1. E.M. Plus Four Coils are 3 ins. in diameter with a winding length of 2½ ins.**
2. Small coils mean small single-strand wire and increased D.C. resistance and "skin effect."	**2. E.M. Plus Four Coils are wound with 27/42 gauge Litz wire, giving 90 per cent. greater efficiency than small single-strand wire.**
3. Increased resistance means lower signal strength and selectivity.	**3. E.M. Plus Four Coils introduce so little damping that signal strength and selectivity are extremely high.**
4. Shields increase the distributed capacity and resistance.	**4. E.M. Plus Four Coils are so designed that shields are unnecessary.**
5. Losses in metallic cores increase as frequency increases. (Therefore, heaviest on medium-wave band.)	**5. E.M. Plus Four Coils are air-cored, on low-loss formers, and give maximum efficiency on medium waves.**
6. Band-pass tuners do not pass all the applied voltage, and losses are often as much as 50 per cent.	**6. E.M. Plus Four selectivity makes band-pass tuning unnecessary, and maximum signal voltage is maintained.**
7. In band-pass and multi-stage circuits slight discrepancies of tuning cause peaks of unequal strength with consequent loss of signal strength.	**7. The E.M. Plus Four special trimming device gives constant accuracy at every setting.**
8. By compressing the long-wave coil into small dimensions the losses and distributed capacity are increased enormously.	**8. The Long-wave sections of E.M. Plus Four Coils are plain solenoids of large diameter.**
9. Maximum voltage amplification is obtained with a tight magnetic coupling of low capacity.	**9. The primary windings on E.M. Plus Four Coils are air-spaced and supported on ribs over the secondary windings.**

THE SET WITH THE WIDEST WAVE-LENGTH RANGE.

185-620 Metres
850-2100 Metres

Whether you built a set last year or last week you will build the

E.M. Plus 4

sooner or later . . . . .

The set for the man who wants something better. The only set for the keen constructor and true experimenter.

FULL-SIZE WIRING CHART FREE

Our E.M. Plus Four folder contains full details of the complete set, with complete building instructions and full-size chart. Ask your dealer for your free copy. If he is out of stock ask him to get you a copy. In case of difficulty post coupon.

Demonstrations at 159, Borough High St., London Bridge, or ask your radio dealer.

Practical HINTS AND TIPS

AIDS TO BETTER RECEPTION

Supplementary Heating Current

IT is easy enough to connect in series a chain of valve heaters or filaments when all take the same heating current. But, if valves of mixed L.T. ratings are to be used, various expedients must be adopted in order that some of the elements may not be overrun or under-heated; in practice it is usual to connect a parallel resistance across each heater or group of heaters taking less than the maximum current.

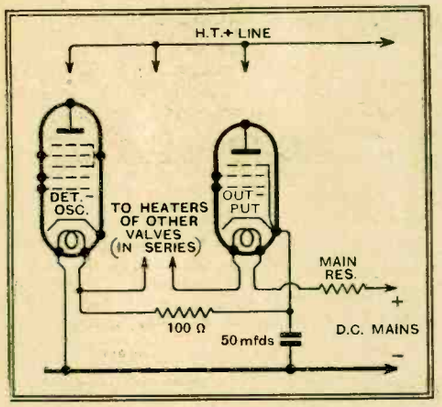


Fig. 1.—Combining 0.3 and 0.25 amp. valves in a D.C. set. Anode current of the output valve flows through the heater of the detector-oscillator.

Other ways of overcoming this minor difficulty have been described from time to time, and now a particularly ingenious solution of the problem is put forward by a reader who is using it in a D.C. mains superheterodyne. His problem was to employ a 6A7 pentagrid frequency changer (with a heater requiring 0.3 amp at 6.3 volts) in series with ordinary British D.C. valves requiring 0.25 amp only. The 6A7 valve therefore requires 0.05 amp (or 50 milliamps) more than the remaining valves.

Now for the solution of the problem. All the heaters are wired in series in the ordinary way, but the cathode circuit of the output valve is so connected that the anode current of this valve is diverted through the heater of the 6A7 valve, and is thus additive to that normally flowing in the heater circuit. As the output valve is a DPT, passing an anode current of 40 milliamps, the frequency changer is working at almost its full rated current, and results are stated to be excellent.

Fig. 1 shows the circuit arrangement actually employed, bias for the output valve being obtained from the drop in voltage across the 100-ohm resistance in series with the heater of the 6A7. By using a 50-mfd. dry electrolytic by-pass condenser in the position shown, the output grid circuit is effectively decoupled, and apparently hum is avoided.

It seems probable that the principle of using anode current as a supplement to the ordinary heating current might have other useful applications.

Anti-Heterodyne Filter

A SCIENTIFICALLY designed low-pass filter, such as that described in *The Wireless World* of November 10th, adds considerably to the number of stations that can be received without interference; at the same time, it does not seriously affect quality of reproduction, but can always be switched out of circuit when receiving stations not subject to interference.

It is generally, and probably rightly, considered that this type of filter is mainly applicable to highly sensitive long-range sets, although it would undoubtedly improve the performance of many others. Take the "local station" type of receiver, in which everything has been sacrificed to quality, and which will normally have an exceptionally good high-frequency response; this type of set is usually so insensitive that it seldom suffers from intelligible interference from other stations, but after dark reproduction is often marred by a continuous high-pitched whistle. This whistle, due to heterodyning by a distant station operating in the adjacent channel, may not be very strong, but is nevertheless annoying; its presence is a testimony to the good high-note response of the receiver, provided both local and interfering stations are on their proper wavelengths.

Here is a case where the whistle filter is invaluable. When interference of the type under consideration becomes evident, it can be switched into circuit in a moment, but the characteristics of the set are not permanently impaired, as full advantage may be taken of its exceptional high-note response as soon as the interference disappears.

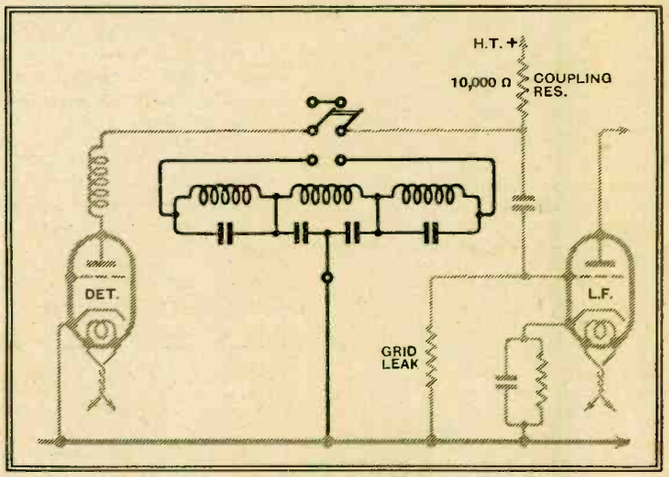


Fig. 2.—Adding a low-pass whistle filter to a receiver with resistance coupling.

Many of these high-quality sets include resistance-coupled L.F. amplifiers, to which the filter should be fitted in the manner shown in Fig. 2. It is desirable that the detector valve should have an impedance in the order of 10,000 ohms, and that the coupling resistance should be of the same value; alterations to satisfy this requirement may generally be made to existing sets without impairing performance in other directions.

A diode detector requires a load of high ohmic resistance, and so the filter unit cannot well be used in direct association with it. Where this form of rectification is employed, it is best to place the filter after the L.F. amplifier which immediately succeeds the diode.

Testing Indirectly Heated Valves

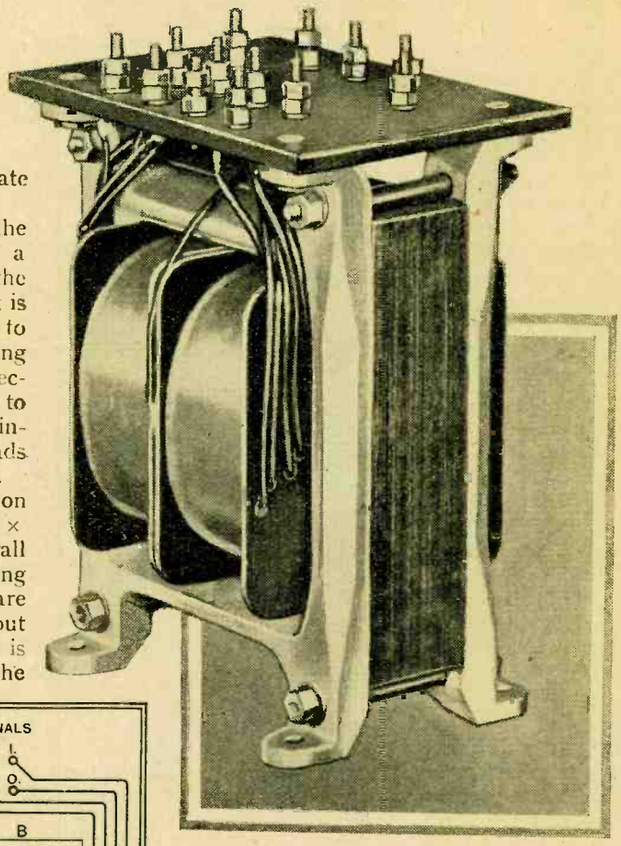
IT is fortunate that breakdowns of insulation between the heater and cathode elements of indirectly heated valves are becoming more rare. Faults of this nature are by no means easy to trace, partly because the defect may manifest itself only after the valve has been working for some time, and is in consequence fully warmed up.

It is probably most satisfactory, when a defect of this nature is suspected, to test the valve *in situ* rather than to remove it and to set up a special testing circuit. Almost all indirectly heated valves are now biased by the insertion of a resistance in the cathode lead; if there has been a breakdown of heater-cathode insulation, this resistance will in effect be short-circuited, and so the valve will be working at zero bias. It therefore follows that excessively high anode current will suggest a breakdown of this nature; the fact can be confirmed by imposing a momentary short-circuit across the bias resistor, a milliammeter being at the same time inserted in series with the anode. If the short-circuit produces no change in anode current, it is fairly certain that the fault in question exists, at any rate, if the insulation of the usual parallel by-pass condenser can be depended upon.

Universal Output Transformer

Constructional Details of a Multi-ratio Component

By H. B. DENT



THE importance of correctly matching the output valve and the loud speaker has been emphasised so often in these pages that it would seem hardly necessary to comment further on it here. But it is well to bear in mind that strict adherence to this practice is just as important when trying out experimental circuits, for otherwise many promising schemes may be written down as unsatisfactory, their performance falling far short of expectations possibly because an unsuitable output transformer ratio was employed.

While it is not always possible to achieve the ideal condition, at least a very good compromise can be made with a universal type transformer, but to be of any value as an experimental component it should provide a large number and wide range of ratios. One that has proved very useful in this respect is illustrated here. Its windings are arranged as shown diagrammatically in Fig. 1; the secondary is in four sections interleaved with the primary, thereby obtaining a tight coupling and keeping the leakage inductance as low as possible.

Push-pull Circuits

The design allows for anode currents of the order of 60 mA. to be handled, and the maximum A.C. output is about six watts. By making use of tappings on the primary winding twelve ratios can be obtained with but four secondary sections. The primary tappings are located equidistant from the centre, and as this is also brought out to a terminal, the transformer can be made to serve for push-pull circuits as well as for the more orthodox output system.

Of the twelve possible variations, two happen to give the same ratio, yet the eleven that result will meet most requirements, for they range from 75 to 1 to 12.5 to 1. With the whole of the primary in use the inductance is 52 henrys, and with 60 mA. of D.C. flowing it falls to about 39 henrys. The two inside tappings, P2 and P3, reduce the primary to 4,000 turns and its inductance then falls to 25 henrys; even so this will be adequate for most occasions.

The construction of the transformer will require a little care, although on the whole it is not difficult. It is very necessary, however, to keep a check on the beginning and finish of the various sections, and a good plan is to thread different coloured insulated sleeving on the leads as the coils are completed.

The windings are carried on two bobbins, each $3\frac{1}{4}$in. × $3\frac{1}{4}$in. × $1\frac{7}{16}$in. wide overall with a centre hole measuring $1\frac{1}{4}$in. square. Both are wound exactly the same, but in the final assembly one is turned round so that the direction of the winding is opposed to that of its companion. It is for this reason that all leads should be clearly marked during the winding process so as to avoid mistakes when it comes to joining them to their respective terminals. The actual arrangement of the windings is shown diagrammatically in Fig. 2; here they are displayed as in the final assembly, the inners and the outers of each being marked and the inter-section connections and the wiring to the terminals shown. If this diagram is studied in conjunction with that of Fig. 1, there will be no difficulty in comprehending the general layout of the transformer.

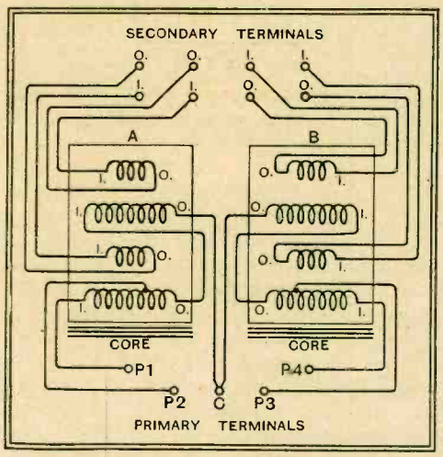


Fig. 2.—The relative position of the windings, inter-coil connections and wiring to terminal board is clearly shown by this schematic layout.

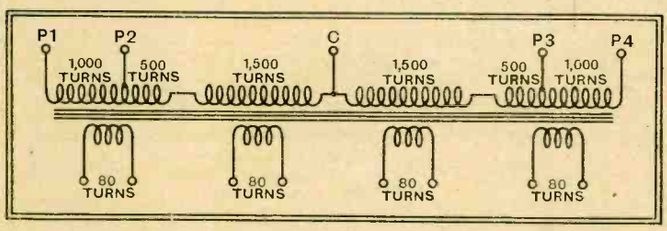
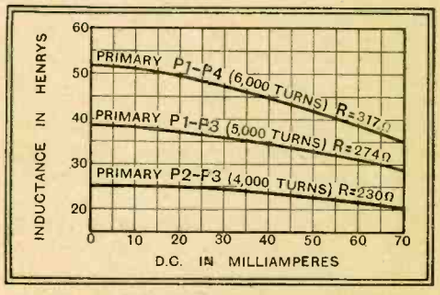


Fig. 1.—Theoretical arrangement of the transformer showing the symmetrical disposition of the windings.

One point in particular requires special attention when assembling the bobbins, and this is to ensure that the external leads joining the two primary sections of bobbins A and B where their cheeks butt do not short circuit, a cheek of thin press-pahn, empire cloth, or any other good insulating material should be interposed between them as a safety measure.

The winding is carried out as follows: first 1,000 turns of No. 32 enamel wire is wound on evenly, a tapping is then brought out and this section completed by the addition of a further 500 turns. Two turns of empire cloth or waxed paper then follow, and the first secondary section, consisting of 80 turns of No. 20 enamel wire put on. Follows a further applica-

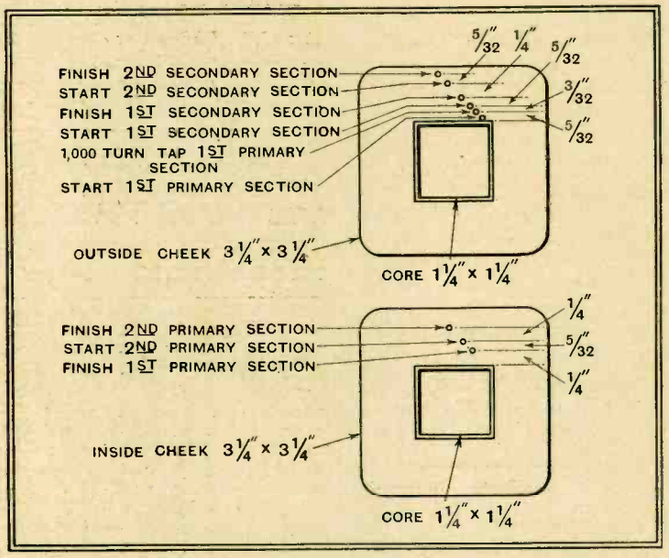


That an adequate primary inductance is available under all conditions is seen from these curves.

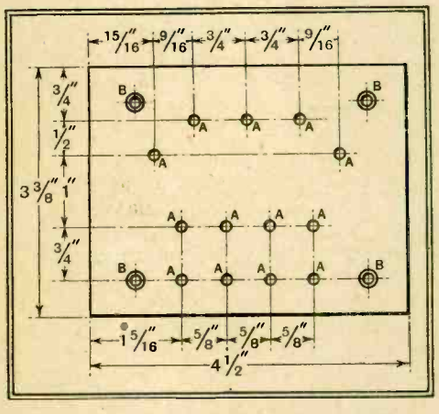
Universal Output Transformer—

tion of insulating material as before and the second primary section of 1,500 turns of the No. 32 enamel wire follows. To complete this bobbin two layers of insulation are required, and then the next secondary section of 80 turns can be wound. The finished bobbin may be covered to protect it by overwinding with a few layers of the insulating material or any other that may be handy. The second bobbin is wound in exactly the same way.

If bobbin A in Fig. 2 is taken as an example it will be seen that the beginning and finish of both secondary sections come out through the same cheek, and on this side is brought out as well the start of the first primary section and its tapping. The end of this section, also the beginning and the finish of section two of the primary, pass through the opposite cheek where they fall most convenient for joining together. To obviate any likelihood of the thin primary wires being broken or damaged, either during the winding process or during the final assembly, the leads that come out through the bobbins' cheeks should be of heavier gauge wire, or, better still, thin flex. Pieces about a foot long soldered to the wire before, and also after, winding, with one or two turns taken round the bobbin to take the strain, will serve this purpose. A word of warning may not be amiss here: use a non-corrosive flux!



In addition to giving the position of the holes in the bobbins this drawing serves as a winding identification chart.



Drilling details of terminal boards; sizes of holes are: A = 1/32in. dia.; B = 3/32in. dia. countersunk for 4BA screws.

Remains now but to assemble the core, for which about 90 pairs of Stalloy No. 33 stampings will be needed. They are arranged with all like-shape pieces on one side, for an air gap is required in the core as comparatively large D.C. currents may be passed through it. The "T" pieces must be packed as tightly as possible into the centre hole of the bobbin, and incidentally it is a wise plan to fit a few before winding so as to ensure that the hole is free from obstructions at all parts to pass the tongue-piece without binding. If not, clean out the inside with a file until an easy fit is obtained.

Little more remains now to be done than to insert, at the three points where the "T" and the "U" laminations abut, a distance piece 0.01in. thick. This is equal to three thicknesses of the paper on which this is printed or twice the thickness of the cover of *The Wireless World*. Cast aluminium end plates should be obtained for clamping the core, after which a terminal board, laid out with 4BA screws and nuts to serve as terminals, is prepared and fixed in position.

Round-headed screws are used with soldering tags threaded on between the head and the panel. The ends of the various coils are then soldered to the tags in the order given in Fig. 2. An alternative method of anchoring the leads would be to loop the wires round the screws below the panel and secure by means of locknuts.

The position of the holes marked B on the drawing of the terminal board is purposely left vague, as these can only be determined accurately after the transformer is assembled.

From the table of ratios the connections for the primary and for the secondaries can be obtained, while in Fig. 3 a few examples have been taken and the terminal connections filled in. The first, marked (a), shows a series arrangement of the four secondaries; in (b) we have three secondaries joined in series, while in (c) two on each bobbin are joined in series and the two sets connected in parallel. Finally, diagram (d) shows the connections when all four sections are required to be joined in parallel.

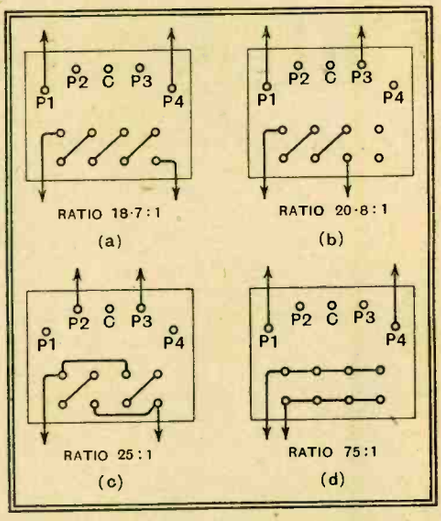


Fig. 3.—The output terminals joined as in (a) place all four sections in series; (b) gives three sections connected in series; (c) two in series and two in parallel, while (d) shows the four sections in parallel.

Material Required.

90 Pairs of Stalloy No. 33 stampings
Jas. Sankey & Sons, Sound Sales
2 Bobbins
3¾in. × 3¼in. × 1 5/16in. with 1¼in. × 1¼in. hole.
Sound Sales
1 Pair aluminium end-clamps
Sound Sales
1½lb. No. 32 S.W.G. enamelled wire; 1lb. No. 20 S.W.G. enamelled wire; quantity empire cloth; quantity insulated sleeving, various colours.
13 4BA ¾in. brass screws, round head, with like number of soldering tags and washers.
4 4BA ½in. countersunk screws; 30 4BA nuts.

Although the holes in the side cheeks of the bobbin can be drilled as the winding progresses if care is exercised, it would, on the whole, be better to prepare the bobbin beforehand. Drilling details of the bobbin are given, therefore, on this page. All holes should be about ⅛in. diameter to allow for slight discrepancies in winding. This drawing will serve, also, as an identification chart, for against each hole is marked its respective lead.

TABLE OF RATIOS AND CONNECTIONS

Ratio.	Primary Connections.	Secondary Connections.	Secondary Resistance.
*12.5 : 1	P2 and P3	Four sections in series ..	1.76 ohms.
15.6 : 1	P1 and P3	Four sections in series ..	1.76 ohms.
*16.6 : 1	P2 and P3	Three sections in series ..	1.32 ohms.
*18.7 : 1	P1 and P4	Four sections in series ..	1.76 ohms.
20.8 : 1	P1 and P3	Three sections in series ..	1.32 ohms.
*25 : 1	(1) P1 and P4	(1) Three sections in series	1.32 ohms.
	(2) P2 and P3	(2) Two sections series / Two sections parallel	0.44 ohms.
31.2 : 1	P1 and P3	Two sections series .. / Two sections parallel	0.44 ohms.
*37.5 : 1	P1 and P4	Two sections series .. / Two sections parallel	0.44 ohms.
*50 : 1	P2 and P3	Four sections in parallel ..	0.11 ohms.
62.5 : 1	P1 and P3	Four sections in parallel ..	0.11 ohms.
*75 : 1	P1 and P4	Four sections in parallel ..	0.11 ohms.

* These ratios can be used for push-pull.

NEWS of the WEEK

Current Events in Brief Review

100 Kilowatts from Hamburg

HAMBURG'S new 100-kW broadcasting station is to be inaugurated on January 15th, 1934, using its Lucerne wavelength of 331.9 metres.

Russian Radio House

TWENTY-FOUR designs for a Radio House for Moscow are now being considered by the Soviet Broadcasting Authorities. It is stated that the building will be second only in size to Radio City, New York.

The Wireless League

THE annual general meeting of members of the Wireless League, will be held on Friday, December 15th, at 3.15 p.m., at 12, Grosvenor Crescent, Hyde Park Corner, London. The chief business will be the annual report and accounts, and the election of committee for the ensuing year. In the chair will be Sir Arthur Stanley, Chairman of the League, and all members are cordially invited to attend.

Japanese Honour

MARCHESE MARCONI, on the occasion of his visit to Japan, has been presented with the Grand Cordon of the Order of the Rising Sun by His Imperial Majesty the Emperor.

Prison for German Pirates

THE number of wireless pirates in Germany is increasing. During the period from July 1st to September 30th last, it is officially stated, 245 persons have been fined for not paying their radio licence fees. The number during the corresponding period last year was only 165. In eight cases the offender has been sent to prison.

A Pleasant Surprise

BELGIAN wireless pirates have received a pleasant surprise in having their confiscated sets returned to them by the Post Office authorities. Contrary to expectation, the receivers appear to have been treated with the utmost care, and, according to a correspondent, "have been found in the most perfect working order." It would almost seem that the Post Office engineers had considered it the courteous thing to repair any sets which were not functioning as they ought.

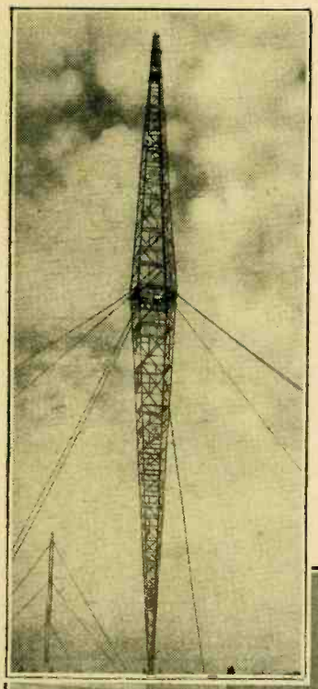
Budapest To-morrow

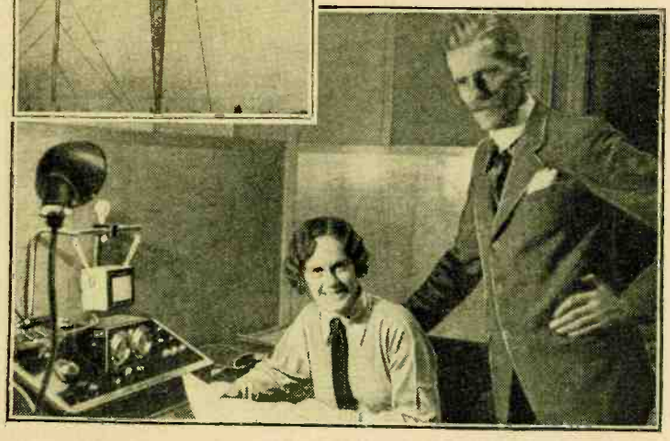
TO-MORROW (Saturday) sees the opening of the new 120 kW. broadcasting station at Lakihegy, near Budapest, which owns the world's highest wireless aerial and, incidentally, the loftiest structure in Europe. This cigar-shaped mast is 314 metres high and thus exceeds the height of the Eiffel Tower by 14 metres. Actually, the mast itself is 284 metres high, but a steel rod projecting from the top can be extended to a maximum of 30 metres in order to tune the aerial to exactly the desired wavelength.

The station is built on the 100 per cent. spare system, i.e., everything is duplicated—even the crystal oscillator—in readiness for emergencies. In the last stage four 120-kW. valves are used in push pull.

An interesting novelty is the provision of a switch which, in case of emergency, will cut out all current supply, closing down the station in a fraction of a second. Naturally, this "brake" must only be used in very special circumstances, as such a drastic cut-off is a great strain on the equipment.

The present 20-kW. transmitter at Budapest is continuing operations four hours a day with an alternative programme.





RADIO-BUDAPEST. Miss Lily Flotas, the announcer at the new high-power station at Budapest, which opens to-morrow with a power of 120 kilowatts. On the right is Mr. Eduard von Scherz, the world's first announcer, who was superintending Budapest's wired broadcasting programmes in 1893. (Above) The 314-metre mast.

Late Programmes from Germany

SPECIAL programmes for listeners who are unable to follow the programmes during normal hours are now provided by the Stuttgart, Frankfurt, and Trier group of German stations. These interesting late night concerts are sometimes continued till 12.30 a.m. The announcements are in German, Italian, Spanish, French, and English.

"Music from the Air"

LT.-COL. ASHLEY SCARLETT, of the Golders Green and Hendon Radio Scientific Society, writes to express his regret that a number of *Wireless World* readers were unable to obtain admission at the Society's recent meeting for the demonstration of electronic music. The meeting was announced in these columns, and, partly in consequence of this publicity, the hall, which holds only 280, was filled five minutes before the opening of the meeting.

The moral is that readers who wish to attend meetings announced in *The Wireless World* should arrive at least ten minutes before the stated hour of opening!

THE ANNUAL PROBLEM.

Next week's issue of *The Wireless World* will be a special CHRISTMAS NUMBER incorporating seasonal ideas both for presents and entertainment.

ORDER YOUR COPY TO-DAY.

Reports, Please!

TO mark the opening of the Budapest transmitter, Hungary is holding a radio week from to-morrow onwards with an official banquet in the evening and an exhibition sponsored by the Post Office, the Radio Industry, and Army Communications.

British listeners are cordially invited to send us reports comparing the relative merits of the old and new transmissions.

Why They Switched Off

WHY do people give up listening? An interesting table published by the German Broadcasting Organisation announces the reasons why licence holders have omitted to renew their subscriptions. Apparently, only 1.5 per cent. during 1933 ceased to listen on account of discontent with the programmes. 1 per cent became defaulters because reception was bad, 3.35 per cent. because of man-made interference, and 37.41 per cent. for "economic reasons." The remaining 56.74 per cent. switched off for the last time for "miscellaneous reasons."

Background Noise

"THE Spontaneous Background Noise in High-gain Receivers Due to Thermal Agitation and Schrott Effects" is the title of the paper to be given by Messrs. E. B. Moullin, M.A., and H. D. M. Ellis, B.Sc., at the meeting next Wednesday, December 6th, of the Wireless Section of the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2. The meeting opens at 6 p.m.

Listen to Warsaw To-night

MR. THAD ORDON, whose English talk from Warsaw last month brought hundreds of enquiries for the free booklet on Polish history, will again broadcast this evening, Friday, from Warsaw, at 9.40 p.m. (G.M.T.), with a special message to the six hundred or more British listeners who wrote to him.

Short Waves from Belgium

SHORT-WAVE relays of the Brussels transmissions are to begin very shortly, writes our Belgian correspondent. The transmissions will be made by one of the Ruysselede stations on a wavelength of 29.04 metres, starting each day at 6 p.m. (G.M.T.). The transmissions are intended primarily for the Belgian Congo.

Radio-Paris: Official

A DECREE signed by the President of the French Republic and published in the *Journal Officiel* of November 22nd, announces that Radio-Paris becomes a State transmitter during this month.

The governing board will consist of thirty members.

Part of the programme time is to be devoted to "the radiation of French thought abroad."

A Radio Medal

THE annual award for the clearest radio diction, awarded by the American Academy of Arts and Letters, goes this year to Jimmy Wallington, an announcer on the National Broadcasting Company's network and famous for his work on Eddie Cantor's programmes.

An Illicit Transmitter

A NEW secret broadcasting station has broken in upon the ether at Enschede, Holland, its object apparently being to attack all political parties except the Independent Socialist group. The authorities have started a "round up," but have not yet run the fox to earth.

Page 427 follows after the Programme Supplement.

Broadcast Brevities

By Our Special Correspondent

Confirming the News

The B.B.C.'s official list of its new wavelengths under the Lucerne Plan simply confirms the list first exclusively published in *The Wireless World* of June 23rd last, but I wonder whether readers realise that the arrangement is purely temporary.

There is to be a grand reshuffle of British wavelengths immediately the new regional transmitters are opened.

Confidential Schedule

By agreement with the International Broadcasting Union the B.B.C. will re-allot its wavelengths according to a schedule already in the hands of the Union, and this schedule cannot be altered at less than six weeks' notice. In all probability, however, it will not be altered.

Another Wavelength Shuffle

When the reshuffle takes place in 1935, the Midland Regional wavelength of 391.1 metres will go to Scottish Regional, the former then taking the 296.2 metre wavelength of North National. West Regional will take the Scottish Regional of 373.1 metres.

North-Eastern

London Regional will remain on 342.1 metres, but the new Northern Ireland transmitter near Belfast will acquire West Regional's 307.1 metre wavelength, while the 285.7 metre wave, allotted to Scottish National under the Lucerne Plan, will be transferred to the new North-Eastern Regional near Newcastle.

North Scottish

The mysterious North Scottish transmitter, whose probable whereabouts are still uncertain, will operate on 267.4 metres, which Belfast will be using until superseded by the high power station.

To complete the shuffle, Scottish National will take the 261.1 metre wavelength previously shared by the London and West Nationals.

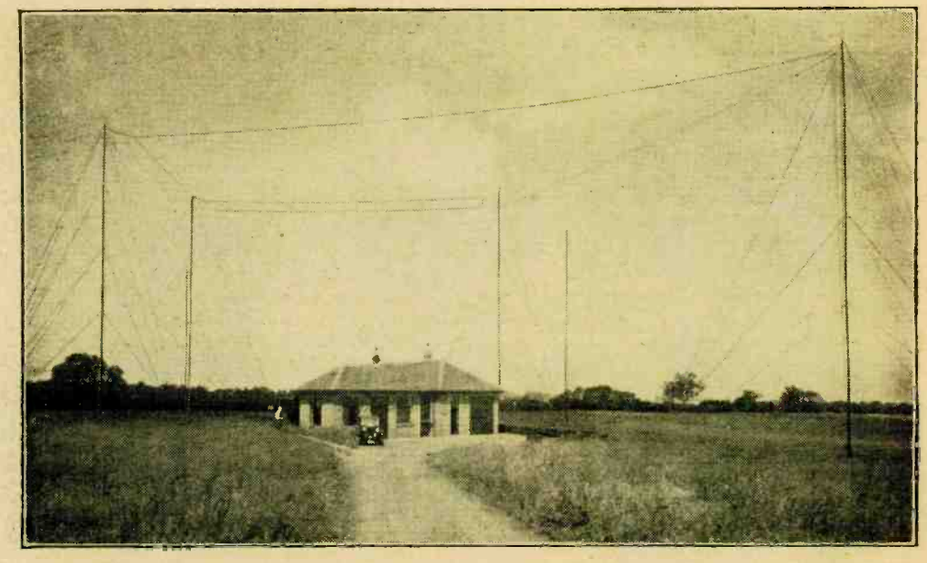
The Happy Midlands

CAN anyone doubt that Midland Regional is among the brightest of the B.B.C. stations at the present time? Unlike so many "veterans," Percy Edgar, the station director, shows no sign of resting on his laurels. The Midland programmes abound in stunts and surprises.

Bring Him to London

THE artistes are keen and original. Anyone who heard Will Gardner, whose songs and patter were relayed from Walsall on November 18th, must agree that if this comedian looked half as funny as he sounded, the audience could have been forgiven for blasting the microphone with their laughs. As it was, they applauded him to the echo.

Will Gardner has the broadcasting voice and I hope we shall soon hear him in London.



CHECKING EUROPE'S WAVELENGTHS. A general view of the B.B.C.'s checking station at Tatsfield, Surrey, which will play a prominent part in the great wavelength change-over on January 14th and 15th.

At Christmas

THE Christmas programme plans are still somewhat nebulous, but certain features are already decided upon. Pride of place must be given to the King's broadcast to his people throughout the Empire on Christmas Day. His Majesty is expected to speak from Sandringham at about 3 p.m. (G.M.T.), and will be heard, to use his own words in last year's message, by "men and women so cut off by the snows and the deserts that only voices out of the air can reach them."

Recording the Bells of Bethlehem

To avoid offending religious susceptibilities the B.B.C. has decided not to broadcast any form of service from Bethlehem on Christmas Eve. What listeners will hear will be the sound of the bells from the 1,600-year-old Church of the Nativity, built over the traditional site of Christ's birth.

It is interesting to note that the chimes will be recorded by Blattnerphone for rebroadcasting to the Empire and also, possibly, for future programme occasions.

Big Ben, and Then . . .

A strange and thrilling contrast should be afforded by the fact that the bells from Bethlehem will follow immediately after the chime of Big Ben at 8 p.m. on December 24th.

Impossible Problems

Engineers and producers alike seem to have been beaten by certain problems arising out of "Sindbad," the pantomime to be broadcast to National listeners on Christmas Day and to the Regional supporters on Boxing Day. For example, it has not been found possible to depict the touching coconut scene in which Sindbad, chased round and round the stage by monkeys throwing coconuts, escapes, while numerous members of the cast are injured.

A Brittle Topic

Likewise it has been found utterly impossible to broadcast the hatching of the egg in the roc's nest. However, listeners will find themselves, in imagination, on the back of a whale and, if they survive that, in an Arabian slave market and other exotic situations.

"Sindbad" is to be produced by Gordon McConnell. The part of Sindbad will be taken by Arty Ash, and Hindbad, the principal boy, by Bertha Willmott. Wynn Ajello will be the Fairy Queen.

A Real "Music Hall"

ST. GEORGE'S HALL has now lost much of the makeshift, impromptu appearance that it wore just after the B.B.C. took over. It is now a fully equipped broadcasting studio.

When I dropped in during the rehearsal for last Saturday's "Music Hall" I was surprised to find a newly erected silence cabinet in the wings, standing some 10 feet above stage level. From the windows of this little box on stilts Paul Askew, the Balance and Control Chief, has complete command of the performance, and nothing could be more fascinating than to sit at his side while he operates the mixing panel and controls the microphones in various parts of the hall.

Balancing and Controlling

We can see Billy Merson at the "mike"; between him and the auditorium is the Theatre Orchestra; beyond in the semi-darkness is the audience. At the moment only the orchestra is heard, for the artistes' "mike" has been faded out. A touch of the gain control and in comes Billy's voice on the loud speaker. The orchestra fades out and is then brought back again until a perfect balance is obtained.

At the end of the turn the microphone in the auditorium is faded in and, if we like, we can have applause which is literally deafening.

Five Microphones

What a fortune awaits the man who can invent a device which would make the same sort of control available at the listener's end. Actually, there are five microphones in circuit in St. George's Hall. These are placed in the commentator's box in the wings, in the footlight gulley, up stage, in mid-air in front of the stage, and away back in the auditorium.

B.B.C.'s Best Studio

Engineers and musicians alike agree that the hall is the finest ever used for broadcasting in this country, with the sole exception of the lounge of the Grand Hotel, Eastbourne.

Letters to the Editor:—

Disturbance or Interference

Long-wave National : Tuning by Name : Cabinet Design

The Editor does not hold himself responsible for the opinions of his correspondents

Disturbance or Interference

WE noted with interest the fact that Mr. E. M. Lee, when speaking at a recent meeting, differentiated between the word "disturbance" and "interference," as applied in particular to apparatus intended for connection in mains leads to reduce the parasitic noises emanating from electrical apparatus.

We agree with the speaker that clear definition is desirable, but we do not agree that the word "disturbance" is necessarily the most suitable word to describe this type of parasitic trouble.

Consultation of leading dictionaries inclines us to the view that of the two words "interference" comes nearer to being the suitable description.

Language is, of course, a living matter, and the meanings of words are always changing. Whichever word is used, therefore, implies a new and slightly different meaning. "Interference," however, necessitates a lesser jump in meaning. The word has hitherto been universally used to cover the objectionable intervention of heterodyne whistles, atmospheric noises, and so forth.

Parasitic noises from electrical apparatus come, we feel, in a similar class of unwanted noises, and we feel, therefore, are also to be described as "interferences," possibly clarified by the word "mains" to indicate and differentiate from other types of interference.

We suggest the following descriptions and notes would clarify matters:—

Aerial Interference Devices.

To be applied to devices for connection in the aerial system for reducing parasitic noises emanating from electrical apparatus and collected by the aerial system.

Mains Interference Devices.

To be applied to devices for connection in the mains leads to reduce parasitic noises emanating from electrical apparatus and propagated along the mains wiring.

We appreciate that this leaves heterodyne whistles and atmospherics, forms of interference still unclassified. There are, however, on the market many devices known and classified already as selectivity units and so forth, and it is already understood that these are connected in the aerial-earth system. We suggest that these descriptions are worthy of close consideration as serving to clarify to the public the uses and intentions of devices with which they are not fully familiar.

At present we feel that the word "interference" alone, although descriptive, is too broadly used, and the purposes of devices to which it is applied remain vague.

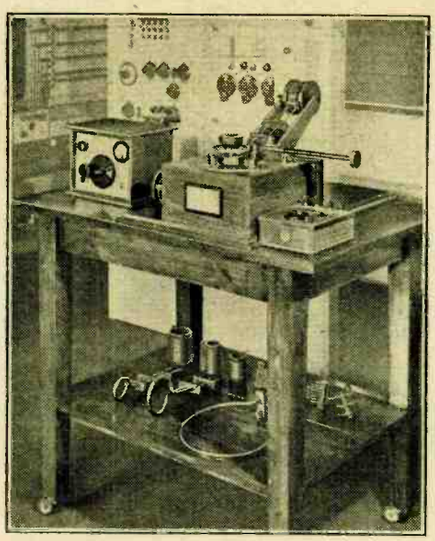
Barking, Essex. H. T. STOTT,
Technical Department, A. Bulgin & Co., Ltd.

Closing Down the National

I HEAR many comments on the proposal of the B.B.C. to close down the National transmitter when the new station at Droitwich opens.

There are many thousands of listeners who do not care about foreign programmes but who want their two local programmes free from interference.

During the past hot and dry summer it has been remarkable how little interference has been experienced from atmospherics in the local Regional and National programmes, whereas on the Daventry wavelength they have been bad.



WATCHING THE WAVELENGTHS. The B.B.C.'s checking station at Tatsfield includes the short-wave wavemeter covering a range of from 10 to 100 metres shown in this photograph.

The proposed discontinuance of the National low-wave transmitter means a backward step to the days of 1929, when the local programmes were the only ones of programme value. A transmission interspersed with a local "Brocks' benefit" has no programme value, and any transmitter situate more than fifty miles away from the receiver, whatever its power, suffers from this disability. LOUIS J. WOOD.

Halifax.

Alternatives to the Disc Record

THE present reproduction obtained from disc records is comparatively good considering the price paid, and cost is the first consideration with both the recording companies and the purchaser. Therefore, until such times as a better method just as cheap as the present can be found, let the companies concentrate on keeping records as cheap as at present. No doubt one of the companies would be glad to make special quality records for those who want them, providing they are willing to pay for them.

Sidcup, Kent. QUITE SATISFIED.

Correspondence, which should be as brief as possible, should be addressed to the Editor, "The Wireless World," Dorset House, Stamford Street, S.E.1, and must be accompanied by the writer's name and address

Why Tune by Wavelength ?

MY view is that the scheme put forward by Mr. Hallows is just as unsound as kilocycles or wavelengths, for the reason that a number has to be memorised in each case.

The public refused to turn to kilocycles because they had got a few of the numbers in wavelengths in their heads, and they were not going to start learning all over again. They will reject channels for the same reason.

If there is to be no stability in the relative tuning positions of stations, then dials will have to be devised with interchangeable slips bearing the station names—not a difficult matter on horizontal and vertical scales—allowing the owner to rearrange his dial when and as changes occur. In fact, each of Mr. Hallows' channels would be a little slide into which the required name could be slipped.

The public demand is, rightly, for names, not wavelength, kilocycles or channels.

N. Ireland. J. N. BROWN.

Cabinet Design

YOUR article on "The Receiver in Outward Form" gave food for thought, but a question which must be asked is, "Would the public favour a drastic change in cabinet design?" I venture to suggest that the answer is in the negative.

My opinion is that a design on the lines of the present-day horizontal cabinet, in a console form, with a sloping control panel, to enable operation to be carried out with ease in any position, would solve most of the problems.

With regard to fatigue, my experience—gained from hundreds of customers to whom I sell receivers weekly—is that a sloping control panel, at 45°, would definitely overcome the problem.

Your readers' views will be of interest.

Guildford. S. G. BUTTON.

Tuning Scales

THE writer has read with the greatest interest and agreement the editorial in *The Wireless World*, dated November 3rd, in which you draw attention to the great importance of a larger and more clearly visible tuning scale.

It is interesting to note that this point was appreciated by the designers of Ekco receivers as far back as 1931, when the R.S.3 receiver was designed with a large tuning scale completely encircling the loud speaker fret. This is, surely, a case in which the area of the tuning device was the maximum which the dimensions of the cabinet permitted.

The same type of scale was continued in an improved form in 1932, whilst the present Ekco receivers have also a tuning scale of sensibly large and even more convenient design.

E. J. WYBORN, B.Sc., A.C.G.I.,
Chief Engineer, E. K. Cole, Ltd.
Southend-on-Sea.

Television Explained

VI.—The Cathode-ray Tube

THE cathode-ray tube is of particular interest for television reception since it avoids the necessity for mechanically moving parts. The whole process of building up the picture is achieved through the aid of a beam of electrons. In this article the principles of operation are explained.

THERE are two general systems whereby the cathode-ray tube may be used for television reception; one involves a special type of transmission, but has the advantage of involving no synchronisation difficulties in the receiver; the other can be used for the reception of any mechanically scanned transmission, but necessitates careful attention to synchronisation if successful results are to be obtained. Taking the latter first, let us consider the requirements for successful operation.

The principles of the cathode-ray tube have recently been described in *The Wireless World*,[1] and it is unnecessary to go into it in any detail. It will suffice to say that a beam of electrons is emitted by the cathode, and, on striking a fluorescent screen mounted on the end of the tube, gives rise to a spot of light. The intensity of the spot of light is dependent upon the density of the electron beam, and means can be provided for controlling this. The position of the spot of light can be varied at will by deflecting the electron beam by applying suitable potentials to pairs of plates set at right angles at a suitable point in the tube.

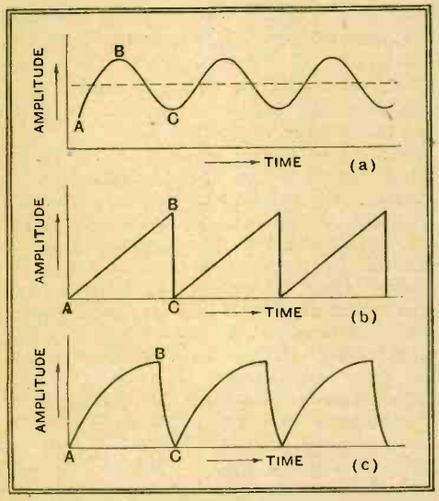
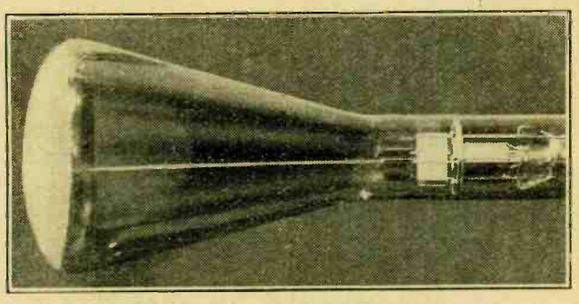


Fig. 1.—The various types of waveform which might be used for the voltages applied to the deflecting plates are illustrated here. A saw-tooth waveform as at (b) is desirable.

By applying a suitable type of voltage variation to one pair of plates, the light spot can be made to move sideways and give the effect of a line of light. The application of another suitable voltage to the other pair of plates will cause the light spot to move vertically. By the choice of the correct frequencies, waveform, and amplitude for these voltages the light spot can be made to move over the screen in any desired manner. For the reception of vertically scanned transmissions, such as the present B.B.C., the light spot is made to move vertically 375 times a second, and horizontally 12½ times a second.

One difficulty which will be obvious with this arrangement is that when the spot of light has moved to the bottom of the screen it must return to the top before the next scanning line can start. If it took as long to return to the top as to travel from the top to the bottom it is obvious that with normal methods of transmission no intelligible picture would be obtained, for alternate lines would be upside down. The waveform applied to the deflecting plates, therefore, is of a special type, so that during the scanning cycles the light spot moves steadily down the screen, but, having reached the bottom, it returns to the top for the next line much more rapidly. The time taken for the return upward movement of the spot is negligible in comparison with that required for the downward movement. In the horizontal movement for the separation of the scanning lines the same quick return is obtained.



A cathode-ray tube in which the beam of electrons can clearly be seen.

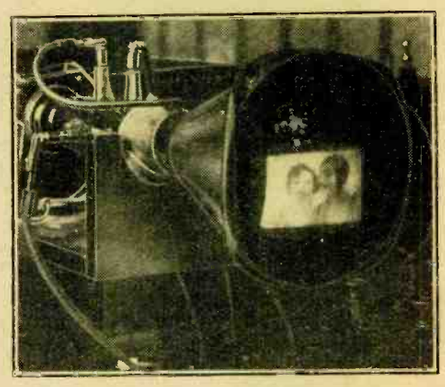
The Synchronising Voltages

The apparatus additional to the cathode-ray tube, therefore, must provide suitable deflecting voltages, and ensure that they are in synchronism with the synchronising impulses in the transmitter. A special form of oscillator is required, therefore, for the ordinary oscillator gives an output which, in the absence of harmonics, is a sine wave, as shown in Fig. 1a. Suppose we try using an oscillator of this nature, however. Considering the lowest portion of the negative half-cycles to represent the zero line, the voltage rises slowly at first from the point A, then rapidly, and again slows down as it approaches the point B. After passing this point, it commences to fall, slowly at first, then more rapidly, and then slowly again as it approaches the minimum C.

The light spot on the viewing screen will follow these variations. The scanning stroke is between A and B, and the speed of the light spot will obviously vary during the line; moreover, the return stroke is the interval BC, which is equal to the scanning stroke. Obviously this will be unsatisfactory.

Let us consider, therefore, what is actually required. During the scanning stroke we need a voltage which rises steadily until the line has been completed, and which then falls instantaneously to zero to permit the light spot to return for the next line. The voltage required, therefore, takes the form shown in Fig. 1b in which the interval AB represents the scanning stroke, and BC the return stroke. In practice, of course, it may prove impossible to obtain exactly this waveform, but it is by no means difficult to generate a voltage which closely approaches it, but which is actually of the form shown greatly exaggerated in Fig. 1c.

The methods of generating such a voltage are more complicated than those for the usual sine wave, but there is nothing essentially difficult about them. In general, the rise in voltage along AB is obtained through the charging of a condenser through a constant current device such as a saturated diode or a screen-grid valve or pentode, while the sudden drop along BC is obtained by suddenly discharging the condenser with the aid of a neon tube, a thyrotron, or an over-biased valve.



The manner in which the picture appears on the end of the cathode-ray tube is well brought out in this illustration.

The frequency of oscillation is determined by the effective resistance and capacity of the circuits, and can be varied by changing either. It is, therefore, quite pos-

[1] The Cathode-ray Oscillograph. Nov. 3rd, 1933.

Television Explained—

sible to produce oscillators the frequencies of which can be readily controlled by variable condensers or resistances. The cathode-ray tube, therefore, offers the important advantage over mechanical systems that it is readily adaptable to the reception of signals with any scanning or picture frequencies, for the oscillator frequencies can be easily adjusted to suit the transmission, whereas with a mechanical system it is necessary to fit at least a new drum or disc. A change from horizontal to vertical scanning at the transmitter requires only a change-over in the frequencies of the two oscillators with the cathode-ray system, but it would necessitate the complete rebuilding of the receiver with a mechanical arrangement. As most foreign stations use horizontal scanning, and the present British transmissions are vertically scanned, this is not without importance.

Synchronisation is dependent upon the maintenance of the two oscillators at exactly their correct frequencies, and in practice this is usually obtained by feeding them with the synchronising impulses carried by the television signal. These impulses increase the oscillator potential momentarily when it is approaching the point B (Fig. 1), and ensure the breakdown of the discharging device at the correct instant.

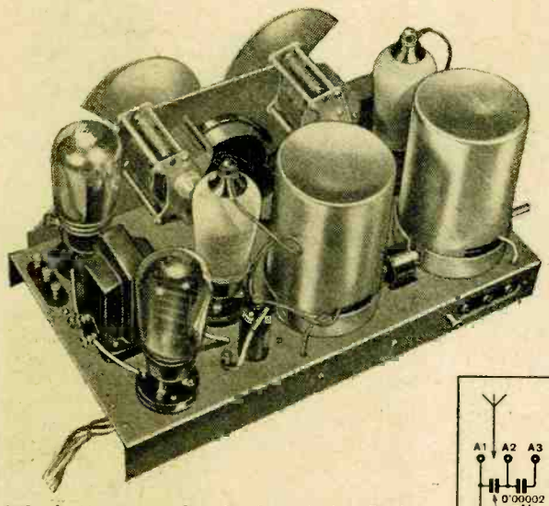
There are, of course, certain difficulties in the way of good cathode-ray television reception among which synchronisation is one of the foremost. Another point which must not be forgotten is that the variations in intensity of the electron beam, which are required for the variations of light and shade in the picture, affect the focusing of the beam to some extent, and may possibly affect its position on the screen. All this means distortion and a reduction of detail, so that an alternative system which requires neither synchronisation nor modulation of the electron beam is of considerable interest, and will be dealt with in the next instalment.

12 TO 2,000 METRES

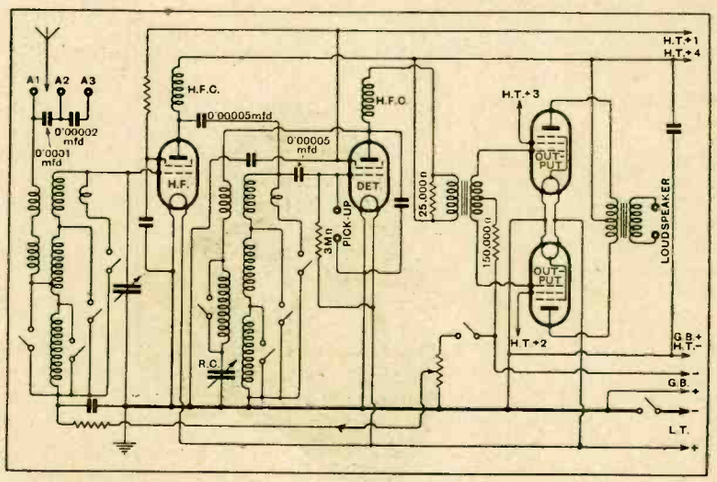
The Lissen "Skyscraper 4" Tested

SO-CALLED "all-wave" sets, covering short, medium and long broadcasting wavelengths, are becoming more and more attractive. Great advances have of late been made in their design, and many assemblies with built-in wave-range switches. In a set of this nature it is obvious that defective switch contacts might cause endless trouble, and so it is reassuring to note that during our tests the Lissen set gave no trouble whatever in this direction, and indeed, the switching system looks as if, bar accidents, it should go on functioning almost indefinitely.

There are several other interesting features, not the least of which is the combined volume-reaction control, which is effected by a single specially designed component. This consists of a potentiometer through which the grid bias of the H.F. valve is varied from maximum negative to zero; further rotation of the control has the effect of increasing reaction feedback between plate and grid circuits of the detector valve in the usual way, grid voltage being meanwhile held at zero.



The Lissen "Skyscraper 4" chassis, and (below) the complete circuit diagram.



With regard to the Q.P.P. output circuit, which is coupled to the detector valve by a high-ratio L.F. transformer, it should be noted that matching of the output valves is effected by adjustment of auxiliary grid voltage. To this end, individual pentode valves supplied with the kit of parts bear a label showing the appropriate voltage to be used, and so the constructor meets with no difficulty, and does not require any measuring instruments.

On the Short Waves.

In testing an "all-wave" set, one generally makes subconscious allowances for the fact that something extra is being provided as compared with the more conventional type of receiver. But, particularly on the 28-80 metres range, there is no need to be tolerant towards the Lissen set, which can well be judged on its merits. Hand-capacity effects were virtually non-existent; the unconventional reaction system worked very sweetly, and, in spite of the two tuning knobs, adjustments were not difficult. Tuning of the input circuit is quite flat, but that of the intervalve coupling requires much more critical adjustment. On the shortest wave-lengths (12-35 metre range), too, performance was also very satisfactory, although the usual slight falling off became evident below 20 metres, where very fine adjustment of the H.F. coupling circuit became necessary. A good "bag" of short-wave stations was obtained both before and after dark.

Medium and Long Wave-bands.

On the medium band, the set is comparable with others having two tuned circuits in regard to selectivity and sensitivity. In order to avoid interference, it is sometimes necessary to use the weakest of the three optional aerial couplings, with a consequent loss of signal strength. On the long waves, performance was well up to the standard for a receiver of this class.

The Q.P.P. output system works well, providing ample volume and good quality, with a commendably low average consumption of H.T. current. It is, indeed, something of an achievement to have designed such a satisfactory all-wave set in a form suitable for amateur construction.

The makers are Lissen, Ltd., Worple Road, Isleworth, Middlesex, and the kit of parts, complete with valves, costs £5 12s. 6d. The model we tested was fitted with a Lissen moving-coil loud speaker, but a moving-iron instrument may be used.

The Lissen "Skyscraper" may be housed in almost any manner, but many constructors will prefer to use the special table or "consolette" cabinets which are available in the form of sets of parts.

of the better examples, far from being Jacks-of-all-trades and masters of none, give a very satisfying performance on all wave-bands.

The fact that such a set can be put forward to the amateur constructor in the form of a kit of parts is indicative of the advances that have been made. The Lissen "Skyscraper 4," with which we are here concerned, is a battery-operated set covering four wave-ranges—nominally, 12-35 metres: 28-80 metres; 195-520 metres; and 800-1,970 metres—and is cleverly planned so that it may be built by the least experienced of home constructors with virtual assurance of success.

Basically, the circuit comprises a three-stage H.F.-det.-L.F. arrangement, with single-tuned input and intervalve circuits, and a Q.P.P. output stage. The various wave-ranges are covered by multiple coil

NEW APPARATUS REVIEWED

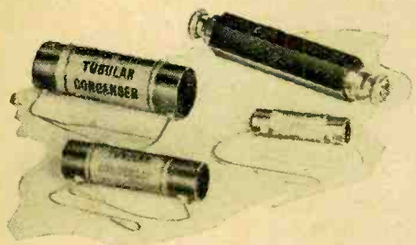
Latest Products of the Manufacturers

GRAHAM FARISH TUBULAR CONDENSERS AND 3-WATT OHMITES

THE new tubular condensers made by Graham Farish, Masons Hill, Bromley, Kent, are fitted with wire ends securely anchored to the bakelite container, a method of construction which gives adequate strength without imposing any strain whatsoever on the condenser insert. They are rated at 250 volts working, but tested at twice this potential, and a wide range of values from 0.0001 mfd. to 0.25 mfd. is available.

Some specimens taken at random show that the customary tolerance of plus or minus 10 per cent. is nowhere exceeded ; for example, an 0.05 mfd. condenser measured 0.0502 mfd. or plus 4 per cent. ; an 0.01 mfd. gave 0.00988 mfd. (minus 1.2 per cent.), whilst one of 0.0003 mfd. measured 0.000291 mfd. or minus 3 per cent. In a few cases only discrepancies of between eight and nine per cent. were found. Prices range from 1s. to 1s. 6d. according to size.

The heavy duty Ohmite resistances are equally as good in their agreement with the marked values, and a 10,000-ohm sample was only 3 per cent. low, whilst one of 25,000 ohms was 4.8 per cent. high. This style dissipates three watts without overheating, or with the temperature rising to an extent that precludes handling it with comfort, and under these conditions only a small change in resistance occurs. After a severe test all the specimens were found to be within a few ohms of their original values. They are, of



Selection of Graham Farish tubular condensers and heavy-duty Ohmite resistance.

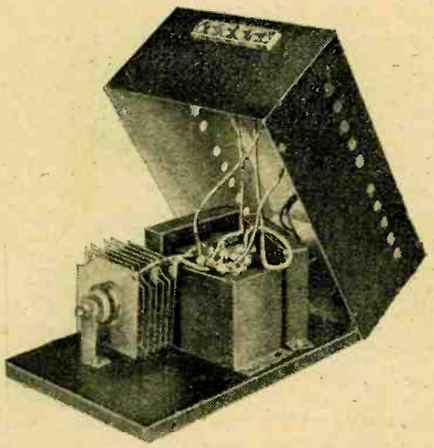
course, synthetic resistors. Quite massive terminals are fitted and they are made in values ranging from 300 to 100,000 ohms, the price being 2s. 3d. each.

FEL-ELECTRIC H.T. MAINS UNIT

THE battery eliminator sent in for test is one of a wide range made by Fel-Electric Radio, Garden Street, Sheffield, 1, which includes both A.C. and D.C. models, and some of the former embody a trickle charger. In addition, all the A.C. models can be supplied with a 4-volt 3-amps. L.T. winding at a small extra cost.

The model illustrated is the type C7/C.H. rated to give 120 volts at 12 mA., and it provides three separate output voltages. The detector valve supply comes from a resistance joined to the " power " tapping and is decoupled by a condenser. A potentiometer supplies the screen grid voltage for the H.F. valves, and under normal working conditions these tappings give 90 volts at 1.5 mA. and 70 volts at about 0.5 mA. respectively, and with the other valves in the set taking 10 mA. in all at 140 volts. These voltages were obtained with the unit connected to a 230-volt 50c/s supply main.

The primary winding of the mains transformer is not tapped, but is stated to be suitable for all A.C. mains of from 200 to 250 volts ; the output will, however, be subject to slight change on supply mains of different voltage.



Fel-Electric battery eliminator, model C7/C.H., with cover removed.

This unit is quite suitable for use with practically any type of battery set taking not more than 12 mA., and very little more background will be present than with batteries. For when tested with a sensitive four-valve set mains hum could be heard only by listening close to the loud speaker.

The components are neatly arranged on a metal base-plate, and the workmanship is very good. The price is £2 2s.

IGRANIC D9 LOUD SPEAKER

THIS unit is very well made and finished and has a magnet system which is designed to reduce amplitude distortion to a minimum. That this aim is accomplished is proved by the fact that frequency doubling cannot be detected by ear when the diaphragm is developing full amplitudes at low frequencies.

Igranic D9 permanent-magnet moving-coil loud speaker unit.

The efficiency is good and in a small room not more than 250 watts is required to give an adequate volume level. The balance of tone at this level is good, and the bass is provided by a couplex group of resonances between 80 and 120 cycles. In the upper register, also, there is a commendable absence of isolated and prominent resonances, but the general level of output is higher over the band of frequencies from 2,500 to 4,500 cycles.

The unit is supplied in three types, the "Standard" model for single output valves at 32s. 6d., and the "Q.P.P." and Class "B" models at 35s. each. The makers are the Igranic Electric Co., Ltd., 149, Queen Victoria Street, London, E.C.4.

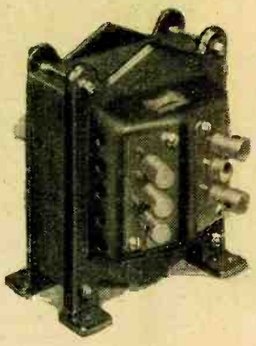
HEAYBERD MAINS TRANSFORMER MODEL W.41

A RECENT addition to the Heayberd range, this model is designed for use with the new Westinghouse H.T.12 rectifier and provides two alternative output voltages for the unit, in addition to one L.T. supply of four volts at four amps. for the A.C. valves. The transformer was tested in conjunction with a voltage doubler circuit, using 4-mfds condensers of 500-volt test rating and a smoothing choke of 300 ohms resistance.

The smoothed D.C. at various current loads is given in the table below, using in the one case the 110-volt output and in the other the 140-volt supply.

110-volt Output.		140-volt Output.	
Current in mA.	Volts.	Current in mA.	Volts.
5	257	5	335
10	236	10	315
15	216	15	295
20	196	20	276
		25	256
25	176	30	245

With the full load of four amps. the L.T. winding gave 4.25 volts with 20 mA. flowing in the H.T. circuit when measured at the transformer. As there will be a small voltage drop along the L.T. leads this ensures that the



Heayberd model W.41 mains transformer for use with Westinghouse H.T.12 rectifier.

valves are operated at their correct voltage. The transformer runs cool, there is no trace of hum due to looseness in the assembly, and, in common with all Heayberd products, it is a very well-made component. Insulated plugs and sockets are fitted in place of terminals, and the price is 22s. 6d.

The makers are F. C. Heayberd and Co., 10, Finsbury Street, London, E.C.2.

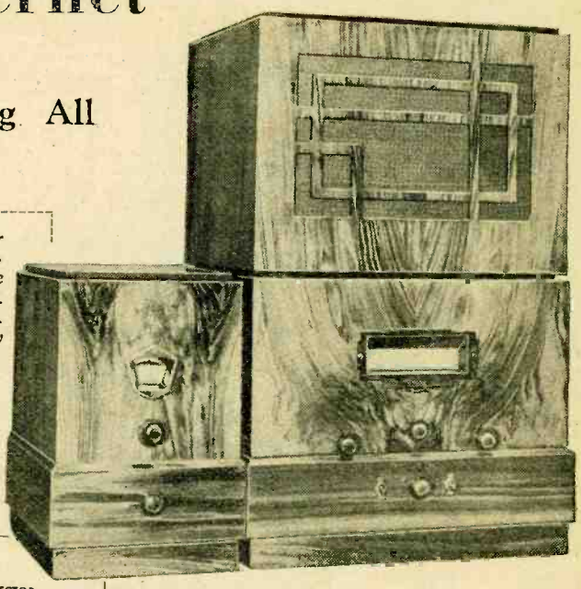
CHANGE OF ADDRESS

The head office of the Edison Swan Electric Co., Ltd., from Queen Victoria Street to 155, Charing Cross Road, London, W.C.2. Tel.: Gerrard 8660.

C.A.C. "Pentagrid" Superhet

AND SHORT-WAVE ADAPTOR

A Sensitive Receiver Equipment Covering All Broadcast Wavelengths



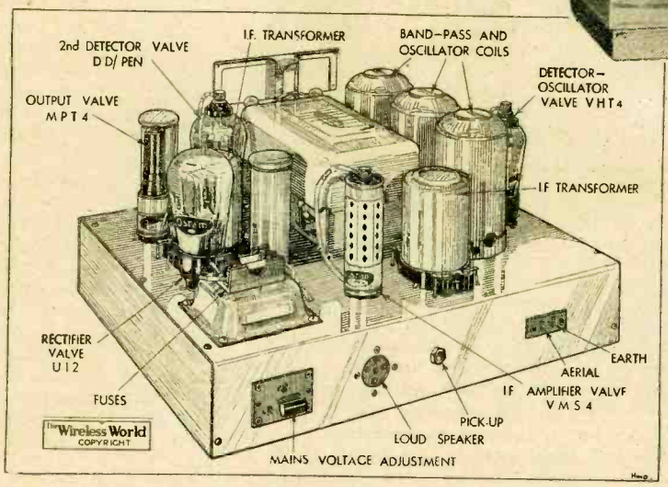
"Pentagrid" Receiver. FEATURES. ***Type.***—*Table model superheterodyne for A.C. mains. Separate loud speaker unit. Provision for Gramophone pick-up.* ***Circuit.***—*Band-pass input to heptode frequency-changer—variable-mu I.F. stage—duo-diode-pentode second detector — pentode output valve. Full-wave Rectifier.* ***Controls.*** — *(1) Tuning. (2) Waverange Switch. (3) Volume control. (4) Pre-set sensitivity control and switch. (5) Radio-gramo. switch.* ***Price.*** — *14 gns. (including L.S. unit.)* ***Makers.*** — *City Accumulator Co. Ltd., 18-20, Norman Buildings, Central Street, London, E.C.1.*

THE enthusiast for long-distance reception will find in this group of receiver units the ideal medium for the pursuit of his hobby, for there can be little doubt that the range available is the maximum which can be gained from the number of valves used.

From this point of view the C.A.C. set is able to offer something a little better than the ordinary run of four-valve superhets., and it is for this reason that it should appeal to the man who takes an interest in foreign-station listening and a pride in the number of stations in his log book. That is not to say that the receiver is a job for the specialist, for the tuning is simple and the quality of reproduction will more than satisfy those who prefer to settle down to the local station programme.

The basic unit is the "Pentagrid" superhet. receiver, which is designed to cover the medium- and long-wave bands, and we propose to discuss its merits as an ordinary broadcast receiver before turning to a consideration of the Short-wave Adaptor.

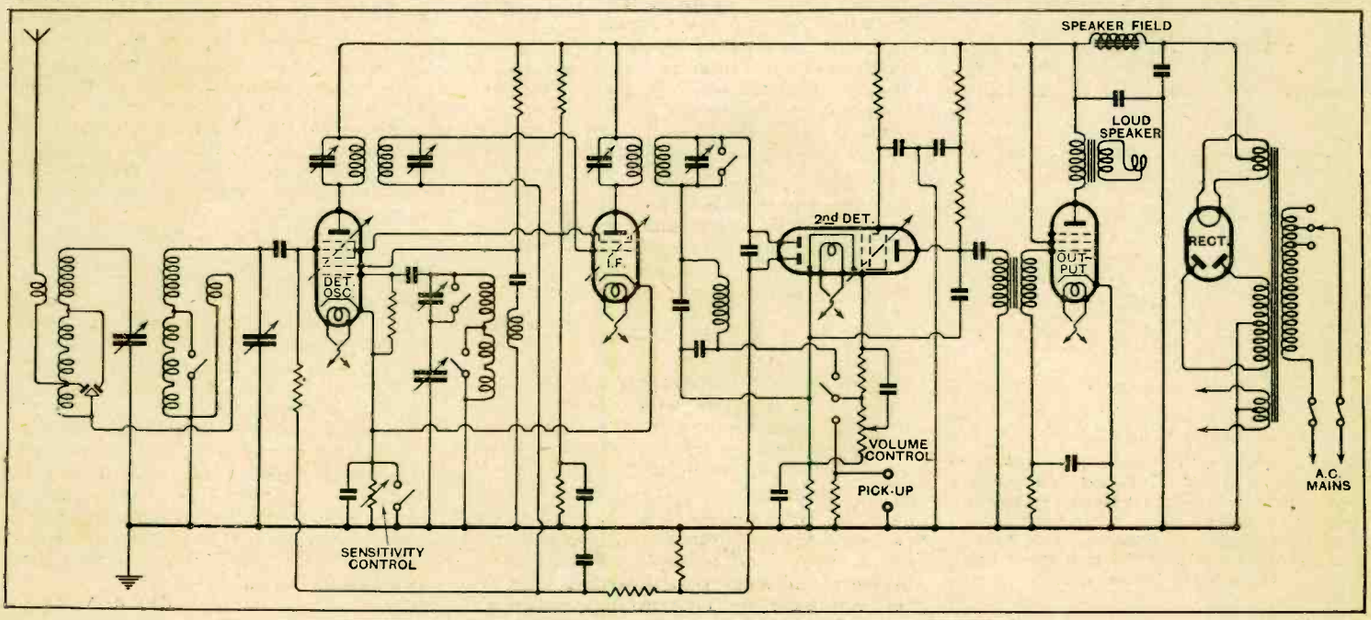
The four-valve superheterodyne circuit is of thoroughly up-to-date design and includes automatic volume control. An inductively coupled band-pass filter precedes the frequency-changer valve, which is the latest Ferranti "Heptode." A special advantage of this valve is that it minimises mutual interference between the various tuned circuits associated with the first stage. A sensitivity control is connected in this stage and consists of a variable cathode bias resistance which is common to both the frequency changer and the I.F. valve, and which can be adjusted to a predetermined level. It is brought into operation by opening the switch in parallel with it.



A logical layout of components contributes to the efficiency of the "Pentagrid" receiver chassis.

The I.F. stage is straightforward and includes a variable-mu valve with four tuned circuits. It is followed by a duo-diode-pentode which combines the function of detection with the provision of the automatic control bias and a degree of L.F. magnification. It is interesting to note that transformer coupling has been included between this valve and the output stage, and it is probable that this contributes materially to the unusually good performance of the set from the point of view of sensitivity.

The set is built in two units, the loud speaker occupying the top section and being connected to the receiver through the medium of a five-pin plug. This is a particularly convenient arrangement and the loud speaker can be used in another room without



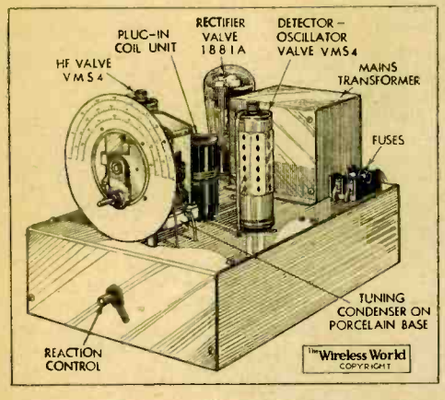
Circuit diagram of the "Pentagrid" receiver. Modern high-efficiency valves are used in all stages.

C.A.C. "Pentagrid" Superhet—detracting from the appearance of the set.

A horizontal type of tuning scale has been adopted, and in the model tested was calibrated only in degrees. We understand, however, that all future models will be marked both in wavelengths and degrees. This will enable the non-technical listener to tune-in the station he requires without any difficulty, and, at the same time, will not deprive the enthusiast of the means of preparing his own accurate tuning charts or calibration curves.

The first thing to attract attention in testing the receiver is its extraordinary liveliness and high overall magnification. Continental stations on the medium waveband, which are difficult to receive in daylight, came in with a volume which normally one would expect only after sunset. The selectivity on medium waves was excellent and barely one channel is lost in Central London on either side of the local B.B.C. transmitters. On long waves, however, there was some difficulty in receiving Zeesen with Radio Paris in operation, but this may have been due to slight misalignment on the long waveband.

With regard to second channel whistles, those due to the London Regional and National transmitters were well defined on the medium waveband, and there was one fairly prominent whistle on the long waveband which was, no doubt, due to a harmonic of the oscillator. In relation to the high magnification of the set, however, these whistles cannot be regarded as being more serious than those in any four-valve superheterodyne of average performance.



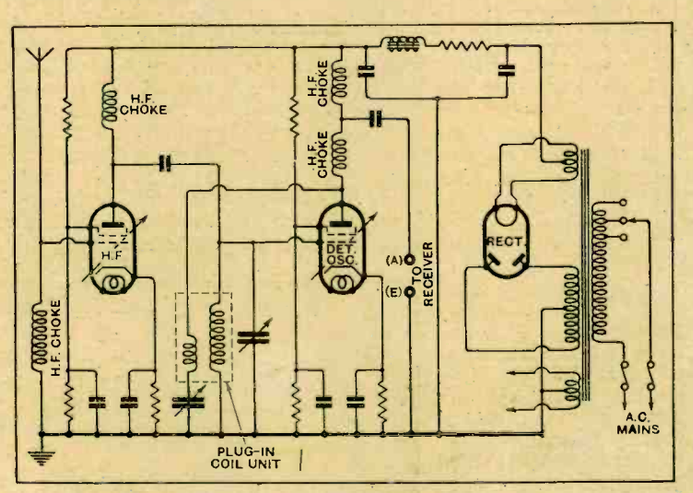
Non-microphonic all-metal valves are a feature of the Short-wave Adaptor chassis.

The Short-Wave Adaptor

FEATURES.

***Type.**—Two-valve autodyne unit for attachment to broadcast receiver. **Circuit.**—Aperiodic H.F.—autodyne detector-oscillator. Full-wave rectifier. **Controls.**—(1) Tuning. (2) Reaction. **Price.**—£10. **Makers.**—City Accumulator Co. Ltd., 18-20, Norman Buildings, Central Street, London, E.C.1.*

The auxiliary short-wave unit is designed to couple-up with the aerial and earth terminals of the main receiver and is provided with its own power supply. The broadcast receiver is tuned to about 1,875 metres and the output from the short-wave unit then receives not only with the full over-all magnification of the set, but is also provided with the advantage of automatic volume control, which is a very real advantage on short waves which are subject to fading.



Circuit diagram of C.A.C. Short-wave Adaptor which is provided with its own power supply.

The autodyne frequency-changer in the short-wave unit is preceded by an aperiodic H.F. stage with choke coupling. The degree of reaction in the frequency-changer stage is under control, and this was found to be a very real advantage when adjusting the set for the maximum sensitivity, as the efficiency of this stage is appreciably affected by the relative strengths of the incoming and locally generated oscillations. This adjustment, however, may be regarded as a refinement, for it is not necessary to touch the reaction control when searching in the normal way.

A specially designed short-wave condenser mounted on an insulating base of ceramic material is used and is fitted with a two-speed slow-motion dial which is admirably suited to short-wave tuning conditions. Another sensible feature is the employment of Catkin valves, which completely overcome the microphonic troubles frequently experienced in sensitive short-wave receivers. The short-wave ranges are changed by means of plug-in coil units, and in the receiver tested the bands covered were as follows: 15.5 to 27.5 metres, 26.5 to 51.5 metres, and 46 to 95 metres.

During the periods of the test the lowest waveband gave best results, at any rate, as far as long-distance reception is concerned. Three American stations, Pittsburgh, W8XK, Schenectady, W2XAD, and Bound Brook, W3XAL, were received at good strength with only slight fading during the afternoon. On the two higher wavebands all the European amateurs and short-wave broadcasting stations were always available, and as a medium for the exploration of this interesting field the C.A.C. short-wave unit could hardly be bettered.

The predominant impression left after handling this equipment is that, by comparison with the ordinary run of mass-produced receivers, it possesses just that extra degree of efficiency that is sought after by the enthusiast for long-distance reception.

The Short-Wave World

DURING the past fortnight short-wave listeners who have been able to listen during the afternoons and early evenings have had much to interest them. The broadcasting of special programmes commemorating the opening of "Radio City," New York, has fortunately coincided with a spell of quite exceptional conditions on the shorter waves.

Probably the best and most reliable station of all has been W3XAL, Bound Brook, on 16.87 metres, which has been received at good strength almost continuously from 2 p.m. until "fade-out." The time of the latter has varied between 5 p.m. and 6.30 p.m. in the course of a week, and will, of course, occur earlier almost day by day until the shortest day.

Many owners of short-wave receivers seem to miss W3XAL on this wave, either because of their inability to tune down below the 19-metre band or simply because they do not realise the excellence of W3XAL's transmissions. Just at present it is certainly better in every way than the 19-metre stations. W9XAA, Chicago, on 16.57 metres, has also been heard on several occasions.

Amateur transmitters throughout the country have been finding the 20-metre band very unsatisfactory for the past two or three weeks—a rather surprising fact in view of the excellence of the 16- and 19-metre broadcasting. It is generally safe to assume that if the amateur 20-metre band is "lifeless," the general conditions below 30 metres are bad. The characteristics of the 20-metre band at present seem to be the somewhat unreliable reception of Australia and New Zealand between 7 and 10 a.m., and the reception of the East Coast of U.S.A. from noon onwards, the strength of signals varying tremendously from day to day.

From the Antipodes

The 40-metre band, on the other hand, has been productive of very interesting results. Signals from the Antipodes have been well and reliably received in the early mornings for the past two months or more.

In the evenings the South African stations may often be heard—from 7 p.m. onwards—while the Australians, presumably received "the other way round," are generally almost as good as in the early mornings. As has always been the case, there seems to be a preponderance of New Zealand in the mornings and Australia in the evenings.

This would appear to confirm the fact that signals are received across the Pacific and South America in the morning, and across Asia in the evening. For this reason it is difficult to explain the presence of South American stations most evenings and their absence in the mornings!

The one remaining continent—Asia—has recently been represented by Japanese stations on 40 metres at about 8 p.m., but they could certainly not be described as reliable. Readers who remember the extraordinary influx of these "J" stations on the 20-metre band two years ago will be disappointed by the weakness of their 40-metre signals at present.

The amateur bands have been dealt with at some length, because they serve as a fairly reliable guide to the general level of short-wave conditions. High-power broadcasting stations may be received consistently on the worst of days, owing to "freakish" conditions of some kind; low-power amateur transmissions seldom survive.

MEGACYCLE.

Readers' Problems

THESE columns are reserved for the publication of matter of general interest arising out of problems submitted by our readers. Readers requiring an individual reply to their technical questions by post are referred to "The Wireless World" Information Bureau, of which brief particulars, with the fee charged, are to be found at the foot of this page.

Bias Polarity

IT is possible, when making alterations to a receiver with automatic bias, to bring about an accidental reversal of voltage and thus to operate one or more of the valves with positive instead of negative bias. A reader has apparently fallen into this trap through attempting to adapt methods that now tend to become obsolete to a modernised set.

When bias is developed across a resistor in the common H.T. negative lead to the receiver, this resistor may be treated as a potentiometer, across which negative bias voltages up to the maximum value provided may be obtained for any number of valves in a set. Referring to Fig. 1 (a), we will assume that a pressure of 10 volts is developed across the bias resistance; point A will therefore be 10 volts negative with respect to the earth line and the cathode of the valve, and any lesser intermediate voltage down to zero is obtainable by making contact with intermediate points on the resistor towards point B.

With a true "self-biased" circuit, such as that shown in Fig. 1 (b), it is no longer possible to obtain negative bias voltages for any other valves from, say, the cathode resistor associated with the output valve.

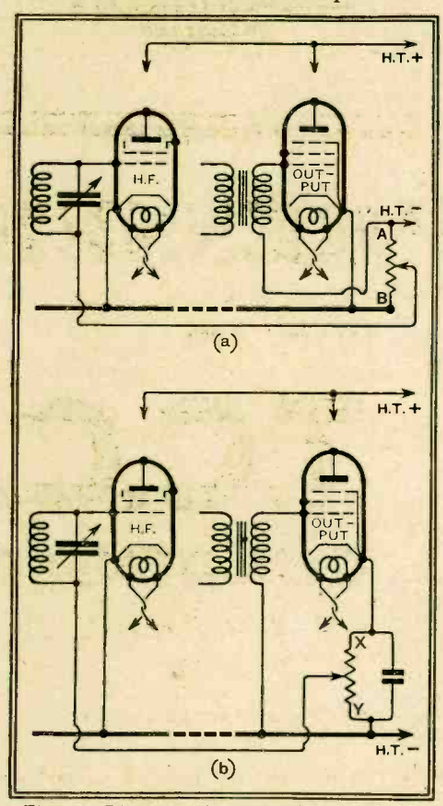


Fig. 1.—Diagram (a) represents a workable method of obtaining negative bias for two valves from a single resistor. The second circuit gives positive bias for the H.F. valve, and is incorrect.

Referring to diagram (b), it should be realised that point X on the bias resistor will be positive with respect to the earth line. At whatever position on this bias resistor we may make contact, it is impossible to obtain a negative voltage for application to earlier valves; even with the slider at Y, the H.F. valve will be operating with a zero grid, and not with negative bias as is required. The second diagram represents the incorrect arrangement (so far as the H.F. valve is concerned) used by the reader whose letter prompts this paragraph.

Inter-connected L.T. Windings

A CORRESPONDENT asks whether it would be advisable to connect in parallel two of the 4-volt low-tension secondaries of his power transformer. It is desired to feed the heater elements of five indirectly heated valves, taking one amp. each; the secondaries were designed to give 3 amps. each.

It is hardly safe to recommend this course. The usual transformer bears no indication of the "sense" of the windings, and if two of the L.T. secondaries were interconnected in the manner proposed by our correspondent, but in the wrong sense, it is possible that the transformer would be burnt out, or at least seriously damaged.

In any case, we can see little advantage in running any risk of trouble. Surely, there is no objection to feeding three of the valves from one secondary, and the remaining two from the other?

Q.P.P. with Triodes

QUIESCENT push-pull amplification with three-electrode output valves (as discussed at length in *The Wireless World* of February 24th) is perhaps not so popular as it deserves to be. A correspondent who has been using the system for many months says that results were excellent until a slight but appreciable deterioration of quality set in a few weeks ago. Subsequent tests with a milliammeter show that the individual anode currents of the output valves now differ considerably, although when the set was new they were sensibly the same. Our correspondent goes on to ask whether there is not some method of equalising the characteristics of the valves; it does not seem possible to match them by applying different values of bias, and, of course, the expedient of matching anode currents by adjustment of auxiliary grid voltage (as applied to pentodes) is impossible.

The circuit diagram submitted by our querist shows that he is using an ordinary push-pull transformer; with a special transformer having a "split" secondary with two windings, it would be possible to adjust the bias of each valve independently.

As it is, we can only suggest the use of one or two extra bias cells connected directly to the grid of one of the valves. Although it is unusual to insert the bias battery at the high-potential end of the circuit, there is actually no objection to doing this if very small cells, carefully insulated and preferably suspended in the wiring, are employed. It is often convenient to connect the extra "balancing" cell or cells so that the voltage applied to the grid is in opposition to that of the main source of bias; this method of connection, shown in Fig. 2, would, of course, be applied to the valve which is found to consume the lower value of anode current when both are working with the same bias.

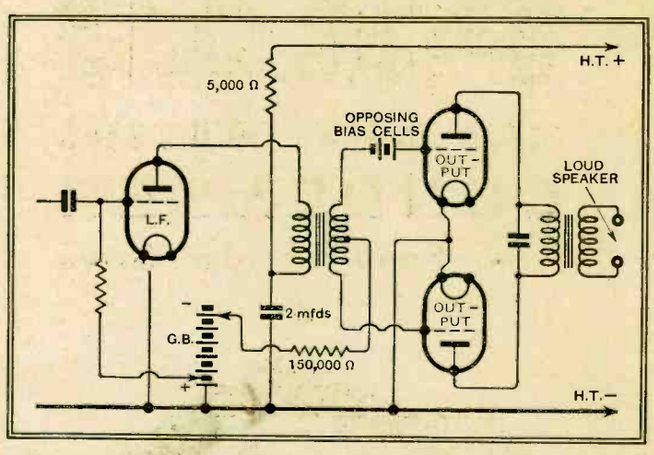


Fig. 2.—Applicable to all push-pull systems: an arrangement whereby the bias of each valve may be adjusted separately.

Aerial Circuit Trimming

A READER who proposes to use a commercial receiver with an exceptionally large aerial asks whether it is probable that this course will necessitate a retrimming of the aerial circuit. He goes on to enquire whether this operation could be satisfactorily carried out by means of an external semi-variable condenser connected in series with the aerial.

This is quite a practical course of procedure, but it will be effective only if, with the particular aerial in use, the input tuned circuit of the receiver suffers from an *excess* of capacity. In the circumstances described, this condition is likely to obtain, and so the series trimmer should be quite effective, and there will be no need to have access to the built-in trimmer, which is presumably hard to get at.

The Wireless World INFORMATION BUREAU

THE service is intended primarily for readers meeting with difficulties in the construction, adjustment, operation, or maintenance of wireless receivers described in *The Wireless World*, or those of commercial design which from time to time are reviewed in the pages of *The Wireless World*. Every endeavour will be made to deal with queries on all wireless matters, provided that they are of such a nature that they can be dealt with satisfactorily in a letter.

Communications should be addressed to *The Wireless World* Information Bureau, Dorset House, Stamford Street, London, S.E.1, and must be accompanied by a remittance of 5s. to cover the cost of the service. The enquirer's name and address should be written in block letters at the top of all communications.

Advertisements for "The Wireless World" are only accepted from firms we believe to be thoroughly reliable.

MISCELLANEOUS ADVERTISEMENTS

NOTICES.

THE CHARGE FOR ADVERTISEMENTS in these columns is

12 words or less, 3/- and 3d. for every additional word.

Each paragraph is charged separately and name and address must be counted.

SERIES DISCOUNTS are allowed to Trade Advertisers as follows on orders for consecutive insertions, provided a contract is placed in advance, and in the absence of fresh instructions the entire "copy" is repeated from the previous issue: 13 consecutive insertions 5%; 26 consecutive, 10%; 52 consecutive, 15%.

ADVERTISEMENTS for these columns are accepted up to FIRST POST on MONDAY MORNING (previous to date of issue) at the Head Offices of "The Wireless World," Dorset House, Stamford Street, London, S.E.1, or on SATURDAY MORNING at the Branch Offices, 19, Hertford Street, Coventry; Guildhall Buildings, Navigation Street, Birmingham, 2; 260, Deansgate, Manchester, 3; 26B, Renfield Street, Glasgow, C.2.

Advertisements that arrive too late for a particular issue will automatically be inserted in the following issue unless accompanied by instructions to the contrary. All advertisements in this section must be strictly prepaid.

The proprietors retain the right to refuse or withdraw advertisements at their discretion.

Postal Orders and Cheques sent in payment for advertisements should be made payable to ILIFFE & SONS Ltd., and crossed & Co. Notes being untraceable if lost in transit should not be sent as remittances.

All letters relating to advertisements should quote the number which is printed at the end of each advertisement and the date of the issue in which it appeared.

The proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes.

NUMBERED ADDRESSES.

For the convenience of private advertisers, letters may be addressed to numbers at "The Wireless World" Office. When this is desired, the sum of 6d. to defray the cost of registration and to cover postage on replies must be added to the advertisement charge, which must include the words Box ooo, c/o "The Wireless World." All replies should be addressed to the Box number shown in the advertisement, c/o "The Wireless World," Dorset House, Stamford Street, London, S.E.1. *Readers who reply to Box No. advertisements are warned against sending remittance through the post except in registered envelopes; in all such cases the use of the Deposit System is recommended, and the envelope should be clearly marked "Deposit Department."*

DEPOSIT SYSTEM.

Readers who hesitate to send money to advertisers in these columns may deal in perfect safety by availing themselves of our Deposit System. If the money be deposited with "The Wireless World," both parties are advised of its receipt.

The time allowed for decision is three days, counting from receipt of goods, after which period, if buyer decides not to retain goods, they must be returned to sender. If a sale is effected, buyer instructs us to remit amount to seller, but if not, seller instructs us to return amount to depositor. Carriage is paid by the buyer, but in the event of no sale, and subject to there being no different arrangement between buyer and seller, each pays carriage one way. The seller takes the risk of loss or damage in transit, for which we take no responsibility. For all transactions up to £10, a deposit fee of 1/- is charged; on transactions over £10 and under £50, the fee is 2/6: over £50, 5/-. All deposit matters are dealt with at Dorset House, Stamford Street, London, S.E.1, and cheques and money orders should be made payable to Iliffe & Sons Limited.

SPECIAL NOTE.—Readers who reply to advertisements and receive no answer to their enquiries are requested to regard the silence as an indication that the goods advertised have already been disposed of. Advertisers often receive so many enquiries that it is quite impossible to reply to each one by post. When sending remittances direct to an advertiser, stamp for return should also be included for use in the event of the application proving unsuccessful.

RECEIVERS AND AMPLIFIERS, ETC.

FUTURA Radiogram, 1933 model, in handsome special walnut case, new; bargain at 19 guineas.

QUANTITY of A.C. and D.C. Mains Receivers, 3 to 5 valves, with or without valves; from £3/10.

WINDSOR Radio Furniture Receiver, with McMichael Chassis, synchronous clock, original price 65 guineas, shop soiled; bargain at 22 guineas.—Radio Furniture and Fittings, Ltd., 106, Victoria St., S.W.1. [4108

"WIRELESS World" Single Dial Super (battery); £4/10.—247, Fore St., Edmonton, N.18. [4130

"PARMEKO" 25-watt Amplifier, Universal output, maker's report if required; £12.—Noakes, Cobden St., Leicester. [4126

G.E.C. Nomad All D.C. Receiver, only 6 months old; £12 or near offer; deposit system.—R. C. LeMan, 15, Victoria Grove, Heaton Chapel, Stockport. [4110

CHASSIS, completely wired and aerial tested, 2-valve A.C., 29/6; D.C., 28/-; with iron-core coils, A.C., 33/-; D.C., 31/-; bargain lists free.—Mains Radio Development Co., 4-6, Muswell Hill Rd., London, N.6. [4145

ARMSTRONG Latest 4v. Chassis, now incorporates 3 pentodes, 3 tuned circuits, full band-pass square peak tuning, 2½-watts undistorted output, massive layer wound mains transformer, ideal for making high quality radiogram; 84/-, with valves 118/-.

ARMSTRONG 1934 Universal 4v. Chassis, incorporating 3 tuned circuits, 9 kilocycles separation, practically superheterodyne performance, full vision tuning, combined switching, 1½ watts output; 75/-, with valves 114/-; both models fully guaranteed; 7 days' trial; demonstration any time.—'Phone: Gulliver 3105. Armstrong Co., 100, King's Rd., N.W.1. [4127

FOLLOWING New A.C. Receivers Available:—Zetavox 8-valve superhet., A.V.C., £11/11; Climax band-pass S.G., det. and pen. 3, £6/10; Zetavox 5-valve table model, £7/10; Pye K 2-valve, det., pen., £5/10; Lotus Bud, £3/15.—Inglis, Westgate Rd., Bury St. Edmund's. [4140

A.V.C. Straight 4, new monodial, or any kit or set supplied; we have established a reputation for excellent service, and solicit your enquiries. N.B.—We are pleased to take your surplus radio goods in part payment.—Macindoe and Co., 99, Waterloo St., Glasgow. [4147

50-WATT Amplifier (P.X.25s push-pull), built recently for highest quality, little used, Epoch 101½ H Domino and new unused spare diaphragm, Garrard turntable, Marconi pick-up (radio side if required), superb outfit, cost over £45, must sell; best offer over £18.—63, Elizabeth Rd., Farncombe, Surrey. [4124

"W.W." Baby Superhet, complete to specification, with valves and speaker, £11; "W.W." Magnavox Three, complete to specification, with valves, but less batteries, £3/10; Ferranti Constructor's Eliminator, 200v. 100 m.a., complete with box, £4; Tungar charger, with valve, 10/-; nearest cash offers considered.—West, 43, St. Jude's Rd. West, Wolverhampton. [4105

AMPLIFIER by Radiolab, 3-stage and rectifier, 8 watts dissipation 100–240 volts A.C. input, all resistance coupled, provision for loud-speaker, field 200 volts D.C., 4 volts A.C. for heaters of radio chassis, totally enclosed in black crystalline finished steel case, purity of tone and great volume; original price £20, my price, complete with valves, £5/10.—L. Eastwood, 70, Pitfield St., Old St., N.1. [0411

MAINS EQUIPMENT.

VORTEXION Lead Again.

VORTEXION A.C./34, used by author in construction of A.V.C. Three, as illustrated, 18/-.

VORTEXION.—Please note brown lead omitted in blue print, is screened primary connection and should be earthed to chassis.

VORTEXION, Wimbledon, for 99.9% reliable transformers.

IF You Haven't Tried Them Yet Ask Someone Who Has, or call and inspect complimentary letters.

GUARANTEED 12 Months, and within 5% normal and 2½% super models, neat shrouding, with detachable feet, as used by Government Departments, etc., etc.

VORTEXION.—New Monodial transformer, 200-250, 50 cycles, 425-0-425, 120 m.a., 4v. C.T. 3a., 4v. C.T. 1a., 4v. C.T. 1a., 4v. C.T. 6a., screen primary, open type, 20/-; shrouded, 22/-; super shrouded, 26/-; weight 14lb., carriage 2/- extra; 10 henry choke, 5/6, post 9d.; 20 henry, 8/6.

VORTEXION, for A.V.C. Straight Four, 200-250 input, 450-0-450v. 120 m.a., 4v. 2.5a. C.T., 4v. 5-6a. C.T., with screened primary, shrouded in cast aluminium to prevent hum, 23/-; with terminals on mains as in A.V.C. III, 25/-.

VORTEXION 26h. 120 m.a. choke, 140 ohms, in die cast shrouding to match; 12/6.

VORTEXION.—5-watt Monodial A.V.C. model, 400-0-400, 120 m.a., 4v. 6a., 4v. 3½a., 4v. 2a., 4v. 1a., super screened, 20/-; shrouded, 24/-.

ALL Secondaries Centre Tapped.

VORTEXION.—250-0-250 60 m.a., 4v. 1 to 2a., 4v. 2 to 4a., open type, 10/6; shrouded, 12/6; post 9d.

VORTEXION D.C.4 Choke, specified for D.C. superhet; 8/6.

VORTEXION Transformers, tested with 2,000 volts between windings.

VORTEXION.—Ferrocart III, 350-0-350, 60 m.a., 4v. 2.5, C.T., 4v. 3.5, C.T.; open type 13/6, shrouded 16/-; post 9d.

VORTEXION.—Super model for H.T.8 or 9 or 10, 4v. 1 to 2, 4v. 2 to 4; open type 14/6, shrouded 16/6; post 1/-.

VORTEXION.—350-0-350, 120 m.a., 4v. 2 to 5a., 4v. 2 to 4a., 4v. 2.5a.; open type 14/6, shrouded 16/6.

VORTEXION.—400 or 450 or 500v., 120 m.a., 4v. 2 to 5, 4v. 2 to 5, 4v. 2.5a., open type 19/-, shrouded 23/-.

VORTEXION.—400 or 450 or 500, 150 m.a., 4v. 4a., 4v. 2.5, 4v. 2, 4v. 2, 4v. 2, core size 2¼×1¼in., a superb job, 2% regulation, 35/-; shrouded with terminals, less terminals, 30/-, open type 26/-; post 1/3.

VORTEXION Auto Transformers to B.E.S.A. Specification, 100, 110, or 120v. to 200, 220 or 240 volts, 60 watts, 9/-, post 9d.; 120 watts, shrouded 12/6, open type 10/6, post 1/-; 200 watts, open 14/6, shrouded 16/6, post 1/-; 2,000 watts, £4/10.

VORTEXION 600-watt Transformers; £4/10, carriage free.

VORTEXION 30h. at 60 m.a. Chokes, 5/6; 40h. at 60 m.a., 8/6; 30h. at 150 m.a., 200 ohms, 10/6 open type, 12/6 shrouded.

VORTEXION Transformers Made to Your Specification; price according to wattage, 6v. filaments same price unless wattage grossly exceeded; special quotations by return.

VORTEXION (S. A. BROWN), 182, The Broadway, Wimbledon, S.W.19. Tel.: Liberty 2814. [4066

EXPERIMENTERS.—One only large Westinghouse metal rectifier, with mains transformer, large smoothing device, new condition, output 350 m.a. at 500 volts; offers wanted.—H. A. G., 147, Shirley Rd., Croydon. [4102

Mains Equipment.—Contd.

SERADEX Products again Specified by "The Wireless world."

KIT of Resisters for A.V.C. Straight Four, 11/4. (Seradex resisters save you 8/8 on this kit.)

SERADEX Mains Equipment List Now Ready, giving details of many types of mains transformers and chokes, also L.F. transformers, etc.

SERADEX Resistance for Television, etc.: illustrated catalogues available shortly.

SERADEX Battery Chargers, valve and Westinghouse rectified; several new models now available; send for illustrated catalogue. Trevor Pepper, 575, Moseley Rd., Birmingham. [4070

N.P. for Battery Chargers, A.C. mains; great clearance sale for one week only.—See below.

N.P.—75 volts 6 amps., 3 circuits, for 100 to 250 batteries; £11/17/6.

N.P.—28 volts 6 amps., 2 circuits, for 24 to 80 batteries; £7/4/6.

N.P.—Westinghouse rectified 24 volts 3 amps.; bargain, £8/15; absolutely unused.

N.P.—Tungar 75 volts 6 amps, new £22, bargain, £12/10; another, 15 to 8 volts, 5 to 3 amps., 65/-.

N.P.—40 volts 6 amps., 3 circuits, for 45 to 100 batteries; £9/1/6; absolutely new.

N.P. Have Several More on List; send for photographs and trade list.—Nash Products, Ltd., Stechford, Birmingham [4128

HOYNE'S Transformers and Chokes the Best Obtainable, perfect insulation, regulation and reliability.

HOYNE'S Transformers, used by many well known set manufacturers after testing all others.

HOYNE'S Transformers, fitted with tapped and screened primaries, filaments all centre tapped, stout cast aluminium clamps and clearly marked Bakelite terminal strips are fitted to all models.

HOYNE'S Components are Guaranteed for One Year; built to your own specification at very competitive prices.

HOYNE'S Components.—The components you will eventually use, start right; a dud cannot pass the Hoyne test.

HOYNE'S A.V.C. Straight Four, 450-0-450v., 120 m.a., 4v., 2-5a., 4v. 5-6a., 18/-, post 1/3; choke, 26H., 120 m.a., 140 ohms, 9/6, post 9d.

HOYNE'S A.V.C. Three, 275-0-275v. 60-70 m.a., v4. 2.5a. 4v. 4a., 12/6, post 1/-; choke, 30 henry 50 m.a., 7/6, post 6d.

HOYNE'S New Monodial Transformer, 425-0-425v. 120 m.a., 4v. 3a., 4v. 1a., 4v. 1a., 4v. 6a., 24/-, post 1/3; weight 10lb.; 10 henry choke, 6/-, post 6d.; 20 henry choke 7/6, post 6d.

HOYNE'S.—250-0-250v. 60 a.m., 4v. 1-2a., 4v. 2-4a., 10/-, post 9d.; with extra 4v. 1-2a. winding, 12/6, post 1/-.

HOYNE'S Ferrocart Model.—350-0-350v. 60-70 m.a., 4v. 2-3a., 4v. 2-4a., 12/6, post 1/-; with extra 4v. 1-2a. winding, 13/6, post 1/-.

HOYNE'S.—350-0-350v. 120 m.a., 4v. 2-3a., 4v. 4-6a., 4v. 1a., 4v. 1a., 18/-, post 1/3.

HOYNE'S.—500-450-0-450-500v. 140 m.a., 4v. 2-4a., 4v. 4-6a., 4v. 2a., 4v. 2a.; 27/6, post 1/3; weight 11lb.

HOYNE'S.—0-110-135v. 90 m.a., suitable for H.T. 6 or 7, 7/6, post 9d.; with 4v. 2-4a. winding, 9/6, post 9d.

HOYNE'S.—200v. 200 m.a., 4v. 2-4a., 4v. 1-2a., for H.T. 8; 13/6, post 1/-.

HOYNE'S Chokes, very generous cores, cotton interleaved, fitted with cast aluminium clamps and terminal strips: 30H., 60 m.a., 900 ohms, 6/6, post 9d.; 30H., 120 m.a., 400 ohms 8/6 post 1/-.

HOYNE'S Chargers and Eliminators to your Specifications; keenest prices.

HOYNE'S Line Transformers (auto-wound) tapped 0-100-110-200-220-240v., 60 watt, 8/6, post 9d.; 120 watt, 10/-, post 1/-.

HOYNE'S Advertisement Through a Clerical Error was unfortunately omitted last week.

M. J. HOYNE, Offices and Works, 8a, Gladstone Rd., Wimbledon, S.W.19 Tel.: Liberty 3303. [4115

PARTRIDGE Transformers.—Self praise is no recommendation, but repeated praise from experts is significant.

PARTRIDGE Transformers.—"Certainly above the average . . . very soundly constructed transformers," "Wireless Trader," October 16th.

PARTRIDGE Transformers.—"A sound electrical job . . . represents very good value."—"Wireless World," September 15th.

PARTRIDGE Transformers.—"Voltage regulation excellent . . . transformer remained remarkably cool."—"Radio Trade Review," May, 1933.

PARTRIDGE Transformers.—"Found to be excellent . . . designed on sound lines."—"Wireless Magazine," October, 1932.

PARTRIDGE.—250-0-250v., 60 m.a., 4v. 1a., 4v. 2-4a., 11/-; 250-0-250v., 60 m.a., 4v. 1a., 4v. 2-3a., 4v. 1a., 12/-.

PARTRIDGE.—350-0-350v., 60 m.a., 4v. 2-2½a., 4v. 2-4a., 13/6; 350-0-350v., 120 m.a., v4. 2-2½a., 4v. 3-5a., 4v. 1a., 17/3.

PARTRIDGE.—425-0-425v., 120 m.a., 4v. 2-2½a., 4v 3-5a., 4v. 2a., 20/6; 500-0-500v., 100 m.a., 4v. 2-2½a., 4v. 3-5a., 4v. 2a., 21/-.

PARTRIDGE.—500-0-500v., 120 m.a., 4v. 2-4a., 4v. 3-6a., 4v. 1-2a., 4v. 1-2a., 27/6; larger types supplied to order.

PARTRIDGE.—0-7½-9-11v., 1.2a., 9/3; 0-15-18-22v., 1.2a., 10/-; 135v. (tapped 110v.), 90 m.a., 4v. 2-4a., 10/6; 240v. (tapped 200v.), 200 m.a., 4v. 2-4a., 13/3.

PARTRIDGE.—Step-up or step-down auto transformers, 60 w., 10/3; 100 w., 12/9; others to order.

PARTRIDGE Chokes.—6H., 500 m.a., 45 ohms, 18/6; 13H., 200 m.a., 120 ohms, 11/6; 20H., 120 m.a., 320 ohms, 9/3; 30H., 60 m.a., 550 ohms, 7/9; 40H., 40 m.a., 700 ohms, 6/6; all constant inductance.

PARTRIDGE.—Service, P.A., and relay requirements a speciality; enquiries solicited; trade lists available to authorised dealers.

PARTRIDGE, N., B.Sc.(Eng.), A.M.I.E.E., A.I.Rad.E.

PARTRIDGE, N., King's Buildings, Dean Stanley St., London, S.W.1. Tel.: Vic.: 5035. [4117

GILBERT INDUSTRIES LTD.

519, London Rd., Westcliff-on-Sea, Essex.

'Phone: 492071 SOUTHEND.

NOTICE

We are disposing of the whole of the imported stock of the famous "HYDRA" (Hydrawerk) Condensers, at a fraction of the original cost.

Every Condenser is new and perfect! This is the chance of the year to buy Condensers with a name behind them at bargain prices! As these Condensers are all stock sizes, and not odd shapes and capacities, the demand will be heavy, so we advise early application. All goods are post free.

Capacity in Mfd.	Working Voltage.	Test Voltage.	List Price.	Our Price.
.1	250	500	1/6	6d.
.1	400	1,000	1/9	9d.
1	250	500	2/3	9d.
1	400	1,000	2/9	1/3
1	500	1,500	4/-	1/9
2	250	500	3/-	1/2
2	300	700	3/3	1/6
2	400	1,000	3/9	1/9
2	500	1,500	6/-	2/6
2	900	2,000	7/6	4/-
4	250	500	5/-	2/2
4	300	700	5/6	2/6
4	400	1,000	6/6	3/-
4	500	1,500	10/6	3/6
6	250	500	7/6	3/6
6	500	1,500	16/-	7/6
12 assorted high voltage tubular, from .00005 to .05				1/-

SET MANUFACTURERS SURPLUS.

Hellesens 8 mfd. electrolitics, fluid type. 435 v. working. Very limited quantity. **3/6.**

T.C.C. 3 mfd. 800 v. working. New goods, all tested. **4/6.**

A SPECIAL OFFER OF THE FAMOUS R.S. 350 TRANSFORMER.

350–0–350 at 85 mA.
4 v. 4 to 6 amp. C.T.
4 v. 2 amp. Rect. (D.W.3).

2,600 of these have been sold by us in the last 18 months, and we guarantee them out and out! 260 only are left, and we offer at **10/6** each, to make room for new stock. If you are wanting a transformer in the near future, be wise and put one by.

INTER-VALVE TRANSFORMERS.

This stuff is right! It's "Lewcos," L.F.T.6A, rato 6–1. Brand new and boxed in original carton. List price 10/-. Offered at **5/6**. L.F.T.4, ratio 4–1. As above, and listed at 6/9; **4/6**.

BAND-PASS UNITS.

Another "Lewcos" bargain. Lewcos Band-pass Filter dual coil, 210–550 m., and 1,000–2,000 m. Listed 12/-. Offered at **7/6**.

Duo Amsco two-gang condensers with trimmers, complete with disc drive, escutcheon, knob, etc., suitable for use with the above band-pass coil unit, **6/6**.

H.F. CHOKES.

Lewcos All-wave H.F. Chokes. A "Pukka" job, fully screened. Listed 6/6, and offered at **3/6**.

Standard Telephones Co., headphones. Brand new and boxed. A useful acquisition to the serious amateur and service man. Extremely sensitive and of robust construction consistent with lightness. Offered at **7/6**. (Special quotations to Churches, Hospitals, Hotels, etc.)

GILBERT INDUSTRIES CHASSIS.

A 9in. × 14in. steel chassis, with 3 chassis type valve holders. Cellulose spray finish.

A very popular line. Designed for the "fan" to design his own set on, as he likes. A good stiff job, but soft enough to work on easily. **2/9.**

AND NOW, MICROPHONES!

Having decided to enter the microphone market seriously, we have arranged to clear the following line, viz.:

First-class microphone assembly with 3in. mike, spring mounted on 12in. stand, rising to 18in, 5in. × 5in. base, incorporating on-off switch and transformer. An ideal mike for home use, recording, or P.A. work.

Each mike is boxed and is an ideal Xmas gift for the real "fan." Complete with special nickel alloy transformer, **£1** each.

RESISTANCES.

A dozen assorted 1-watt and ½-watt resistances by Dubilier, Lowe, Givrite, etc. Our assortment, but all useful values. **4/6.**

REDESIGNED A.C. ELIMINATOR KIT.

We have now made an even greater bargain of this. A new case of cellulose steel, and an even better rectifier. Mains transformer to suit your voltage, wound by us. A Gilbert Industries choke, and 4 × 4 × 6 × 1 × 1 mfd. condensers. Engraved panel, plugs, solder, wire, in fact every detail to build a £4 10s. eliminator, complete with diagram and our now well-known colour coded component scheme. 30/-

Another bargain parcel, to replace our famous "A" and "D" parcels. The "XXX" parcel.

One Gilbert Industries steel chassis, 9in. × 14in., with 3-valve holders; 1 R.S.350 mains transformer; 2-gang condenser, complete with dial and drive, etc.; 1 volume control, 1 50 hy. 50 amp. choke; 6 assorted fixed condensers; 6 assorted resistances. £1

Cash with order, C.O.D., or "W.W." deposit system. Gilbert Industries usual courteous attention extended to all customers, large or small, and all orders carriage paid.

Mains Equipment.—Contd.

TANTALUM for A.C. Chargers, H.T. and L.T.—Blackwell's Metallurgical Works, Ltd., Garston, Liverpool. [3448

A.C. Charging Plant (new), output 40 volts 6 amperes; listed £18/18, accept £8.—Jersey, Cumnor Hill, Oxford. [4131

"DULCI" Unused D.C. Eliminators, 25 milliamps output, 13/- each; B.T.H. pick-up tone arms, 3/-; post paid, cash with order or c.o.d.—Ward, 12, Tredegar Rd., Bow, E.3. [4158

A.C. or D.C. Chargers for 2 to 200 Cells at Low Prices; state requirements; dynamos and rotaries in stock, all sizes; Brown's Generometer, battery superseders for H.T. for 2v. or 6v. input, 37/6 and 52/6; television and sewing machine universal motors, 25/-; lists.—Electradix Radios, 218, Upper Thames St., E.C.4. [0398

CABINETS.

RADIO-GRAM Cabinets; fully illustrated list free; remarkable values.—Gilbert, Cabinet Maker, Swindon. [1686

MANUFACTURER'S Clearance Lines of Cabinets for Radiograms, loud-speakers, and radio sets; hundreds to select from; send us particulars of your requirements, giving size of set, etc.—H. L. Smith and Co., Ltd., 289, Edgware Rd., London, W.2. [3852

EPTON.—First again with Xmas bargains! Just arrived! Botolph Consolette cabinets, polished figured walnut, black contrast edging to speaker fret, handsome design (15¼×13¼×8½), 10/9; Philco polished walnut cabinets, undrilled (15×12½×7¼), 10/6; Philomel cabinets, black contrast edging to speaker fret (15¼×15½×9½), 8/9.—Epton, 93, New Rd., Chingford, E.4. [4141

COILS, ETC.

COILS.—2 K.B.L.C. ganged to K.T.A.1 and K.T.A.2.—Box 8739, c/o *The Wireless World*. [4096

DYNAMOS, ETC.

M-L Heavy Duty H.T. and L.T. Motor Generator Set, perfect condition; stamp, particulars; no reasonable offer refused.—Darnton, Sissinghurst, Cranbrook. [4136

ROTARY Converters, 220 volts D.C. to 200 volts A.C., capacities up to 0.44 K.V.A.; from £4/10.—Milo Engineering Works, Milo Rd., East Dulwich, S.E.22. 'Phone: Sydenham 4422. [4046

GRAMOPHONES, PICK-UPS, ETC.

FOR Perfect Gramophone Recording Plants apply Dennis, 49, Church Lane, Hornsey, N.8. [4150

IS Your Woodroffe Pick-up Still Giving Satisfaction? Complete overhaul costs 7/6; pick-ups (2 years' guarantee) at 25/- each.—J. B. Woodroffe, 93, Harwood Rd., S.W.6. [4157

LOUD-SPEAKERS.

H.D. Radio Electrical Service Offers Surplus of a Set Manufacturer, every article guaranteed new.

MOVING Coil Speakers, Magnavox type D.C.144, 2,500 ohms or 7,500 ohms complete with transformer at 19/-; type D.C.142, same voltages, at 26/-; all fitted Dumbuckers; all goods carriage paid; cash with order or c.o.d.—No. 9, Kingly St., London, W.1. Regent 6240. [3880

ATLAS P.M. M.C. Speakers (2), boxed and as brand new; list 42/-, 27/6 each.—143, Park Lane, Birmingham, 6. [4095

FOR Sale, speakers, W.B. P.M.11.A., Marconi P.M.93, Amplion Lion.—Apply Hunter, Southfield, Garmouth, Morayshire. [4106

BAKER Selhurst Super Power Speaker, D.C. field, 9½in. cone, cost £8, almost new and perfect; £3, or nearest offer.—23, Holborn St., Rochdale. [4101

AMERICAN Rola, 10in., fitted A.C. energising, nice deep tone, £2; also Magnavox, fitted A.C. energising, in attractive solid oak cabinet, 45/-.—White House, Rosehill Parkwest, Sutton, Surrey. [4100

EPTON First Again with Xmas Bargains! Bullphone moving iron speakers, in handsome polished walnut cabinets, fine tone, 10/6; Triotron loudspeaker units, power type, extra large magnets, 8/11.—Epton, 93, New Rd., Chingford, E.4. [4143

30/- !!!—B.T.H. R.K. moving coil speakers, 6in. cone, new and unused, guaranteed; these speakers are the type as used in cinema sound equipment, suitable for public address work; weight 30lb., and vastly superior to the cheap speakers now on the market, 100 volts, 150 volts, and 200 volts D.C.

27/6 !!!—6-volt D.C. speakers, as above; £2/7/6 speakers as above for 100-250 volts A.C., complete with field rectifier.

B.T.H. Transformer, brand new, ratios 1-1, 2-1, 20-1, and 30-1 microphone; 7/- each.

CARRIAGE Paid, cash with order, or c.o.d.—Ward, 12, Tredegar Rd., Bow, E.3. Tel.: Advance 3668. [4092

RADIO AGENCIES Have for Disposal New Moving Coil Speakers, all guaranteed, sealed cartons, all worth three times the advertised prices, real hefty jobs; Magnavox "X" Core (U.S.A.) Juniors 7½in. cones, 120/170 volts, (2,500 ohms), 110/175 volts (2,000 ohms), 200/250 volts, 6,500 ohms, at 18/-; Seniors, all above voltages, 8¾in. cones, at 25/- (state if power or pentode transformer); Rola's K. type (U.S.A.) (all voltages, as in Magnavox), Juniors, 7½in. cones, at 18/-; Seniors, same voltages, 9in. cones, at 25/- (state if power or pentode transformer); also number Junior and Senior permanent magnets, class "B" and Duals; all goods carriage paid cash with order or c.o.d.—Radio Agencies, No. 37, Albemarle St., London, W.1. [4155

AMERICAN Rola M.C. Speakers. K. type, 2,000, 2,500, and 6,500 ohms standard model 7½in. cones 18/-; Senior 9in. cones, at 25/-; P.M.s Standard and Seniors also in stock, cobalt magnets; state power or pentode when ordering; dual-balanced pairs matched to customers' requirements; P.M. Midgets, multi-ratio transformers, 17/6; special, P.M.s, 7½in. cones, in patent baffle cabinet, black leatherette finish, at 32/-, wonderful tone, reproduction crisp, no high note loss, and a drum sounds like a drum, not a tin kettle; also supplied for class B., 2/- extra, makes a battery job sound like a mains set; all goods carriage paid, cash with order or c.o.d. Not sure which speaker will do your job best, send stamped addressed envelope and get real honest advice—K.C. Radio Electric, 14, Handel St., London, W.C. [4067

TRANSMITTERS.

SPECIAL Double Spaced 0.0003 Low Loss Variables, 2/6; all brass "Hamband" microvariables, 2/-; B.T.H., new, 720c., 140 m.a., 45/-; second-hand 2,000v. Mackie, 45/-; ditto, M-L rotary 12v. input, 1,000v. 100 m.a., 65/-; bakelite, polished black, ⅜in., 40in.×20in., cost £4, snip, 10/-.—G5NI, Radiomart, 19, John Bright St., Birmingham. [4135

VALVES.

8/9—Ostar Ganz valves, any type; buy a spare set while our stocks last, state type and voltage required: c.o.d., postage paid.—Kay, 167, City Rd., London, E.C.1. [3814

EPTON Leads Again! This week's bargains:—A.C. detectors: Tungsram AR4100, Triotron W415N, Vatea RV4100, 4/9 each; many other non-ring valves.—Epton, 93, New Rd., Chingford, E.4. [4142

SPECIAL Offer.—Valves by world-famous Continental manufacturers, fully guaranteed, screen grid, variable mu screen grid, high magnification screen grid, low magnification screen grid, H, HL, L; all the above standard mains type, 4/6 each.—Premier Supply Stores, 20-22, High St., Clapham, S.W.4. Macaulay 2188. [3911

ALL Types of Brand New American Valves in Stock, first class makes, guaranteed; 247, 235, 224, 244, 236, 242, 238, 46, 59, 89, 2A.7, 12/-; 80, 45, 226, 227, 8/-; 250, 281, 210, 17/6; post paid, cash with order or c.o.d.; enquiries for all other types invited.—Ward, 12, Tredegar Rd., Bow, E.3. 'Phone: Advance 3698. [4159

NEWMAN, the Valve Man!—Just arrived, 2,000 brand new latest type American valves, all boxed, guaranteed R.C.A. manufacture; 235 11/-, 224 12/-, 236 13/-, 247 13/6, 237 13/-, 233 15/3, 245 8/-, 244 14/-, 227 8/-, 226 6/-, 280 8/-, 242 14/-, 232 13/6, 6A7 16/-, etc., etc.; send us your enquiries, prompt attention for cash or c.o.d.—Newmans, 309, Roman Rd., Bow, E.3. [3882

COMPONENTS, ETC., FOR SALE.

R.

SELECTED Parts for Sale, as new, any c.o.d. or "Wireless World" deposit system, which we recommend if in doubt as to the splendid value offered; we take risk of damage in transit to customers; goods tested for callers and guaranteed.

RADIOPHONE 2-gang, with drive complete, less cover, 8/6; Colvern S.W. intermediates, 4/9; Dubilier 2×2, 500v. working, 1/9 each to clear; Wearite superhet coils, no pigtail, 4/-; Lewcos extenser oscillator, 3/6; Varley P.P. pentode choke, 10/-; pair Varley P.P. transformers, separate, G.B., 25/-; Heayberd H.T.7 transformer, 6/-; Varley Nicore 1, 9/-.

VARLEY Auto. 7-1 Transformer, 9/-; R.I. adjustable chokes, second-hand, 200 m.a., 15/-; R.I. L.T. chokes, second-hand, 2/6; Edison Bell 50H. 100 m.a. choke, 7/6; Gecophone L.F. choke, 3/-; R.I. 25H. 30-60 m.a. choke, second-hand, 5/9; Wearite antimobo units, 2/6; Telsen multi ratio output transformer, 9/15/22-1, 6/-.

BRITISH GENERAL Output Transformers, multi ratio, 4/-; Sterling shrouded 30H. 30 m.a. chokes, 4/6; Telsen Power grid 40H. 6 m.a. choke, 4/6; 40H. 4 m.a., 3/-; Igranic C.40 choke, 5/-; Igranic Midget L.F. transformer, 5/-; Marconi 4-1 Ideal transformer, 5/6; 2.7-1 ditto, Bulgin 32H. choke, 4/-; Polar 0.0001 Q.J. condenser, 3/6, new.

TELSEN 350v., 2 4v. windings, mains transformer, 7/6; Ekco ditto, Igranic 250v., 4v. 5 amp., 7/6; Savage 460v., 4 4v. L.T., 20/-; Polar 3-gang tub, trimmers and cover, 5/9; Astra 2-gang, 4/6; R. and A. 100 speaker, M.C., P.M., with multi ratio transformer, 25/-; Epoch P.M. G speaker, 17/6.

SPECIAL Offer of 3v. and Rectifier (valve) Chassis, from Yagerphone, all guaranteed, new and very well made; chassis only, 50/-; with valves, 90/-; carriage forward.

B.T.H. Junior Speaker, 6in corrugated cone, with separate B.T.H. rectifier, 60/-; B.T.H. 200/250v. D.C. speaker junior, with transformer, 18/6; Philips 6-amp. charger, No. 366, 60/-; Ferranti portable meter, 200 ohms per volt, 250v., 10v. 100 m.a., 40/-.

TRANSFORMERS.—Ferranti C.P.M.1c, 16/6; O.P.M.5, 13/6; B.1 choke, new, 13/-; B.1 choke, used, 10/-; Lissen 23-1 output transformers, 6/-.

TO Clear.—Mullard H.T. unit, 150v. 20 m.a., 25/-; Amplion P.A. mike, 40/-; Ekco 4T.60 D.C. unit, 150v. 50 m.a., 25/-; Igranic mains transformers, half wave, 550v. 60 m.a., 7.5v., 7.5v., new, 6/-; ditto, full wave, 250v. 100 m.a., 4v. 1 amp., 7/6; Brown Vee units, new, 9/6; Triotron 8 mf. wet electrolytic, 440v. working, 3/6.

RYALL'S Mains Transformers, 250v. 60 m.a., 4v. 1 amp., 4v. 3 amp., 10/6; 350v., 12/9; 4v. 3-5 amp., 8/9; 4v. 3 amp., 6/9; chokes, 20H. at 100 m.a., 8/9; 15H. at 60 m.a., 6/9; resistance 230 ohms, 25H. at 60 m.a., 6/9; resistance 430 ohms, 40H. at 100 m.a., resistance 600 ohms, 10/6.

HELSBY Non-inductive Bakelite Condensers, new, 250v. working, 4 mf. 3/-, 2 mf. 2/-; R.I. O.P.P. input transformers, 9/6, second-hand; Ferranti large safety boxes, 9/6; Amplion B.A. cone speaker, in solid oak, 18×18, 15/-.

LAMPLUGH Senior D.C. Speakers, 8½in. cone, 2,200 ohms, 13/6; Collaro A.C. motor, with pick-up, complete unit, 52/6.

PAIRS New Solar Twin S.M. Thumb Drive, 0.0005, complete, 12/6; Cyldon 0.0005 double thumb twin extenser, 15/6; Cyldon single 0.0005 extenser, 7/6; Ready Radio 0.0005 extenser condensers, new, 2/-.

T.C.C. 2 mf., 350v. working, 1/6; T.C.C. 0.01, mica, type M., 1/-; T.C.C. 4×4 mf., 4/-; H.M.V. 4×4 mf., 3/6; T.C.C. 4×4×1×1×½ mf., 4/9; H.M.V. ditto, 4/-; all 250v. working; Triotron, 8 mf., 450v. working, 3/6, electrolytic; T.C.C. 250 mf., 100v. working, 8/6; T.C.C. 500 mf., 40v. working, 6/6.

POLAR Star Senior 3-gang Condensers, new, 15/-, with drive, 16/6; Radiophone 3-gangs, complete with cover, drive, etc., new, 15/9; Radiophone 4-gangs, 8/6, with cover, drive, and all fittings, 17/6; Radiophone 4-gang super het, type, fully screened with trimmers, Radiopack type, 9/-, post 9d.; Lotus fully screened 4-gangs, new, trimmers on top, 15/-.

SUITCASE Type Cases, in best crocodile leather, 14×14×8, ample room for 12in. turntable and pick-up, 10/-.

RYALL'S RADIO, 33, Chancery Lane, London, W.C.2 (nearest Tube, Chancery Lane; 'bus 67 passes door, or tram to Savoy St.). Holborn 3529. Open Saturday afternoon. Close 7 p.m., Saturday 6 p.m. Thursday closed 1 o'clock.

R. [4112

Components, etc., for Sale.—Contd.

PREMIER.

PREMIER SUPPLY STORES Offer the Following Set Manufacturers' Surplus New Goods at a Fraction of the Original Cost, all goods guaranteed perfect, carriage paid over 5/-, under 5/- postage 6d. extra (Ireland, carriage forward).

ELIMINATOR Kits, including transformer, choke, Westinghouse metal rectifier. T.C.C. condensers, resistances and diagram, 120v. 20 m.a., 20/-; trickle charger 8/- extra; 150v. 30 milliamps, with 4v. 2-4 amps. C.T., L.T., 25/-; trickle charger, 6/6 extra; 250v. 60 milliamps, with 4v. 3-5 amps. C.T., L.T., 30/-; 200v. 100 milliamps, with 4v. 3-5 amps. C.T., L.T., 49/6; 300v. 60 milliamps, with 4v. 3-5 amps. C.T., L.T., 37/6; 150v. 50 milliamps, 27/6.

T.C.C. Condensers, 750v. working, 2 mf., 3/6; 4 mf. 6/-, 4 mf. 450v. working 4/-, 250v. working 1 mf. 1/3, 2 mf. 1/9, 4 mf. 2/6; aqueous electrolytic, 440v. working, 4 mf. 3/-, 8 mf. 3/6.

ALL the Following Lines 6d. each or 5/- per dozen; 4- and 5-pin chassis mounting valve holders; shielded screen grid or pentode leads, 1-watt wire end resistances, any value; 0.1 condensers; on-off switches, push-pull; polar ganging devices; 0.02 condensers, 0.5 condensers, 0.01 condensers, 0.2 condensers.

POLAR 3-gang 0.0005 Condensers, split end vanes, totally screened disc drive; 6/11.

AMSCO Triple-gang, 0.0005 Condensers, with trimmers, 4/11.

T.C.C. Electrolytic Condensers, 100 volts working, 15 mfd.; 1/3.

PREMIER Chokes. 40 m.a., 25 hys., 4/-; 65 m.a., 30 hys., 6/-; 150 m.a., 30 hys., 10/6.

PYE Chokes, 20 or 32 hys., 4/-; Premier multi-ratio output transformers, giving 15 different ratios; 7/6.

HIGH Inductance Chokes, resistance 2,500 ohms; 80 henrys, 60 m.a.; 5/6.

WESTINGHOUSE Metal Rectifiers, 120v. at 20 m.a., 6/6; 200v. at 30 m.a., 8/6; 200v., 60 m.a., 10/-.

HARLEY Pick-up, complete with arm and volume control; 12/6.

BRITISH RADIOPHONE Wire Wound Potentiometers, with mains switch incorporated, 5,000 ohms, 10,000 ohms, 50,000 ohms, 10,000 ohms, any value; 3/6.

KOLSTER BRANDES Gramophone Motors, dual type, can be worked by clockwork or mains, induction type 100-250 volts, 25/-; complete with all fittings and turntable.

MAGNAVOX D.C. 154, 2,500 ohms, 17/6; Magnavox D.C.142, 1,000 ohms, 21/-; all complete with humbucking coils; please state whether power or pentode transformer required; A.C. conversion kit for either type, 10/-.

SPECIAL Offer.—Microphones by prominent manufacturer, high sensitivity, uniform response, complete with stand, transformer and battery; listed £3/15; our price 18/6.

PREMIER British Made Meters, moving iron, flush mounting, accurate; 0-15, 0-50, 0-100, 0-250 milliamps., 0-1, 0-5 amps., all at 6/-.

ORMOND Condensers, 2-gang, semi shielded, 2/6; wire wound potentiometers, 15,000 ohms, 1/6.

SPECIAL Offer of Mains Transformers, manufactured by Philips, input 110-115v. or 200-250v., output 180-0-180 volts, 40 m.a., 4v. 1a., and 4v. 3a., 4/6; 200-0-200v., 4v. 1a., 4v. 3a., 4/6.

ALL Premier Guaranteed Mains Transformers have engraved terminal strips with terminal connections, input 200-250 volts, 40-100 cycles, all windings paper interleaved.

PREMIER H.T.8 Transformers, 250v. 60 m.a., rectified, with 4v. 3-5a. C.T., L.T., and screen primary, 15/-; with Westinghouse rectifier, 25/-.

PREMIER H.T.9 Transformer, 300v. 60 m.a., rectified, with 4v. 3-5a. C.T., L.T., and screened primary, 15/-; with Westinghouse rectifier, 26/-.

PREMIER H.T.10 Transformer, 200v. 100 m.a., rectified, with 4v. 3-5a. C.T., L.T., and screened primary, 15/-; with Westinghouse rectifier, 26/-.

DOUBLE Spring Motors, made by Garrard, play five sides of 10in. record, complete with turntable and all fittings; 17/6.

SPECIAL Offer.—Accumulator chargers, input 200-250v. A.C. to charge 2- and 4-volt accumulators at ½ amp.; owing to the high efficiency of the silver oxide rectifier employed charger may be used during broadcast; 9/6 each.

CENTRALAB Potentiometers: 50,000, 250,000 and 500,000 ohms, 2/- each; ditto, wire wound, 200 ohms and 400 ohms, 1/-.

A FEW More Only.—Western Electric 4211E's and 4211D's, 15/-; 4212's, £3; callers only.

WESTERN ELECTRIC Mains Transformers: 500-0-500v. 150 m.a., 4v. 3-5 amps., 4v. 2-5 amps., 4v. 2-3 amps., 4v. 1 amp., C.T., 4v. 1 amp., C.T.; 19/6.

RELIABLE Canned Coils with circuit; accurately matched, dual range; 3/- per coil.

PREMIER L.T. Supply Units, consisting of Premier transformer and Westinghouse rectifier, inputs 200-250 A.C., output 8v. ½ amp., 13/6; 8v. 1 amp., 17/6; 15v. 1 amp., 19/-; 6v. 2 amps, 27/6; 30v. 1a., 37/6.

PREMIER Mains Transformers, output 135v. 80 m.a., for voltage doubling, 8/6; 4v. 3-4a., C.T., L.T., 2/- extra; Westinghouse rectifier for above, giving 200v. 30 m.a., 8/6.

PREMIER Mains Transformers, output 250-0-250 volts 60 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 1-2a. (all C.T.), with screened primary, 15/-.

PREMIER Mains Transformers, output 350-0-350 volts, 90 m.a., 4v. 3-5a., 4v. 2-3a., 4v. 1-2a. (all C.T.), with screened primary, 15/-.

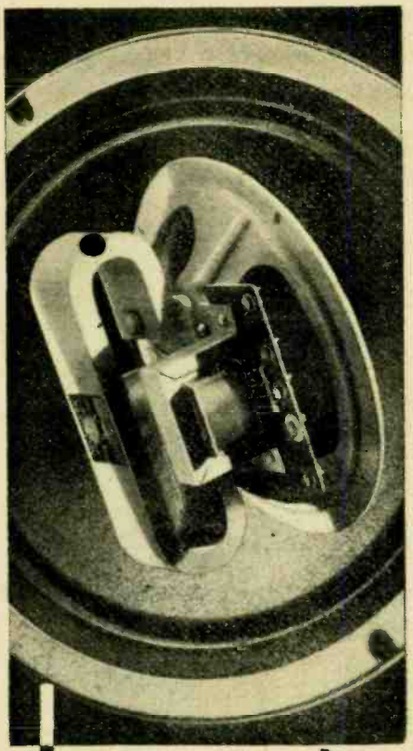
PREMIER Mains Transformers, output 400-0-400 volts, 100 m.a., 4v. 4-5a., 4v. 2-3a., with screened primary; 15/-.

PREMIER Auto Transformers, 100-110/200-250 volts or vice versa, 60-watt, 7/9; 100-watt, 10/-.

SPECIAL Offer of Manufacturers' Type Transformers, any input, output 250-0-250 volts, 60 m.a., 4v. 1a., 4v. 3a. (both C.T.), 8/6; H.T.8 transformer, with 4v. 3-4a. (C.T.), 8/6; with rectifier, 18/6.

MAGNAVOX P.M. Loud-speakers, 7in. cone, 18/6; please state whether power or pentode transformer required.

(This advertisement continued in third column.)



It must be MAGNAVOX

There is always a demand for a de-luxe speaker, and it is that demand which the Magnavox P.M. "Senior" Model at £3.3.0 so completely fills.

Based on the unique Magnavox experience of 22 years' standing it is—only naturally—the finest P.M. speaker obtainable.

The same exclusive qualities are found in the P.M. "Standard" Model—perfection in a smaller speaker—and this costs 37/6; both models, of course, being fitted with universal transformers, for Class "B," etc.

You can buy cheaper speakers, but if you are to feel really confident and happy about your purchase there can be no alternative—it MUST be MAGNAVOX.

"SENIOR" MODEL
£3 . 3 . 0
"STANDARD" MODEL
£1 . 17 . 6

BENJAMIN

The Benjamin Electric Ltd., Tariff Road, Tottenham, N.17.

Components, etc., for Sale.—Contd.

(This advertisement continued from first column.)

GRAMPION P.M. Loud-speakers, 9in. cone, handles 4 watts; 18/6.

GRAMPION M.C. Loud-speakers, 2,500 ohm field, 9in. cone, handles 6 watts; 21/-.

H.M.V. Condenser Blocks, 4×4×1×1×0.5, 250v. working, 3/6; ditto, 400v. working, 5/6.

ELLIOT First-grade Moving Coil Meters, 0-30, 0-50, 0-100, 0-150 milliamps, projecting types, 15/- each; 0-100, 0-150 milliamps, flush types, 17/6 each.

B.T.H. Induction Type (A.C. only) Electric Gramophone Motors, 100-250v.; 30/- complete.

AMPLION Moving Coil Speakers, type E.M.644, dual fields 2,500 and 5,000 ohms (100 and 200v.), with output transformer, 12/6; A.C. conversion kit for this speaker, 10/- extra.

WESTERN ELECTRIC Condensers, 250v. working, 1 mfd. 6d., 2 mfd. 1/-; 500v. working, 1 mfd, 1/-.

T.C.C. Condensers, 250v. working, 4×4×1 mfd., 3/6; 6×4×2×2×2 mfd., 375v. working, 6/11; 4×4×1, 6/-.

SPECIAL Offer of Wire Wound Resistances.—4 watts any value up to 10,000 ohms, 1/-; 8 watts, any value up to 15,000 ohms, 1/6; 15 watts, any value up to 1,000 ohms, 2/-; 25 watts, any value up to 50,000 ohms, 2/6; 50 watts, any value up to 50,000 ohms, 3/6.

PREMIER SUPPLY STORES, 20-22, High St., Clapham, S.W.4. Macaulay 2188. Closed 1 o'clock Wednesdays, open to 9 o'clock Saturdays. Nearest Station, Clapham North Underground.

PREMIER. [4156

WOBURN RADIO offer following New and Bankrupt Stock:—

FERRANTI Multi Ratio Output Transformers, 18-1, 23-1, 32-1, centre tapped, at 4/11; Class B Driver and Choke, 9/6 per pair, with valve and 7-pin valveholder, 22/-; S.T.500 Coils, 5/6 per pair; Wego 750v. test Condensers, 1mfd. 1/-, 2mfd. 1/3, 4mfd. 2/4; Siemens .01×0.1mfd. and 0.1×0.1mfd. 3,500v. test 1/7, 4mfd. 750v. test 2/4; T.C.C. 0.1mfd. 350v. working 9d.; Tubular Condensers, 1,500v. test .001, .0001 and .00015mfd., 1/3 half dozen; Clix 4- and 5-pin valve holders, 1/3 half dozen; Edison Bell R.C.C. Units, 1/- each; Resistances as last week; H.F. Chokes, 10d.; Binocular Chokes, 1/3; 4 watt Resistances, 50,000 and 100,000, 9d.; Dur-Amsco (ILM.V.) 3-gang condensers, with drum drive calibrated in wavelengths, with trimmers, 7/-; Dur-Amsco 2-gang with trimmers, 4/6; Centralab Volume Controls with switch, 20,000, 2/-; Clarostat Ganged Volume Controls, with switch, 2×50,000, 3/-; A.V.C. 3 Kit, £8; S.T.500 Kit, 52/6; let us quote for parts.—Woburn Radio Co., 7, Woburn Buildings, W.C.1. Euston 1571. (Near Euston Station, back of St. Pancras Church.) [4129

T. W. THOMPSON and Co., 14-17, Strutton Ground, Westminster, S.W.1.

PHILIPS 1-watt Resistances, full range from 400 ohms up to 100,000 ohms, 6d. each, post free.

ELECTRIC Light and Power Meters, for A.C. mains 200/250 volts, 50 periods; no more wondering as to the amount of current this or that article is consuming; useful for checking consumption of sub-let flats, charging plants, motors, wireless apparatus, or anything using electricity; a few shillings will save pounds; makers, Westinghouse, and other well known firms; cost £4/18 each, to clear 6/- each, post 1/3; jewelled pivots.

FAY Broadcast Microphones, complete with stand and transformer, highly sensitive; listed 3 guineas, to clear, brand new, 15/6, post 1/-.

WESTON 0-100 Milliampmeters Moving Coil; 17/6 each, post 6d.

MILLIAMPMETERS, brand new, ranging from 20 to 100 milliamps; 5/6 each, post 9d.

0-1 Milliamps High Grade Moving Coil; 27/6 to clear.

JUST Obtained, large batch of moving coil speakers, 200/250 volts mains; list 37/6, to clear 18/6, post 9d.

PERMANENT Magnet Type, list 37/6, to clear 21/-, post 9d.; will stand 5-6 watt undistorted output.

T. W. THOMPSON and Co., 14-17, Strutton Ground, Westminster S.W.1. (See display advertisement on page 12.) [4162

MILDMAY RADIO EXCHANGE Offers the Following, sound and perfect:—

MARCONI A.C. Mains Radiogram, type 330, listed £30/9 1933 catalogue, complete with Marconi valves, in solid oak cabinet, moving coil speaker, etc.; £14.

ALBA A.C. Mains Radiogram, 1933 model 70, Band Pass tuning, Using Mullard valves, types M.H.4V., S.4V.A., P.M.24M., D.U.2, Rola moving coil fitted, very fine job, £14.

HAMPTON 6-valve A.C Mains Receiver, Band Pass tuning, with 2 stages, Var. mu detector and 2 A.C. Pens in push-pull, Senior type Rola speaker fitted, in walnut cabinet, Mazda valves supplied; £10.

1934 H.M.V. 7-valve Superhet, A.V.C., second-hand, with valves, very fine condition; £14.

READY Radio Meteor Screen Grid Kits, in sealed boxes, with Mullard valves, moving coil speaker and cabinet; £3/15/- listed £8/17/6.

GARRARD Type A.C.4 A.C. Mains Motors, with automatic plate, stop and start; 32/6.

COLLARO Combined A.C. Motors, with pick-up and volume control, fully automatic, stop and start, 39/6; Collaro Empire model, A.C. motor, less pick-up, 37/6.

ALL the Above Carriage Paid.

PHONE: Clissold 5001.

OPEN Thursday, Closed Saturday All Day.

24, Mildmay Grove, London, N.1. [4118

Components, etc., for Sale.—Contd.

SOUTHERN RADIO'S Wireless Bargains.—Set manufacturers' guaranteed surplus.

MAINS Transformers.—250-0-250 volts 60 m.a., 4v. 1a., 4v. 2-4a., 11/-; 250-0-250 volts 60 m.a., 4v. 1a., 4v. 2-3a., 4v. 1a., 12/-; 350-0-350 volts 60 m.a., 4v. 2-2½a., 4v. 2-4a., 13/6; 350-0-350 volts 120 m.a., 4v. 2-2½a., 4v. 3-5a., 4v. 1a., 16/-; 500-0-500 100 m.a., 4v. 2½a., 4v. 3-5a., 4v. 2a., 19/-; step-up or step-down transformers, 0, 100, 110, 200, 230 and 250 volts, 60 watt output, 12/6; 100 watt output, 14/9.

SMOOTHING Chokes.—20 henrys, 120 m.a., 320 ohms, 8/9; 50 henrys, 60 m.a., 500 ohms, 7/8; 40 henrys, 40 m.a., 700 ohms, 6/6; Ferranti chokes, 20 henrys, 60 m.a., centre tapped, 6/9 (list 21/-).

ALL-MAINS Transformers and Chokes Guaranteed for 12 Months, specials quoted for and delivery given within 3 days of order

VARIABLE Condensers.—Lotus 2-gang 0.0005 complete with dial, knob, escutcheon, 8/6; all ganged condensers are fully screened with trimmers, and boxed; Lotus Dyblock single variable condensers, 0.0005, complete with dial, escutcheon, etc., 4/9 (list 9/6); Hydra block condensers, new, 16 mfd., 2+2+8+2+1+1, 1,000 volt test, 7/- each; 4 mfd., 2/6; 2 mfd., 1/9; 1 mfd., 1/-; T.C.C. 4 mfd. electrolytic, 440 D.C. working, 3/- each; Hellesens 8 mfd. electrolytic, 3/9 each; block condensers, 1,500 volt, with terminals, 10 mfd. (2+2+2+2+1+1), 8/3; 20 mfd. (2+2+2+2+2+2+2+1+1+1+1), 12/9.

SPEAKERS.—Permanent magnet speakers, 7in. cone, 28/- (listed 49/6); D.C. mains energised, 2,500 to 6,500 ohms, complete with humbucking coils and transformers, 16/6 (list 39/6); 7 Magnavox moving coil D.C., 2,500 ohms, 18/- each (list 39/6); G.E.C. Stork speakers, complete in magnificent cabinet, 19/6 (listed £3/15); Ormond speakers, complete in cabinets, 10/- (listed 25/-); Blue Spot, 100U, 13/6 (list 39/6)

FAMOS 4-pole Loud-speaker Units; 7/- (listed 29/-).

CONSTRUCTORS' Kits.—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 £5/7/6); Universal Radio 3-valve kits, ready assembled on chassis, 12/6 (listed 45/-).

READY RADIO "303" A Kits, complete with cabinet, M.C. speaker, less valves, £2/5; with 3 Mullard valves (P.M.1L.F., P.M.2D.X., P.M.2), £3/5 (list £6/17/6).

READY RADIO Meteor "A" 3-valve Screen Grid Kit, complete with cabinet, M.C. speaker, less valves, £3/7/6; with 3 Mullard valves (P.M.12A., P.M.2D.X., P.M.2A.), £4/10 (list £8/7/6).

READY RADIO S.T.400 Kits, as specified by Scott Taggart. £2/19/6 each (list £4/17/6); Mullard Radio for Million 3-valve battery kits, complete with 3 Mullard valves, £3/3 (list £6/2/6), all kit new, in original sealed cartons.

B.T.H. Senior Pick-ups, 1934 model, with volume control, 23/- each (list 37/6); Marconi pick-ups, 1934 Model No. 19, 25/- (list 32/6); H.M.V. volume controls, 1/6 each (list 12/6); Radiophone volume controls, with switch, 3/- each (list 10/6); Amplion loud-speaker units, 2/3 (list 12/6).

RECEIVERS.—Burgoyne 3-valve transportable, complete with 3 Cossor valves, batteries and accumulator, £3/2/6, 4 only; latest Class B.3 Burgoyne, complete with 3 valves, batteries, accumulator, moving coil speaker, in latest oblong cabinet, £5/5, new, in original cartons.

WE Have Purchased the Liquidated Stock of a Large Northern Manufacturer and Factor, and offer the following special bargains:—

DUBILIER 4 mfd. Condensers (2+1+1), 1,000 volt test, 2/9 each; 4.5 mfd., 1,000 volt test (2.25+2.25), 3/- each; mains switches, 3 amp. 250 volt, 8d. each, 7/6 dozen; Lumophon D.C. mains energised moving coil speakers, 6,500 ohms, with terminals, 11/6 each (listed 39/6); Pifco All-in-One radiometers, latest bakelite case, 9/3 each (list 12/6); Ferrocart coils, F1, F2, and F3, G1, G2, and G3, 32/- per set; S.T. 4-500 coils, 5/6 per pair; Kolster-Brandes dual motors, for 100-250 volts, A.C. or clockwork, complete with all accessories and turntable, 25/- each (list 95/-); Edison plugin inductance coils, all values from 20 upwards, centre tapped, 9d. each, 7/6 per dozen, assorted values; every article new.

ALL Goods Guaranteed and Sent Carriage Paid.

BRANCHES at 271-275, High Rd., Willesden Green, N.W.10, and at 46, Lisle St., W.C.2; 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. [4146

METERS Moving Coil, Weston 301; 10 m.a. and upwards, 22/6; Galvos 30-0-30, 27/6.

NEW British Made, 1 m.a., 27/6; 250 volts (1,000 w. per volt), 32/6; Turners 20 m.a. upwards, 17/6; thermo ammeters, 1.5a, 22/6; French 3-range, 3 m.a., 6v., 240v., 22/6; 2-range, 2 m.a., 240v., 20/-; German 2 m.a., 25/-; 2,000 volts, 32/6; assorted makers, 25 m.a. and upwards 10/6; laboratory apparatus in stock; meter repairs a speciality.—The Victa Electrical Co., 47, High St., Battersea, S.W.11. 'Phone: Batt. 0780. [0355

FERRANTI A.F.5, perfect condition; 17/6.—Chandler, 70, Deyncourt Gardens, Upminster, Essex. [4121

A.F.5, 12/6; A.F.6, 14/-; O.P.M.1, 7/6; 2-valve A.C. set, complete, 25/-; P.M. speaker 12/6.—Wallis, 58a, Endlesham Rd. S.W.12. [4116

PEPPER'S Final Clearance Lists Now Available; all goods guaranteed; the following are only a few examples of our value:—

FERRANTI A.F.7 15/-; O.P.1, 7/6; O.P.M.5, 9/11; Ferranti 3-gang condenser, as new, 19/6; A.F.15c, O.P.M.16c, for Class B, 15/- each.

MILNES H.T. Unit, good condition, cost £4/14; £1/19/6 carriage fwd

MANY Other Bargains in our List.—Pepper, 575, Moseley Rd., Birmingham [4071

1-WATT Carbon Resistances, 500 ohms to 1 megohm, 1½d., 1/- dozen, plus postage, special for quantities.—54, Herne Hill Rd., S.E.24 [4035

Electradix Bargains

METERS, TESTERS, CHARGERS

Meters. All Ranges and Types in stock.

The Dix-onemeter

The ideal of multi-range, moving-coil meters. Built to first-grade British Engineering Standard. 50 ranges in one meter. Measures Microamps to 20 amps., millivolts to 1,000 volts, 50 ohms to megohms. Six Terminals. Two clear scales, mirror and knife-edge pointer for accurate reading. Complete in case, 60/-. (Multipliers extra.)

Testers. No. 108, with moving-coil meter and graded Rheo., 12/6. Silvertown astatic horizontal galvos, jewel pivots, 7/-. Sifam polarised Central Zero Ammeters, 303 amps., 7/-. Recording Graph. Voltmeters, £4 10s. Cambridge meters for Pyrometers to 1,200 cent., 35/-. 3in. dial, 1,500 volts, D.C. Moving Coil panel, 35/-. Testing Sets, Elliott, etc., E. 108, 4 ranges amps and volts, 45/-. A.C. Hot Wire, ½ amp., 5/-. 6 and 110 volts, 5/9. Cell testers, pocket, 15/-; with spikes, 30/-. Bridges, 10,000-ohm 4-dial Wheatstone, with Galvo, £10. G.P.O. type, £7 10s. Mirror Galvos Reflecting Beam, by Paul Gambrell, Sullivan and Tinsley, £3 to £10. Standard Res. Boxes and Univer. Shunts, 35/-. Electrostatic Voltmeters to 2,800 volts, £2. First grade Moving Coil Meter movements for 5/-. In portable wood case, 7/6, or complete Portable Meters, 12/-, for home test sets. Record Cirscale, 25/-. Weston Moving Coil Panel Meters, 30 m/a, 17/6. 120 lb. Gauges, 2/6. Watch Movements, 1/6.

Lesdix Chargers. A.C.—D.C.

We have 25 models to offer, from 35/-, and build special types to special requirements. Three popular sizes are the AC109A. for 36 cells. The AC106 for 108 cells. and the Lesdix Super Six for 200 cells.

Charger List "W" Free.

ELECTRADIX RADIOS,
218 UPPER THAMES STREET, E.C.4
Telephone: City 0191.

Write for Illustrated Catalogue of

RADIO-GRAMOPHONE CABINETS

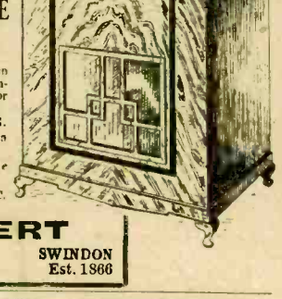
of exclusive modern design made by craftsmen, in highly figured Oak, Walnut or Mahogany, post free.

REMARKABLE VALUES.

Cabinets made to order a speciality.

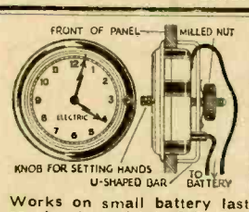
Maker, under licence, of the **HOWE BOX BAFFLE.**

Recommended by the B.B.C. Full details on request.



GILBERT

Cabinet Maker Estimates Free. SWINDON Est. 1866



FIT THIS ELECTRIC CLOCK TO YOUR SET!

NO MAINS NEEDED! KEEPS CORRECT TIME! NO WINDING!

Works on small battery lasting 12 months, or can be plugged into G.B. Battery without affecting reception. Uses practically no current. Fits into hole 3⅛" dia. in any panel up to ¼" thick. Easy to fix—no screws required. Only ¼" from front of panel to back of case. Swiss movement. Hands set from front. Nickel plated bezel. Useful addition to any set.

12/6 COMPLETE WITH BATTERY

POSTAGE 6D

RIVERSIDE MFG. CO., LTD.,
Dept. 20, Crisp Rd., Hammersmith W.6
Telephone: Riverside 6392

CATALOGUE 1933-34 NOW READY FOR THE TRADER.

Perseus supplies all makes KITS OR PART KITS,

or any components, valves or Speakers, at best discount. LATEST WIRELESS WORLD & OTHER JOURNAL KITS. First in delivery. Latest information. 120 pp. illustrated catalogue 6d. stamps. *Personal attention of the proprietor.*

PERSEUS RADIO, W.W. Burton-on-Trent.

Components, etc., for Sale.—Contd.

BIRMINGHAM RADIOMART.—Radiophone, 27/6; straight 3-gangs, duct cover and trimmers, 12/6.

RADIOMART.—Utility 25/- 2-gangs, with concentric knob trimming wavelength disc dial; 7/6.

RADIOMART.—T.C.C. electrolytic bias condensers, boxed, 50 mfd. 12v. or 6 mfd. 50v.; 7½d.

RADIOMART.—Milliammeters, all readings above 20 m.a., 5/9; super 3in. model, 6/9.

RADIOMART.—T.C.C. 4×4 mfd., 375v. working, 3/9; 2¼×2¼ mfd., 500v. working, 2/9; 4×4×1 mfd., 500v. test, 3/3.

RADIOMART.—440v. electrolytics, T.C.C., 8 mfd., aqueous, 3/11; Hellesen ditto, 3/3; Hellesen 8×4 mfd., dry, 3/3.

RADIOMART.—Wearite transformers, 300/300, 250/250, H.T.8, H.T.9, all with 4×4 A.C.T., 4v. 2½ A.C.T., 10/6; Metvick 250/250, 4v. 2.4v. 5. 12/6; no stripped models.

RADIOMART.—1-watt resistances, wire ends, Erie, most values, 8d.; one dozen, your selection, 6/9; H.M.V., Philips, etc., 6d.; one dozen, your selection, 5/6; our selection, all different, 3/-; Metvick 25,000, 100,000, 2 meg., three for 6d.; Ohmite ¼ meg., 6d.

RADIOMART.—Lotus super chassis mount, screened coils aerial, 2nd band-pass, tuned H.F., with reaction; 2/- each, set of three 5/-.

RADIOMART.—Lotus super jack plugs, 9d.; 6ft. Lewcos twin screened pick-up cable, 9d.; ditto single, 6d.; 5-way heavy cable, 6d. yard length.

RADIOMART.—Non-inductive tubulars, 0.1 T.C.C., 375 working, 0.2 or 0.01 mfd., 1,500v. test, 6d. each.

RADIOMART.—Lotus push-pull 3-1 intervalve transformers, manufacturing type, no bakelite case; 2/-.

RADIOMART.—Postage on less than 6/- 6d. extra, otherwise free; new and revised list, now ready, for stamp.—19, John Bright St., Birmingham. [4134

GILBERT INDUSTRIES Parcels and Components.—"A," "B" and "D" parcels still available by return (see issue October 6th).

OUR Famous 30 m.a. 180v. A.C. Eliminator Kit, complete in every detail, has now been redesigned with a still smarter case and heavier rectifier; price remains at 30/-, post paid, while supplies last.

GILBERT INDUSTRIES, Ltd., 519, London Rd., Westcliff, Essex. 'Phone: Southend 492071. "Come and see us Sunday morning. [0402

SURPLUS Components of All Descriptions for Disposal; bargain prices; callers only.—Newport Surplus Stores, 24a, Newport Court, W.C.2. [4148

NICORE 1 Transformer, 8/6; 11, 6/-, new; Baird Televisor, perfect, £6; several other components.—Tait, 186, Bluebell Hill, Nottingham. [4122

ANY Radio Receiver, kit or gramophone part supplied; cash or terms; illustrated catalogue free.—W. D. Burt, 185, High St., Deptford, S.E.8. [4114

CINEMATOGRAPH Projectors, optical lanterns, films, slides, projection bulbs, lenses, spotlights; your inspection invited of big selection of bargains too numerous to list.

ILLUSTRA ENTERPRISES, 159, Wardour St. (facing Film House), London, W.1. 'Phone: Gerrard 6889. [3750

RESISTANCE Boxes, four dial, rotary switch type, 5,110 w., R. W. Paul, 65/-, postage 1/-; voltmeter panel, M.C. 3v. 7/6, postage 6d.—Beatons, Chalk Farm Rd., N.W. [4123

SPECIAL Christmas Bargains: Twin-gang tuning units for broadcast wavebands, with special position for Fecamp, list price 12/6, our price 6/6; also 0.0005 J.B. S.M. variable condensers, list price 8/6, our price 3/9; 1/- blue prints free!—N.R.S., Ltd., 15, Alfred Place, London, W.C.1. [4103

MODERN RADIO present the following amazing bargains in new, bankrupt stock, and manufacturers' surplus; we have hundreds of absolutely satisfied customers; can we add your name to our lists?; we are noted for square dealing, and always endeavour to give complete satisfaction.

GENUINE Fay Microphones, boxed, new, complete with stand, battery and transformer; microphone mounted in frame on three-point spring suspension; buy one now and introduce lots of fun at your Christmas party; post free, 15/- each.

FAY Acoustic Model Home Recorders, complete with special sapphire cutting needle, tracking arm and soundbox, with speech horn; record your home talent right now, 5/3 each, new, boxed and post free; records for above, 6in., double-sided, 2/3 per dozen, 8in. double-sided 4/6 per dozen.

IF You Want the Real Heart of a Microphone buy one of our super-sensitive microphone buttons, and make any amount of experiments; they can be used with or without a transformer, and can either be used with a diaphragm, or screwed to any article in the room in order to pick up the sound waves; all in perfect order and guaranteed, 1/6 each.

PHILLIPS' Mains Transformers, input 100-200v., output 250-0-250 60 ma., 4v. 3amp. C.T., 4v. 1amp., 5/-; 210v. input, output 200-0-200v. 30 ma., 4v. 3amp. C.T., 4v. 1amp. with screened primary, 5/6; 210v. input, output 200-0-200v. 30ma. 4v. 3amp., 4v. 1amp. 5/-; 210v. input, output 330-0-330 v. 60ma., 4v. 4amp, 4v. 2amp., 6/-.

A LARGE Selection of 100v. Transformers for Disposal at 1/6 each; stampings alone worth treble.

SUPERIOR Model A.C. Meter in Bakelite Case, reading 5.5 and 275 v., new and boxed, 12/6 each; H.T.8 rectifiers, 10/6 each, manufacturer's type.

PHILLIPS' Block Condensers, 300v., working, all in perfect condition, 4×3×1.5×0.5×0.5×0.2, 2/6 each; we cannot offer again.

PHILLIPS' 1 watt Resistances, 2,000, 8,000, 10,000, 16,000, 20,000, 64,000, 80,000, 100,000 ohms, all new and perfect, 4d. each, 3/- per dozen; special price for quantity.

DUBILIER Block Condensers, 500v. test, 2×2×1×1×1, 3/- each.

SMOOTHING Chokes, ex-H.M.V., 640 ohm, 30ma., 20 hen, 2/6 each.

KOLSTER BRANDE'S Speakers, in solid oak cabinet, and very sensitive movement, incorporated, all new and boxed, model 287, 12/6 each.

(This advertisement continued on next page.)

Components, etc., for Sale.—Contd.

(This advertisement continued from previous page.)

CENTRALAB Twin Volume Controls, 10,000 and 100,000 ohms, 2/- each; listed at 10/6.

PHILLIPS' 6,000 ohm Volume Controls, with switch, 3/- each; special smoothing choke, as used in Phillips' receivers, about 300 ohms, 20/30 hen, 25 milliamps, nickel iron core and special impregnated winding, 2/- each.

MARCONI Model 34 Short Wave Sets, in sloping mahog. any cabinet, detector, L.F. and power type of circuit, fitted with ultra-slow motion condensers, with two coils to cover 16-52 metres, 27/6.

ALL Above Goods Post Free Except I.F.S.; we endeavour to send by return; for quick delivery send cash with order.

MODERN RADIO, 25, York Terrace, Clapham, S.W.4. Callers only to Modern Radio, 37, Lisle St., Leicester Square. [4138

BURNS' Bargains.—British WEGO condensers, 0.01 mf., 2,000v. D.C., 1/-; 1 mf., 1,650v. D.C., 2/-; ditto, 2,000v. D.C., 2/6; 2 mf., 2,000v. D.C., 4/-; 4 mf., 2,000v. D.C., 6/6; also 4 mf., 1,650v. D.C., 5/-; Dubilier 1 mf., L.S.C., 1,600v. D.C., 3/-; 4 mf., L.S.C., 1,600 test, 5/6; 4 mf. L.S.B., 800v. D.C., 4/-; 4 mf., L.S.G., 2,500v. D.C., 10/-; 10 mf., B.C., 500v. D.C., 4/6.

TRANSFORMERS.—200-250 in 1,000 volts at 0.25 amp. out, 35/-; 200-250 in 2-0-2 at 2-4 amp. out, 6/-; Varley 200-250 in 375-0-375 at 100 mills., 5.5 at 3.3 amp. 7.5 volts at 3.5 amp., 19/6; R.I. Varley 200-250 in 230 at 100 mills. out, for H.T.1, 10/-; Varley output transformer, push-pull, 1 to 1, 25 to 1, 12/6; Marconi D.C. speaker, 240 volts, with extra transformer for P.p., 35/-; Wearite choke, 50 henrys or 30 henrys at 60 mills., 6/6; H.T.10, 12/-; Philco type cabinets, polished 9/-, white 7/6; send us your name, our mailing list of radio bargains.—Note address: W. Burns and Co., 287, City Rd., E.C.2. [4161

STANDARD TELEPHONES and CABLES, Ltd., Radio Dept., Aerodrome Rd., Hendon, N.W.9, have for disposal large surplus stocks of radio receiving and transmitting components of the highest grade at very low prices: condensers, transformers, chokes, insulators, motor generator sets, cartridge fuses, meters and small components of every description; call at the above address or telephone, Colindale 6533 (extension 417), and discuss your requirements with us. Lists will be supplied upon application. [4120

NEW Radio Surplus, all post free.—Radiophone 4-gang condensers, straight type, split vanes and trimmers, 8/9; Triotron 8 mf., wet, 2/11; H.M.V. 4×4 mf. condenser blocks, 3/6; 250v. working T.C.C. 0.01 mica, type M, only dozen lots, 4/9; T.C.C. 0.0005 mica, type M, only dozen lots, 2/6; Polar Star Major 3-gang, 14/-; Magnavox D.C.144, with transformer, 2,500 ohms, 16/-; R. and A. type output transformers, 18/23/32-1, 4/9; Pye 20H and 32H chokes, new, 4/9.—Bell, 77, Badminton Rd., London, S.W.12. [3935

EPTON First Again with Xmas Bargains! Just arrived, Watbro A.C. eliminators, 200-250v. input, 25 m.a. output, Westinghouse rectifier, 3 positive tappings, S.G.-Det.-Pen., in handsome gilt metal case, guaranteed (listed £2/12/6), 32/6; D.C. model, 21/-; Bentona P.M. speakers, power/pentode output, cobalt steel magnets, 7in. cone, guaranteed (listed 39/6), 22/6; Wego 16 mfd. condenser banks (6×6×2×2), 500v. test, 5/9; Wego voltage doublers, 14 mfds. (4×4×2×2×2), 5/9.—Epton, 93, New Rd., Chingford, E.4. [4144

CHAL-ELECTRIC Offers: New set makers' surplus, all guaranteed, all goods carr. paid, cash with order, or c.o.d.; owing to the nearness of Xmas cash with order makes a difference in delivery of 4 days; moving coil speakers, Magnavox 1933, Type D.C. 144, 2,000 ohms (110/175 D.C.) or 6,500 ohms (200/250 D.C.), listed 40/- and 42/6 each, at 19/-; type 142, voltages as in 144, 8½in. cones, listed 50/- and 52/6, at 26/- (state if power or pentode transformer); Rola's K. type (U.S.A.) Juniors, 7½in. cones, at 18/-; Seniors, 9in. cones, at 25/-; in following voltages: 2,000 ohms (110-175 D.C.), 2,500 ohms, or 200/250 D.C. (650 ohms); (state if power or pentode transformer); also number of Junior and Senior P.M.s, Duals, and Class "B."

COILS (6 each only).—Colvern Ferrocart, mounted on base with switching, F.1, F.2 and F.3, or G.1, G.2 and G.3, at 32/- per set (200 only); Eston iron cored coils in cans, theoretical circuit enclosed for different circuits, at 5/- each.

PICK-UPS, few only.—B.T.H. Senior, complete with vol. control, at 28/-; Marconiphone, 1933, at 27/-; Harlie, with vol. control, list 27/6, at 15/-.

VARIABLE Condensers, all complete in sealed cartons, with covers, trimmers, light, moving scale drive, knob, escutcheon, light, etc.: J.B. Nu Gang (3-gang), at 17/-; Nu Gang (2-gang), 9/6; Polar Star, 1933, 3-star ordinary, 18/-; 1933 Star super het. (3), 18/-; Star Minors, 3-gang (Ordinary), at 16/-; 3-gang super het. at 16/-; 2-gang, 10/-.

SMOOTHING Condensers.—C.E.C., Murphy, etc., 800 test, 250 A.C., working, 1 mfd., 1/1; 2 mfd., 1/9; 4 mfd., 2/6; (all the following 1,500 test, 500 A.C. working) 1 mfd., 1/9; 2 mfd., 2/4; 4 mfd., 4/-; multiple banks, 500 A.C., working separate tappings, 20 mfd., 2+2+2+2+2+2+2+2+1+1 mfd., at 11/-; 11 mfd., 4+2+2+2+1+1 mfd., at 6/9; 5 mfd., 2+2+1 mfd., at 4/6.—Chal-Electric, No. 6 Conduit St., London, W.1. Regent 6240. [4154

CLASS "B" COMPONENTS.

SOUND SALES, Ltd., for Class "B" Components. List "B.B." on request.—Tremlett Grove, Highgate, N.19. [0401

MISCELLANEOUS.

MEASUREMENTS Made for Amateurs; instruments and advanced technical books loaned.—BM/ZLME, W.C.1. [4139

RELAY or Wired Wireless.—Those interested in this industry should take the "Radio Relay Review"; specimen copy post free from the publishers.—"Radio Relay Review," Smithygate, Padiham, Lancs. [4098

WIRELESS Notes.—A unique news and information service, now starting its sixth year; useful to thousands, you can't afford to be without it; postcard for full particulars, to Robinson, "Langmead," Pirbright, Woking. [4063

EASY Payments.—We supply, by easy payments, components, accessories, and sets, any make; 10% down, balance spread over 11 months.—Send list of requirements to London Radio Supply Co., 11, Oat Lane, London, E.C.2. [0337

Miscellaneous.—Contd.

ENGINEERS and Technical Workers of All Kinds.—A proper training by post in your spare time will take you through your right examination, the employment is waiting. Our advice on all careers free.—Dept. 92, The Bennett College, Ltd., Sheffield. [0395

AMBITIOUS Men.—Qualify for a well-paid post by studying at home with The T.I.G.B. Write to-day for "The Engineer's Guide to Success," 144 pages, free, which contains the widest selection of engineering and wireless courses in the world, and shows you how to become A.M.I.E.E., A.M.I.Mech.E., A.Rad.A., etc. State branch, post or qualification that interests you.—The Technological Institute of Great Britain, 82, Temple Bar House, London, E.C.4. (Founded 1917. 19,000 successes.) [4107

LABORATORY CALIBRATION.

CALIBRATION of Apparatus at Modified Rates to Amateurs is now conducted by a special section of Paul D. Tyer's laboratory; applications by letter only to: 28, Victoria St., London, S.W.1. [0406

PATENT AGENTS.

A. MATHISEN, B.Sc., Patent Agent and Consulting Electrical Engineer, First Avenue House, High Holborn, London, W.C.1. Holborn 8950. [3496

PATENTS and Trade Marks, British and Foreign.—Gee and Co. (H. T. P. Gee, Member R.S.G.B. and A.M.I.R.E.), 51-52, Chancery Lane, London, W.C.2. 'Phone: Holborn 1525. [0001

REPAIRS.

SERVICING to Any Set, British or American; highest workmanship only.

SPECIALIST in the Manufacture of Amplifying Equipment of any output, also mains, superheterodyne receivers.

L. EASTWOOD, Radio Manufacturers Consultant, late of His Master's Voice and Marconi's Wireless Telegraph Co. 'Phone: Clerkenwell 7693. Address: 70, Pitfield St., Great Eastern St., N.1. [0404

MAINS Transformers Rewound; prompt service, satisfaction guaranteed; prices on request.—The Sturdy Electric Co., Wesley Terrace, Dipton, Newcastle-on-Tyne. [4097

METROPOLITAN RADIO SERVICE Co. Specialise in Repairs to British and American radios; transformers rewound; guaranteed workmanship.—102r, Finchley Rd., Golders Green. Speedwell 3000. [3992

REWINDS of All Descriptions; mains transformers, chokes rewound or converted, any specification; m/cs., inductors quoted; pick-ups, 3/-; L.F. transformers, 3/-; loudspeakers, 3/-; twelve months' guarantee; 24 hours delivery.—Graham's, 208, High St., Tooting, London. [4085

GUARANTEED Repairs by Experts, specialists for repairs to S. G. Brown and Amplion radio apparatus, also loud speakers, headphones, pick-ups. Blue Spots, any type rewound, remagnetised and adjusted. 4/-; post free; mains transformer repairs; terms to trade. Howell, 91, Morley Hill, Enfield, Middlesex. [9716

REPAIRS, Northern Area.—High grade workmanship, sets built to specification, specialists in the building and servicing of "Wireless World" sets, quick service a feature; public address equipments for hire.—Thornber-Richardson, 3, Dean Av., Old Trafford, Manchester. Telephone: Chorlton 3849 and Woodley 2481. [0405

REPAIRS to Loud-speakers, transformers and headphones 4/-. Blue Spots or Wufas, 5/-, post free; moving coils a speciality, new cones fitted; ellminators and mains transformers quoted for; prompt service; satisfaction guaranteed; discount to trade.—Loud Speaker Repair Works, 5, Balham Grove, London. Battersea 1321. [0394

TUITION.

QUALIFIED Radio Engineers are Always in Demand, and our Home Study Course will enable you to qualify for a good post; many students already placed this season; prospectus free.—Northern Counties Wireless School, Preston. [0399

YOUNG Men Trained for all Branches of the Wireless Profession in Britain's Leading College; training fee can be paid after appointment secured; students accepted as boarders; London representative available for interviews. Prospectus free.—The Wireless College, Colwyn Bay. [0388

ELECTRIC CLOCKS.

MAINS Synchronous Clock Movements, any voltage, 50 cycles, 3½in. diameter, without hands or dials; 12/6; postage 6d.—Lincoln Electric Clock Co., 162, Burnt Ash Hill, S.E.12. [4133

SPECIAL Offer.—Superior A.C. mains electric clock movements, rotor only 127 revs., drive up to 10-inch hands; 16/6, post 6d.—Write details, Ebury Bridge Radio Co., 33, Ebury Bridge Rd. Sloane 8407. [4137

EXCHANGE.

TRICKLE Charger, Exide combined H.T., L.T., perfect; exchange Radiopack.—Topham, 63, Town Moor Av., Doncaster. [4111

EXCHANGE Your Old Set or Components for New, best allowance.—Radio Exchanges, 114, Ramuz Drive, Westcliff-on-Sea. [4062

DEAL With the Firm that Gives You the Highest Possible Allowance in Exchange; sets or components; prompt attention and deliveries.—Mildmay Radio Exchange. 'Phone: Clissold 5001. 24, Mildmay Grove, London N.1. [3658

RYALL'S RADIO, 33, Chancery Lane, London, will accept modern parts and sets in part payment for brand new; we also purchase approved parts for cash; quotations given by post only, provided stamped addressed enclosed. [4113

Exchange.—Contd.

HIGH Allowances Made on Second-hand Goods in Part Payment for New Sets or Components; easy payments available; we have tremendous stocks tested second-hand goods, send list of your requirements for quotation.—Bostock and Stonnill, 1, Westbourne Terrace, S.E.23. [4132

WANTED.

WANTED, all types of new surplus radio goods.—Ward, 12, Tredegar Rd., Bow, E.3. Advance 3668. [4160

MODERN Set, less speaker, giving 2½ watts upwards; good quality; H.P.—Box 8751, c/o *The Wireless World*. [4104

GOOD Senior or Pair Matched Permanent Magnet Speakers, Pen.220A.—Wilson Elkington, Haverhill, Suffolk. [4125

SPOT Cash for Components, sets, etc.; any quantity.—Economic Radio Co., 96-98, South Lambeth Rd., S.W.8. [4075

INSTRUCTION Books for Best Known Commercial Receivers past four years.—Box 8771, c/o *The Wireless World*. [4151

SHORT Wave Experimenter Requires Quantity of Short Wave Condensers, coils, etc., cheap.—Box 8773, c/o *The Wireless World*. [4152

WANTED, good modern second-hand wireless parts, sets, meters, eliminators, speakers; we pay higher prices than any other dealer; bring or send, spot cash. Open 9-8.—University Radio, 142, Drummond St., Euston, N.W.1. [4031

HIGH-CLASS Radio Parts and Sets Wanted for cash, new or second-hand, any quantity; send yours stating reasonable price; cash by return; retailers stocks purchased.—Mildmay Radio Exchange, 24, Mildmay Grove, London, N.1. 'Phone: Clissold 5001. [3453

SITUATIONS VACANT.

YOUNG Man, knowledge of amplifiers; small investment.—Box 8770, c/o *The Wireless World*. [4149

SITUATIONS WANTED.

SITUATION Required, 3 years broadcasting, 4 years sound engineer.—Box 8761, c/o *The Wireless World*. [4109

BUSINESSES AND PROPERTY FOR SALE, TO BE LET, OR WANTED.

FOR Sale.—Progressive wireless relay service, or shares. Box 8765, c/o *The Wireless World*. [4119

FOR Sale, radio and electrical, well known and established business; agents for all principal radio and gramophone firms; main road Islington.; ill-health cause of sale.—Box 8772, c/o *The Wireless World*. [4153

BOOKS, INSTRUCTION, ETC.

"THE Wireless World" Diary for 1934 contains, in addition to the usual diary section, 78 pages of facts, figures, and explanations, including circuit diagrams of complete receivers and details of receivers, size 4½×3½in., bound leather cloth; price 1/6 net, by post 1/7 from the Publishers, Iliffe and Sons Ltd., Dorset House, Stamford St., London, S.E.1. [0403

INDEX TO ADVERTISEMENTS.

Printed for the Publishers, ILIFFE & SONS LTD., Dorset House, Stamford Street, London, S.E.1, by The Cornwall Press Ltd., Paris Garden, Stamford Street, London, S.E.1.

Colonial and Foreign Agents:
UNITED STATES—The International News Co., 131, Varick Street, New York. FRANCE—W. H. Smith & Son, 248, Rue Rivoli, Paris; Hachette et Cie., Rue Réaumur, Paris. BELGIUM—W. H. Smith and Son, 71-75, Boulevard Adolphe Max, Brussels. INDIA—A. H. Wheeler & Co., Bombay, Allahabad and Calcutta. SOUTH AFRICA—Central News Agency, Ltd. AUSTRALIA—Gordon & Gotch, Ltd., Melbourne (Victoria), Sydney (N.S.W.), Brisbane (Queensland), Adelaide (S.A.), Perth (W.A.), and Launceston (Tasmania). CANADA—The American News Co., Ltd., Toronto, Winnipeg, Vancouver, Montreal. Ottawa, St. John, Halifax, Hamilton; Gordon & Gotch, Ltd., Toronto; Imperial News Co., Toronto, Montreal, Winnipeg, Vancouver, Victoria. NEW ZEALAND—Gordon & Gotch, Ltd., Wellington, Auckland, Christchurch and Dunedin.

PURVEYORS OF ELECTRIC LAMPS BY APPOINTMENT

EDISWAN

MANUFACTURERS & PURVEYORS OF ELECTRIC LAMPS BY APPOINTMENT

Now here is something to SHOUT ABOUT!

● We have now produced a valve having the highest sensitivity of any Pentode Output Valve. What does this mean?

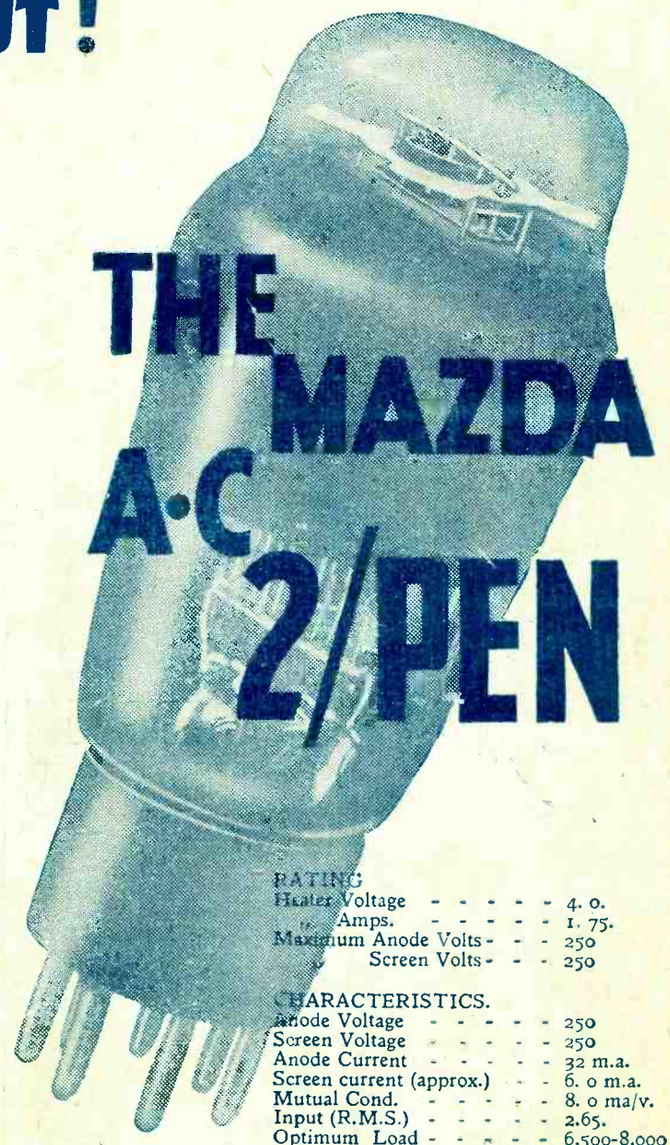
It means that it will operate a moving coil speaker with plenty of volume from a pick-up *without an intermediate amplifying stage.

The input swing required for ample output is only 2.6 volts R.M.S. The high power sensitivity opens up a new field for receiver design, and enables a receiver to be constructed embodying diode A.V.C. in which the diode is directly coupled to the output stage. As the anode load is relatively low, the output transformer need not have a very high primary inductance with a consequent reduction in cost. (A condenser resistance filter should be used to prevent the anode load increasing with frequency). We recommend that a self-bias circuit only should be employed with this valve and the grid leak with such self-biasing should not exceed ½ megohm.

*By a pick-up we mean, of course, the *B.T-H Pick-up* which is in universal use.

Your dealer has these valves in stock and can give you further details, or you can write to the Valve Service Department who will be pleased to send you full information and circuit diagrams.

Price 18/6. Standard 7 Pin Base.



THE MAZDA A·C 2/PEN

RATING	
Heater Voltage	4. 0.
Amps.	1. 75.
Maximum Anode Volts	250
Screen Volts	250

CHARACTERISTICS.	
Anode Voltage	250
Screen Voltage	250
Anode Current	32 m.a.
Screen current (approx.)	6. 0 m.a.
Mutual Cond.	8. 0 ma/v.
Input (R.M.S.)	2.65.
Optimum Load	6,500-8,000
Auto Bias Resist.	140 ohms.

SOME TAKE CHANCES... OTHERS BUY

MAZDA

THE SAFETY VALVE

Mazda Radio Valves are manufactured in Great Britain for the British Thomson-Houston Co., Ltd., London and Rugby.

THE EDISON SWAN ELECTRIC CO. LTD. 155, CHARING CROSS ROAD, W.C.2.

(16T)